



**CANADIAN
GEOSCIENCE
COUNCIL**

**THE GEOSCIENCES
IN CANADA, 1984**

ANNUAL REPORT

Prepared by
The Canadian Geoscience Council

Published for the Council by the
Geological Survey of Canada as
Paper 85-6

Edited by J.P. Greenhouse

P. G. KILLEN
GEOPHYSICS



Energy, Mines and
Resources Canada

Énergie, Mines et
Ressources Canada

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**GEOLOGICAL SURVEY OF CANADA
PAPER 85-6**

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Available in Canada through

authorized bookstore agents and other bookstores

or by mail from

Canadian Government Publishing Centre
Supply and Services Canada
Ottawa, Canada K1A 0S9

and from

Geological Survey of Canada offices:

601 Booth Street
Ottawa, Canada K1A 0E8

3303-33rd Street N.W.,
Calgary, Alberta T2L 2A7

100 West Pender Street
Vancouver, British Columbia V6B 1R8
(mainly B.C. and Yukon)

A deposit copy of this publication is also available
for reference in public libraries across Canada

Cat. No. M44-85/6 Canada: \$4.75
ISBN 0-660-53124-0 Other countries: \$5.70

Price subject to change without notice

CONTENTS

1	Report of the President
5	Report of Foreign Secretary
10	Report of the Secretary Treasurer
13	Reports of the Member Societies
13	Canadian Association of Geographers
13	Canadian Geophysical Union
13	Canadian Quaternary Association
13	Canadian Society of Exploration Geophysicists
14	Canadian Society of Petroleum Geologists
16	Canadian Society of Soil Science
16	Canadian Well Logging Association
17	Geological Association of Canada
18	Mineralogical Association of Canada
19	Reports of the Associate Members and Report Committees
19	Geological Survey of Canada
21	Quaternary Geoscience in Canada: Progress Report – 1984
23	Report on Enrolment Statistics in Earth Sciences

Tables

iv	1. Organization chart
10	2. Approved budget, 1985
11	3. Consolidated balance sheet, 1984
12	4. Statement of income and expenses, 1984
25	5. Student and staff numbers, 1980-85
26	6. Graduate student enrolment by program, gender and region, 1984-85
27	7. Graduate student enrolment by subdiscipline, 1984-85
28	8. Number of graduate students ranked by subdiscipline, 1984-85

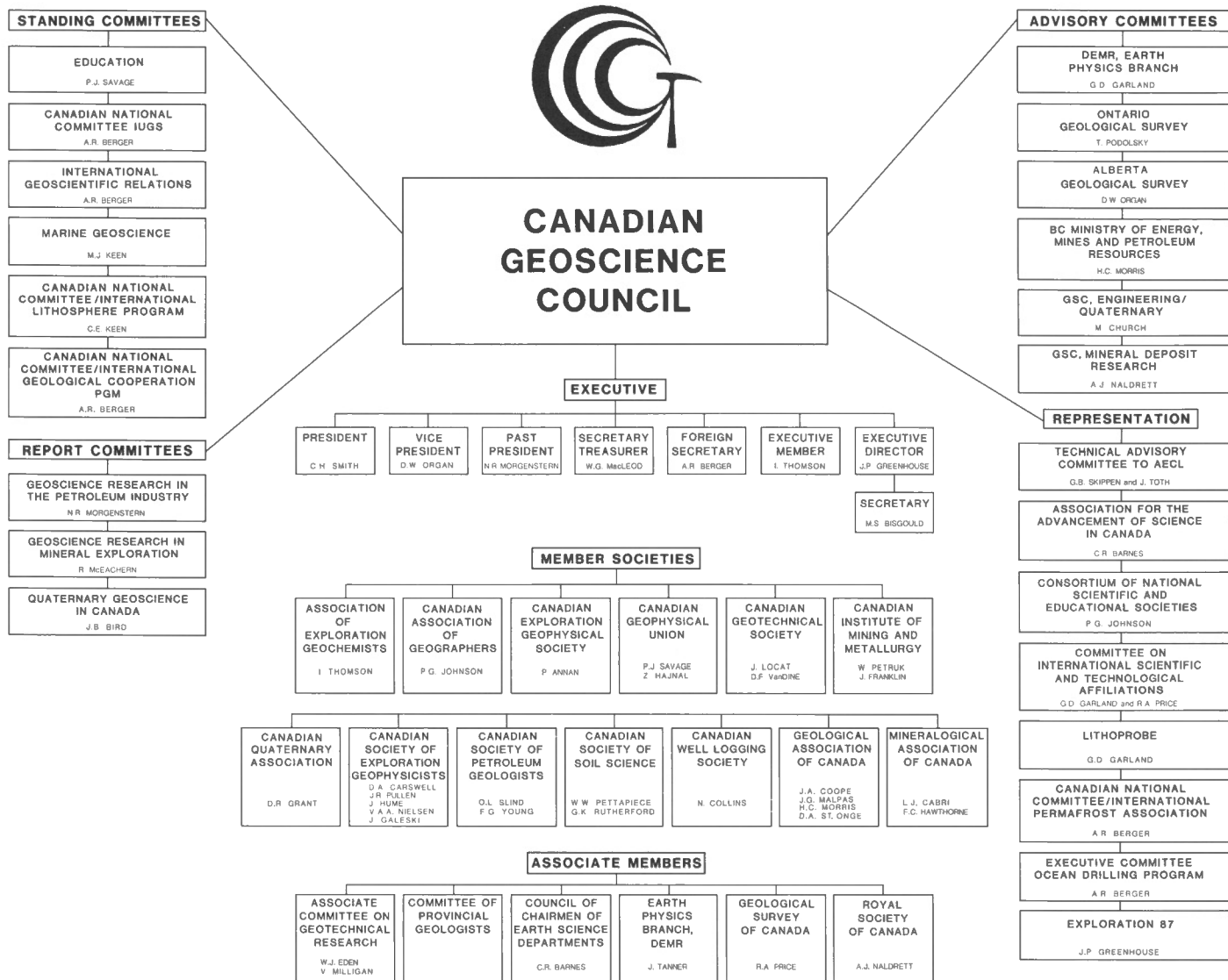
Plate

3	1. Canadian Geoscience Council Executive, 1984
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Figures

22	1. Undergraduate and graduate enrolments, 1973-74 to 1984-85
22	2. Number of faculty, staff and research fellows, 1973-74 to 1984-85

Table 1. Organization chart of the Canadian Geoscience Council, 1984



REPORT OF THE PRESIDENT

Introduction

The organization diagram of the Canadian Geoscience Council (Table 1) shows how its activities involve a large number of Canadian geoscience groups, and a number of international non-governmental organizations as well. In this way the Council serves as a forum for its member societies, whose individual memberships total approximately 15 000 scientists, engineers and technologists. The Council's objectives include the provision of advice to governments on science policy and its implementation with respect to the earth sciences; the promotion of science education; and the conduct and publication of reviews and assessments of Canadian geoscience activities – their health and the effectiveness of organizations involved in them.

Canada has an enormous potential. Our resources have been the basis for establishing our high standard of living. In this, the geosciences have played an important role. They have the potential to do more in the future.

However, this year has been a difficult one, as the economic recession has continued and the unemployment rate has failed to improve. There has been a hiatus from a national election, followed by concerns over the federal deficit and the need to reduce government programs. Given this environment, it is pleasing to note that major strides were made in Canada in developing and implementing major programs in crustal studies (Lithoprobe), ocean studies (Ocean Drilling Program) and the geology of the offshore and northern areas (Frontier Geoscience Program). The geoscientists and administrators involved are to be commended.

The Canadian Geoscience Council in 1984

The Council has developed a large program of studies, advice, assistance and intervention. The various activities are pursued by a large number of individuals and groups on a volunteer basis. To review, monitor and coordinate these activities, the Council met in London in May 1984 during the GAC/MAC Joint Annual Meeting, in September in Calgary, and in Ottawa in November for the Annual Meeting and the joint meeting with representatives of the Department of Energy, Mines and Resources. Some of this work is described below.

Publications

In addition to the Annual Report on The Geosciences in Canada, published by the Geological Survey of Canada, the Report of the Advisory Committee to the Alberta Geological Survey was published. Copies are available from Council headquarters.

Reports were completed by the Advisory Committee to the Ontario Geological Survey, the Advisory Committee to the Earth Physics Branch, and the Advisory Committee to the Geological Survey on Mineral Deposits Research. They will be published in 1985.

Work is continuing on revision and updating of the booklet on "Careers in Geoscience", designed to give students an opportunity to find out more about the career options open to them in the geosciences.

Major Studies

Activity continued on the Council's three major studies.

1. The study group on Geoscience Research in Mineral Exploration, chaired by R.G. McEachern, completed its questionnaire surveys. The response from industry was poor and many were pessimistic, reflecting the mood in the industry. The surveys of governments and universities were more successful. Progress on this study during the year has been slow.
2. The study of Geoscience Research and Development in the Petroleum Industry is being conducted by a consultant, Dan Jardine. Matching funding is provided by the Canadian Petroleum Association and EMR. Interviews have been conducted with industry and an extensive questionnaire has been developed and circulated. The study is scheduled for completion in 1985.
3. The study of Quaternary Geoscience in Canada is a longer term study, directed by Dr. Brian Bird. Its questionnaire surveys were completed, with comprehensive replies from government and universities but a weaker response from the private sector. Committee members have been assigned sections for preparing the first draft of the final report. It is scheduled for publication in 1986, in time for the INQUA meeting in Canada in 1987.

Advisory Committees

The Council has developed a unique service to federal and provincial organizations by establishing Advisory Committees to examine and comment on their earth science programs.

The Committees provide an independent peer review. Their memberships are established by the Council in consultation with Member Societies and the client organization. The committees receive their terms of reference, funding and timetable from the organization. The Council reviews progress at its regular meetings. While the decision to publish rests with the client, the Council urges that all appropriate parts of the reports be made public.

During 1984, there were five advisory committees in operation. They were:

- i) Advisory Committee to the Alberta Geological Survey
Chairman: N. Rutter
Status: Report completed and published.
- ii) Advisory Committee to the Ontario Geological Survey
Chairman: T. Podolsky
Status: Report in draft form.
- iii) Advisory Committee to Earth Physics Branch, EMR
Chairman: G. Garland
Status: Report in draft form.
- iv) Advisory Committee to the Geological Survey of Canada on Mineral Deposits Research
Chairman: T. Naldrett
Status: Report completed and under review.
- v) Advisory Committee to the Geological Survey of Canada on Engineering Geology and Quaternary Studies
Chairman: M. Church
Status: Study underway.

The Council also provided two members to the Technical Advisory Committee of the Atomic Energy of Canada Limited. The memberships of G. Skippen and J. Toth were renewed during the year.

National Geoscience Programs

Two geoscience programs of national importance received considerable attention during the year. Both involve participation from all sectors – government, industry and universities – and both face the constraints of government cutbacks in funding. The Council played an aggressive role in promoting the programs to the sponsoring agencies and their ministers.

LITHOPROBE is a major coordinated study of the earth's crust and uppermost mantle beneath Canada and the adjacent shelves. Phase I was conducted in 1984 with joint funding from EMR and NSERC, and the seismic results from Vancouver Island and Kapuskasing exceeded expectations. The full extent of funding for Phase II is uncertain due to the change of government and a freeze in funding.

The OCEAN DRILLING PROGRAM (ODP) is a co-operative effort by scientists and governments from around the world who have joined together to investigate the structure and history of ocean basins. The strong leadership shown by officials in EMR resulted in a Canadian announcement to join ODP in December. Canadian participation in ODP is coordinated by EMR and the Council. Funding is provided by EMR and NSERC. The Council will be expected to assume increasing responsibilities in 1985, as the Canadian program in support of this international study is developed in more detail.

EdGEO

The EdGEO program, led by Peter Savage, held geoscience educational workshops for teachers in Edmonton, Calgary, Brandon and Star Lake, Manitoba. These activities were jointly funded by the Council and the Manitoba Department of Education. Plans were developed for workshops in 1985 in Edmonton, Star Lake, Toronto, Sault Ste. Marie and the Maritimes.

International Affairs

The Council's activities in international affairs are actively coordinated by its Foreign Secretary, A.R. Berger, and are described in his separate report. It is a major job to keep on top of the myriad international geoscience organizations, and he has done so with a great deal of energy and zeal. This year his responsibilities were much greater, in chairing the Canadian National Committee for the IUGS and coordinating the Canadian participation at the International Geological Congress in Moscow. He completed his duties this year, and we are most grateful for his leadership. Dr. Brian Norford has been appointed as the new Foreign Secretary, and we look forward to his support.

Accreditation and Registration of Geologists and Geophysicists in Canada

There is a strong trend in government regulation toward the registration of geologists in Canada and the United States. The province of Alberta has taken the lead in this regard in Canada. The Canadian Society of Petroleum Geologists has recommended a nationwide accreditation system in order that (a) students are aware of their future professional status and (b) the mobility of geologists is not complicated by differing requirements in each province.

Member societies considered the Council to be the most appropriate body to sponsor the accreditation program. In September they asked the Council to undertake the task of establishing methods and procedures for accreditation of the educational qualifications of graduates of geology programs across Canada. A committee was established under the chairmanship of John Maher and the proposed terms of reference for a Canadian Geological Accreditation Board were drafted.

Administration

The year was marked by a major change in the administration of the Council. In addition to the normal annual change of officers, three longstanding members of the Executive Committee retired from office. I have already referred to the Foreign Secretary.

John Greenhouse resigned as Executive Director due to an upcoming sabbatical and the pressure of other duties. He has carried a substantial burden and has served the Council with distinction over the past four years. He was supported by staff and the administration of the University of Waterloo, where the Council's headquarters have been located for the past eleven years. We sincerely appreciate the major contributions that he has made to the effectiveness of the Council and its presidents.

It is intended that headquarters be rotated at approximately five year intervals. The Council is anxious to maintain excellent working relationships with all Earth Science Departments in Canada.

Following a review of several nominations, the Council voted to approve a nomination of the University of Alberta in Edmonton as the new headquarters of the Council. A change to a western location for this term is in keeping with the desire of the Council to maintain a nationwide identity. Dr. Brian D.E. Chatterton of the University of Alberta has been named Executive Director of the Council, and we welcome him enthusiastically.

Bill MacLeod completed his third term as Secretary Treasurer of the Council, a task he carried out with precision and persistence. He gave freely of his time and we have greatly appreciated his contribution. D.F. VanDine has accepted the responsibilities of this office.



PLATE 1

The Executive of the Canadian Geoscience Council, 1984.

Standing, left to right: W. MacLeod, Secretary-Treasurer; I. Thomson, Executive Member; A. Berger, Foreign Secretary; J. Greenhouse, Executive-Director. Seated, left to right: D. Organ, Vice President; C. Smith, President.

Incorporation

With increasing responsibilities for the contracting of studies, receipt of funds, and sponsorship of meetings, the Executive Committee decided to incorporate the Council, a practice recently followed by the Geological Association of Canada and several other member societies.

Incorporation involves some changes in the By-Laws to reflect the format and criteria required under the Canada Corporation Act. It will insert both a discipline and a rigidity in the operating procedures, and it will also require a redefinition of the duties of some officers, principally those of the Executive Director and the Secretary-Treasurer. A lawyer was retained to draft the required documents and the process will be completed in 1985.

Commentary

I complete my duties as President of the Council with a much fuller awareness of the size and scope of the Council's responsibilities and the great dependence of the Council on a large army of volunteers who give of their time and talents to contribute to the geoscience community. Such organizations are short on money, facilities and staff and long on inspiration and enthusiasm.

While the Council has made a number of contributions over the past thirteen years, the magnitude of the issues confronting it on conception has not diminished. I wish they had. But we as geoscientists are part of a much larger political, economic and social community, and our future is continually in the hands of others who control this future. As a national, independent body the Council has gained respect and access to decision-makers. It will be an ongoing requirement to maintain this role forcefully and honourably.

I wish to record my great admiration and respect for the representatives of the member societies who have attended and contributed to our long and complicated meetings, and to the leaders of study groups and advisory committees who have provided the substance for many of our discussions. As I have said previously, I have welcomed the strong support of John Greenhouse as Executive Director, Bill MacLeod as Secretary Treasurer and Tony Berger as Foreign Secretary. In addition, Ian Thomson has been a helpful Member of the Executive.

Dave Organ, as my successor, has already shown that he will be an excellent leader and that he will continue in the footsteps of my predecessors, the 'giants of the past'. I wish him every success and give my continued support.

Charles H. Smith

REPORT OF FOREIGN SECRETARY, 1984

The Foreign Secretary acts as a link between Canadian Geoscience Council and international non-governmental organizations with geoscientific activities involving Canadians. This liaison is achieved through the Standing Committee on International Geoscientific Relations (SCIGR) and the Canadian National Committee for the International Union of Geological Sciences (CNC/IUGS), both chaired by the Foreign Secretary. The SCIGR held its eighth annual meeting at the Geological Survey of Canada, Ottawa, on November 28, 1984, followed on the same day by the third annual meeting of the CNC/IUGS. The reports which follow are based on the minutes of these meetings and incorporate some subsequent developments.

Standing Committee on International Geoscientific Relations

The Standing Committee is an advisory body on foreign geoscience activities outside those of the IUGS and the International Geological Congress (IGC). SCIGR acts as a clearing house for reports to the CGC from international organizations involving Canada, and proposes to the CGC responses to new international initiatives.

The 1984 meeting was attended by representatives of many of the international earth science associations and programs with activities in Canada or involving Canadians. The organizational structure of and the inter-relationships between these organizations are complex, as is to be expected where so many disciplines and activities are represented (see "organograms" on page 10 of 1983 Annual Report, in GSC Paper 84-6, 1985).

The major international geoscience activity in 1984 was the 27th International Geological Congress held in Moscow from August 4 to 14, and the report of the Canadian delegation is given below. Many of the organizations reporting to SCIGR held international symposia or business meetings at the Congress, and Canadians were elected to several key positions, as stated in the following.

Unesco

C.H. Smith (Science Consultant, Canadian Commission for Unesco, Ottawa) recalled that Unesco provides funds for ICSU, IUGS, CGMW, COGEOGDATA, ILP and others. He reviewed the situation leading to the withdrawal of the U.S. from Unesco at the end of 1984. The U.K. had also stated its plan to withdraw at the end of 1985 if substantial changes were not forthcoming. To forestall a similar move by the Canadian Government, the CGC had responded to a call from the CC/Unesco with a letter to External Affairs Minister Joe Clark supporting Canada's continued membership in the organization. This was based on CGC's high rating (1983) for Unesco's geoscience programs.

International Union of Geophysics and Geodesy

I. Halliday (Secretary, CNC/IUGG, Ottawa) reported that G. Needler had been elected CNC Chairman and that all efforts were now focussed on the IUGG General Assembly planned for Vancouver in 1987, under the chairmanship of R.D. Russell (Vancouver). The 1983-84 issue of the Canadian Geophysical Bulletin summarizing geophysical activity in Canada was released in October 1984.

International Geographical Union and Canadian Association of Geographers

P.G. Johnson (CAG representative to CGC, Ottawa) reported that Canada was now playing a major role in IGU affairs with the recent election of L. Kosinski of the Department of Geography, University of Alberta, as Secretary-Treasurer. L.S. Bourne (University of Toronto), M.G. Frougton (University of Western Ontario) and H.M. French (University of Ottawa) were elected Chairmen of three of the 14 IGU Commissions. Canadian affiliation to IGU was now achieved via the NRC-sponsored CNC for Geography. H.M. French would act as liaison between IGU and the 1987 INQUA meeting to be held in Ottawa.

Johnson reported that the 1984 IGU Congress held in Paris had been poorly organized, partly due to a larger attendance than expected. Canadians had contributed 9 per cent of the total number of papers presented. On another topic, there was a discussion within the geomorphological community on the need for an international organization for geomorphology, possibly to be raised in 1985 at the 1st International Conference on Geomorphology (U.K.). Canadian geographers are also involved in many international activities outside IGU, ranging from meteorology and hydrology to coastal zone management in Indonesia and surficial mapping in Kenya.

The 27th International Geological Congress

R.A. Price (Chief Canadian Delegate, GSC, Ottawa) gave a report on the 27th IGC held in Moscow, August 4-14, 1984. There were 85 participants from Canada, the 8th largest contingent among the 5500 delegates from 110 countries. Despite prior assurances that all bona fide scientists would be issued visas, more than 50 applicants from South Africa and Israel were denied permission to

enter, though others from these two countries were admitted. The technical program was plagued by no-shows and impromptu substitutions, and the overall scientific standard was not high. On the more positive side, many special publications were issued, and the field trips were well received. The U.S. invitation to hold the next Congress in Washington in 1989 was accepted, with China and Japan both extending invitations for the following Congress.

International Union of Geological Sciences

Price also reported that the IUGS Council had met thrice during the Congress. W.W. Hutchison (EMR, Ottawa) was elected the new President of IUGS. Other Canadians elected to official positions (see below) included A.J. Naldrett (Toronto), R.A.F. Grieve (Ottawa) and R.G. Garrett (Ottawa). Applications for membership from Algeria, Belize, Burundi, Ecuador, Jamaica, and Burkina Faso (Upper Volta) were accepted, but that from Transkei was postponed. The IUGS Council voted against a proposal to change the C in IGCP from Correlation to Cooperation. A proposal, with wording by the Canadian delegation, to establish a new non-voting category of Associate Member (individuals or private or public institutions) was adopted by the IUGS Council.

D.J. McLaren (Past Chairman of the IUGS Commission on Stratigraphy, Ottawa) reported verbally on the structure of the Commission, and its General Assembly in Moscow, which he had chaired. This had been uncomfortable because of the controversy surrounding several recommendations and decisions on boundary stratotypes, especially as regards the Precambrian/Cambrian and Ordovician/Silurian boundaries, which required further work before approval.

W.W. Hutchison reviewed briefly the composition of the new IUGS "management team". He stressed the need to streamline IUGS policies as regards its high-profile projects, its work on methodologies, standards and concepts and its involvement in major on-going programs like IGCP, ILP and the proposed one on Global Change. New sources of funding were needed, as was a tightening of the IUGS administrative "belt", and an increase in visibility of the Union.

The Foreign Secretary reported that Episodes, the IUGS newsmagazine, continued to be published in Ottawa with support from the GSC, and that IUGS had released in 1984 three publications in its new numbered series. All of these are being distributed from the Ottawa Secretariat.

Association of Exploration Geochemists

R.G. Garrett (President AEG) reported that the membership now stands at 1313. Two successful symposia had been held this year, in Toronto on "Computers in Mineral Exploration" (January) and in Reno on "Exploration in the Cordillera" (March). Plans for the 11th International Geochemical Exploration Symposium (Toronto, May 1985) were well underway, and AEG was also organizing a workshop on geochemical techniques in tropical rainforests (Brazil 1985), regional symposia in Vancouver, Johannesburg and Athens in 1986 and the 12th IGES in France in 1987. The AEG publication program continued to thrive through the Journal of Geochemical Exploration, and the very successful Bibliography of Exploration Geochemistry was being updated for release in 1985. AEG remains on a firm financial basis, with member dues steady at \$42.50.

Association of Geoscientists for International Development

The Foreign Secretary, a former Vice-President of AGID, reported that AGID had been quite active in southeast Asia, Australia and Latin America. The quadrennial election of Council and officers had been held in 1984 by postal ballot, and the new group was firmly installed with P.G. Cooray (Sri Lanka) as President. The headquarters remains in Thailand, and there is a new Canadian council member, L. Wolofsky (Niagara-on-the-Lake). Unfortunately, AGID was deep in financial crisis, with the sudden and unexpected withdrawal of Canadian funds in mid-1984. A campaign was being mounted to find alternative sources of finance.

IUGS Commission on Comparative Planetology

R.A.F. Grieve (Secretary, CCP) described the background and terms of reference to this newly-created IUGS Commission. CCP exists to promote communication and awareness of the role of planetary science in terrestrial research. It stimulates research efforts and the application of planetary data to geological problems, and it advises IUGS on new initiatives in this field. CCP had already been involved in 1984 in meetings in Mainz, Graz, Moscow, Reno and Houston, and it would be a co-sponsor of the 1985 Lunar and Planetary Science Conference.

CCP had begun a project to catalogue sources of data from planetary exploration, the production of a slide show and text to illustrate geologic processes on planets, and the compilation of a bureau of speakers on planetary geology. Canadian interest in planetary studies remains high, even though Canada is not a major participant in front-line research.

IUGS Commission on Experimental Petrology at High Pressures and Temperatures

A.J. Naldrett, the new Chairman of CEPHPT, reported that the Commission, formed 13 years ago, had set itself the task of bringing modern aspects of petrology to scientific meetings of a more general petrological nature. It would be involved in the IMA and Kimberlite conferences in 1986. More detailed plans for the future would be drawn up during 1985.

Commission for the Geological Map of the World

R.A. Price (Canadian Representative to CGMW) reported briefly on CGMW's assembly in Moscow. There was little CGMW activity now in North America that was not linked to the DNAG program. J.O. Wheeler (Vancouver) has now succeeded Price as CGC representative to CGMW.

IUGS Commission on Storage, Automatic Processing and Retrieval of Geological Data

R.G. Garrett (Secretary-Treasurer, COGEODATA) reviewed the activities and management structure of this energetic IUGS Commission. Three working groups on resource data, exploration data, and information technology were providing a forum for the exchange of concepts and a nucleus for technology transfer in various parts of the world. COGEODATA was supporting the IUGS/Unesco Deposit Modelling Project which involved several Canadians. Meetings in 1984 were held in Jerusalem and Leoben, and planning was underway for seminars and meetings in 1985 in France, Morocco, U.S.S.R., Brazil and Sudan.

International Association of Engineering Geology and Canadian Geotechnical Society

J. Locat (Secretary of the Engineering Geology Division of the CGS, Québec) presented a report on the IAEG assembly held in Moscow in August. The Association continued to be very active with international and regional meetings, and plans were well advanced for the 5th IAEG Congress to be held in Buenos Aires in 1986.

International Association on the Genesis of Ore Deposits

G.B. Leech (Associate Secretary General, IAGOD, Ottawa) briefly reviewed the work of IAGOD Commissions and Working Groups, and plans for forthcoming meetings, especially the 7th IAGOD Symposium scheduled for Sweden in 1986. A symposium on copper had been held during the Moscow Congress, and the first volume of proceedings of the 1982 Tbilisi symposium was published in 1984. A new category of "national membership" had been established to enable individuals in countries with currency restrictions to join IAGOD.

International Association of Hydrogeologists

A report on IAH was presented for the first time to SCIGR. G.M. Gabert (Edmonton), President of the Canadian National Chapter, stated that IAH, with a membership of 1300 from 58 countries, had a long history of activity (meetings, publications, links with other organizations). There were eight commissions on topics ranging from hydrogeology of karst to groundwater protection. The CNC/IAH had been set up in 1974 by J. Toth, and national and international meetings had been held in Edmonton (1978), Winnipeg (1982) and Montreal (1984). Plans for future conferences in 1986 and 1988 were being formulated. CNC/IAH has 168 members, its own bi-monthly newsletter, and a program of field trips, short technical meetings and visiting specialists. The CNC cooperates closely with CWWA, the Canadian Water Well Association, and is interested in cooperating more closely with other Canadian groups working on water, environment, or engineering geology.

International Federation of Palynological Societies

At the 6th International Palynological Conference (Calgary, August 1984) the former International Commission for Palynology became the IFPS, a name that reflected the true nature of the organization, which links 21 national, regional linguistic and specialist societies with a total membership of over 3000. The new President is D.F. McGregor (Ottawa), who reported to SCIGR, and D.M. Jarzen (Ottawa) is Secretary-Treasurer. IFPS is now compiling (R.A. Fensome, Dartmouth) a world list of palynologists, and the first issue of a new newsletter, *Palynos*, would soon be issued.

International Geological Correlation Programme

A.J. Naldrett (Chairman, CNC/IGCP) reviewed briefly the main activities in 1984 of nine IGCP projects involving Canadians. CNC/IGCP had met in March to allocate funds to Canadian activities, especially travel funds to the Moscow IGC where many IGCP projects held meetings. A new project on North Atlantic terranes has been approved with project leaders J.D. Keppie (Halifax) and R. Dallmeyer (U.S.A.); this is a successor to Project 27 on the Caledonides.

International Lithosphere Program

R.A. Price (President, Inter-Union Commission on the Lithosphere, Ottawa) reported that the main activity now in ILP was aimed at the preparation of mid-term scientific reports. These would be used as a basis for planning the second half of the program, and a re-structuring would be completed in 1985. K. Fuchs (F.R.G.) would replace Price as ICL President. The General Assembly of Unesco had passed a motion, at the urging of Canada and other countries, to provide substantially increased funds for the ILP, but only about \$10 000 had actually been allocated, and even this was caught up in Unesco's current crisis. The outlook for future funding was not encouraging, and there was no prospect of increased activities.

International Mineralogical Association

D.G.W. Smith (Member IMA Council, Edmonton) reviewed IMA activities for 1984 including: meeting of Council (Moscow, August), discussions on collaboration with new International Committee on Applied Mineralogy, acceptance of invitation to hold 15th General IMA Meeting in China (1990), and planning for the 14th IMA meeting in 1986 at Stanford University. The long-awaited World Directory of Mineralogists was published in late 1984.

International Union for Quaternary Research

D.R. Grant (Secretary, CNC/INQUA, Ottawa) stressed that INQUA is a union dealing with a "time slice" and is therefore very much an inter-disciplinary organization. CNC/INQUA has been rather inactive and not very effective as a liaison between Canadian Quaternarists and INQUA, despite the personal activities of some CNC members. Grant reported that the first circular for the 1987 Ottawa Congress of INQUA was now out and preparations well underway.

International Permafrost Association, International Society for Soil Mechanics and Foundation Engineering, International Tunnelling Association and International Society for Rock Mechanics

W.J. Eden (NRC Advisory Committee on Geotechnical Research representative to CGC, Ottawa) reported on these four international organizations with links to the Canadian geotechnical community. A CNC for IPA had now been established with N. Kalmanovich as the CGC representative. The IPA Secretariat is at UBC (J.R. MacKay, Vancouver), and discussions are underway to attract other countries to the Association. Affiliation to IUGS, IUGG and engineering unions is being considered.

The Canadian section of ISSMFE (CGS) sponsored in September the 4th International Symposium on Landslides (Toronto), attended by 350 people from many countries. Two volumes of proceedings had already been published. The second geotechnical engineer from Ghana to be sponsored by the Ghanaian Fellowship Program had spent four months in 1984 working with Ontario Hydro. Geotechnical News, a quarterly joint publication of the Canadian, Mexican and U.S. member societies of ISSMFE was now firmly established with a publishing base in Vancouver.

The ITA is represented in Canada by the Canadian Tunnelling Association, a relatively small group. The Canadian affiliate to ISRM is now the Canadian Rock Mechanics Association, formed in 1984. Plans for the International ISRM Congress in Montreal, 1987, are going ahead.

NRC Committee on International Scientific Affiliations and the International Council of Scientific Unions

R.A. Price (CGC representative to CISTA) reported that at its October 1984 meeting, CISTA approved the setting up of a 12-member CNC/ITA under the aegis of the NRC (see previous item). ICSU had held its 20th General Assembly in Ottawa in September, featuring a Symposium on Global Change attended by scientists from all over the world. As a result ICSU is setting up an ad hoc planning group to review ICSU member activities, to identify priority subjects and to develop a coherent global research program for the 1990s. The refusal of Canada to grant visas to two members of the Soviet delegation led to an ICSU resolution expressing concern about violation of the principles of free circulation of scientists and to continuing embarrassment on the part of some Canadian scientists.

Decade of North American Geology

The Chairman reviewed a written report from J.O. Wheeler (Canadian Coordinator for DNAG) on the progress of Canadian inputs to DNAG. The nine volume work was well underway.

Canadian National Committee for the International Union of Geological Sciences

The CNC/IUGS held two meetings in 1984. The first, on May 12 in Toronto, was a briefing session for the Canadian delegation going to the Moscow IGC. Matters to be raised at the IUGS Council included the choice of national membership categories, the application for membership by Transkei, the proposed associate membership status, the work of the Stratigraphic Commission, and the proposed name change of IGCP.

The second meeting, in Ottawa immediately after the SCIGR meeting reviewed the IGC itself, and the sessions held there of the Councils of the Congress and of IUGS. The delegation had consisted of the following:

R.A. Price (Ottawa)	- Chief Delegate, representing Structural Geology and Tectonics.
D.G.W. Smith (Montreal)	- Mineralogy, Petrology and Geochemistry.
P.J. Lespérance (Montreal)	- Stratigraphy and Paleontology.
J. Locat (Québec)	- Engineering Geology and Hydrology.
M.E. Hriskevich (Calgary)	- Petroleum Geology and Sedimentology.
I. Smalley (Waterloo)	- Quaternary Geology and Geomorphology.

The Congress Council met on several occasions throughout the IGC to review the progress of the Congress, and the main decisions taken by the IUGS Council are reviewed above. As a result of the decision of the IUGS Commission on Stratigraphy to forward for formal voting the proposal to establish the Ordovician-Silurian Boundary Stratotype at Dob's Linn, Scotland, the CNC/IUGS agreed to express its concern to the IUGS Executive (which must ratify all such Commission decisions) over the procedures used in this case.

The CNC/IUGS also agreed that the size and composition of future Canadian delegations to IGCs should be re-examined, with careful consideration being given to a smaller delegation and assignment of delegates to other key organizations meeting during the Congress, keeping in mind the usefulness of a "corporate memory" in the Canadian geoscience community for future Congresses.

Acknowledgement

On November 29, 1984, Dr. Brian Norford succeeded me as Foreign Secretary of the Canadian Geoscience Council. My tenure of this post since 1982 has given me a superb overview of the international linkages between Canadian geoscientists and their counterparts abroad. I have been impressed with the strength and diversity of these contacts, as well as with the very important role played by Canadians in international geoscience activities and organizations. Training foreign students, lecturing abroad, collaborating in international programs like IGCP and ILP, leading the activities of international organizations, hosting international conferences and symposia in Canada, or participating in global or regional research projects – all these activities contribute to the competency of our own geoscience community and help us to avoid being "prisoners of our own limited geology". My thanks to members of the CNC/IUGS and to those who attended and reported to the SCIGR meetings.

A.R. Berger
Foreign Secretary

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
TOTAL	\$116,000.00
<u>INCOME</u>	
GSC : IGC Grant	3,000.00
: CNC/IUGS Grant	3,000.00
: 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
TOTAL	\$ 94,300.00
PROFIT (Loss)	\$(21,700.00)

W.G. MacLeod, Secretary-Treasurer
November 1, 1984

Table 3

CANADIAN GEOSCIENCE COUNCIL
CONSOLIDATED BALANCE SHEET
as of September 28, 1984

<u>ASSETS</u>	<u>1984</u>	<u>1983</u>
Chequing Account 2300915	\$ 457.12	\$ 979.22
Saving Account 95-09364	10,450.44	19,742.34
Term Deposits	76,257.06	56,486.48
Univ. of Waterloo Account 901-118801	(1,458.66)	(1,048.88)
Univ. of Waterloo Account 901-118802	4,446.91	4,237.97
Accounts Receivable	<u>673.00</u>	<u>1,253.00</u>
TOTAL ASSETS	\$90,824.87	\$81,650.13
 <u>LIABILITIES</u>		
TOTAL LIABILITIES	-	-
ASSETS LESS LIABILITIES	\$90,824.87	\$81,650.13
 <u>CONSOLIDATED STATEMENT</u>		
Balance at Beginning of Year	\$81,650.13	\$79,192.01
Income less Expenses	<u>9,174.74</u>	<u>2,458.12</u>
BALANCE AT END OF YEAR	\$90,824.87	\$81,650.13

W.G. MacLeod, Secretary-Treasurer
November 1, 1984

We have examined the financial records of the Council, Secretary Treasurer's ledger, cancelled cheques, bank statements, etc., for the year ending September 28, 1984.

All records are in order and we believe the consolidated financial standing of the Canadian Geoscience Council to be fairly represented in the Consolidated Financial Statement of 1984-11-01.

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

J.B. Bushell

J.R. Minions

Table 4

CANADIAN GEOSCIENCE COUNCIL
STATEMENT OF INCOME AND EXPENSES
FOR THE YEAR ENDING 84-09-28

<u>ASSETS</u>	<u>1984</u>	<u>1983</u>
Mineral Research Committee	\$ 2,818.28	\$ 4,040.12
Quaternary Studies Committee	3,465.85	5,861.69
Marine Geoscience Committee	1,440.70	1,144.30
CNC/IUGS 3,000.00	3,000.00	
EdGEO Workshops	8,116.05	10,500.00
International Geological Congress 12,000.00	-	
Secretarial Services, Postage	6,172.20	5,405.98
Printing: Brochures, Booklets	4,562.54	10,905.03
Executive Travel	1,573.42	1,092.57
Council Meetings	2,351.88	1,056.64
Youth Science Foundation	150.00	150.00
AGID and AASC Memberships	200.00	200.00
Miscellaneous	135.92	417.41
Youth Science Fair	500.00	-
TOTAL EXPENSES	\$46,486.84	\$43,773.74
 <u>INCOME</u>		
IGC Grant 3,000.00	3,000.00	
CNC/IUGS Grant	3,000.00	3,000.00
G.S.C. Operating Grant	5,000.00	5,000.00
Provincial Grants	4,000.00	7,000.00
Membership Fees	5,768.00	5,543.25
Interest: Term Deposits	4,770.00	4,567.98
: Savings Account	1,170.10	2,185.01
Publication Sales	3,952.90	10,266.00
EMR Petroleum Research Grant	15,000.00	-
Mineral Research Grants	8,000.00	-
EdGEO Donations	-	3,000.00
Ont. Gov't Contract 1805	2,000.00	-
EMR Contract No. 1451729	-	2,669.62
TOTAL INCOME	\$55,661.58	\$46,231.86
INCOME LESS EXPENSES	\$ 9,174.74	\$ 2,458.12

REPORTS OF THE MEMBER SOCIETIES

1. *The Canadian Association of Geographers*

The Canadian Association of Geographers has successfully launched a new journal, *The Operational Geographer*, published three times a year by Brenton Barr, Department of Geography, University of Calgary. The journal not only aims at the needs of practicing geographers in business, government and education, but also serves a communication function among university geographers as well.

The CAG publishes an annual directory of members and research, and quarterly publishes a major academic journal, *The Canadian Geographer*, with articles on physical and human geography. The CAG is reviewing its entire publication policy with the purpose of sharpening the focus of each of its three publications, and has another committee examining the broad range of functions offered to professional geographers by the association.

The 1984 annual meeting was held at Malaspina College in Nanaimo; regional or divisional meetings were held in Kamloops, Swan River, and Waterloo. The next annual meeting is scheduled for late May in Trois-Rivières.

Brenton M. Barr

2. *Canadian Geophysical Union*

The Canadian Geophysical Union had a very successful joint annual meeting with the Canadian Meteorological and Oceanographic Society at Dalhousie University, Halifax, May 29 to June 1, 1984. Attendance from members of both organizations was high. Thirty-five scientific sessions were held and papers were presented on many aspects of meteorology, recent and paleoclimatic studies, lithospheric stresses, fluid dynamics, recent Arctic expeditions (Cesar, Lorex and Fram I), deep crustal seismic studies, studies of the continental margin, and several aspects of geophysical investigations offshore.

The Union was successful in establishing close association with the membership of CIS (Canadian Institute of Surveying). Similar negotiation with the CSEG (Canadian Society of Exploration Geophysicists) are in progress. The executive is revising the constitution in order to formally accommodate its new associate members.

In 1984, CGU awarded the J. Tuzo Wilson medal for outstanding contributions to Canadian geophysics to Dr. Ted Irving.

Z. Hajnal

3. *Canadian Quaternary Association*

Since 1980, the Canadian Quaternary Association (CANQUA) has sought to maintain communication among 20 scientists across Canada and the United States. CANQUA represents members in more than twenty disciplines including geology, geography, biology, paleontology, engineering, mining, climatology, meteorology, and pedology.

During 1984 we initiated an agreement with AQQUA (Association Québécoise pour l'Étude du Quaternaire) and GPQ (Géographie Physique et Quaternaire) whereby G.P.Q. became the official Canadian journal for Quaternary scientists. The executive of CANQUA raised the membership fee to \$20 for 1985 with \$15 intended for a subscription to G.P.Q. We intend this relationship to create strong bonds between AQQUA and CANQUA and bring more members to consider publishing research results in G.P.Q.

Elections for a new executive will take place during the summer of 1985. Newsletters were placed on a twice-annual schedule at the CANQUA business meeting held in conjunction with the GAC (Geological Association of Canada) in London, Ontario in May, 1984. CANQUA is now an affiliated society of the Geological Association of Canada.

Jacques Thibault

4. *Canadian Society of Exploration Geophysicists*

The Canadian Society of Exploration Geophysicists (C.S.E.G.) is probably the most active group involved in science today. The 2033 members had some 30 different committees providing information in its annual report. The Annual Convention this year was held in conjunction with the Canadian Society of Petroleum Geologists and with 3200 registrants (3500 at the spring ball) was the most successful ever held. The keynote addresses given by Dr. Michael Walker, Director, the Fraser Institute, and Mr. Don McIvor, Chairman of Imperial Oil Ltd., were followed by some fifty technical presentations which provided Canadian scientists with an easy way to get knowledge on some of the many exciting new things that are happening in the world today.

The object of the C.S.E.G. is to promote the science of geophysics as it applies to exploration and to promote fellowship and co-operation among those interested in geophysical problems. To this end, as well as the above mentioned annual convention, monthly dinner meetings are held. In 1984 ten very successful meetings were held with an average attendance of 750. Topics such as: Keep an Eye on Your Basement; Engineering Considerations for Beaufort Sea Production; Lithoprobe and Stratigraphy of the Continental Crust; Depositional Environments of the Upper Birdbear Formation of Saskatchewan; How, Why and Where to use the Vertical Seismic Profile; Geophysical Technology – Reservoir Delineation and the S.E.G.; Field Tests Revisited; Seismic Resolution and Field Design – Success and Failure at Taber; Stratigraphic Amplitude; were all enthusiastically received.

The C.S.E.G. had a display booth at the Edmonton Conference on Women in Science, Engineering, and Technology. A yearly journal is also prepared which covers papers on seismic exploration methods (this will also carry a Lithoprobe paper).

The C.S.E.G. Ladies Auxiliary is invaluable to the group by attending to, among other things, the social part of our life.

A Scholarship Committee provided some 35 awards most of which were worth \$1250 each. The C.S.E.G. is working closely with the Professional Engineer, Geologists, and Geophysicists of Alberta in solving some fundamental questions such as "What is a Geophysicist".

And lastly, of course we are pleased to be a part of the Canadian Geoscience Council.

J.R. Hume

5. Canadian Society of Petroleum Geologists

From a foresighted nucleus of 19 founding members in 1928, our Society has become one of the most prolific and respected geological organizations in the world, encompassing approximately 4000 scientists. It took over 20 years for the original small, but growing, group to prove that the Western Canada Sedimentary Basin was a significant petroleum producing area. Subsequent to these early struggling years, our organization showed dramatic growth paralleling the tremendous world demand for hydrocarbons. This unprecedented growth has culminated in various employment problems which currently represent one of the most pressing subjects facing the Society.

Canadian universities are graduating a record number of geological students at a time when the demands for petroleum, natural gas and many other mineral resources are declining. Employers, educators, and others involved in manpower planning obviously have some difficult decisions to make. From 1950 to 1984 the demand for geological talent in the petroleum industry has caused an increase in our membership of approximately 110 new geologists each year. If we assume that the average age of new members in 1950 was 25, and retain the standard retirement age of 65, we can project that no significant attrition will take place until 1990. To evaluate the future growth of our Society, it is necessary to consider the potential demand for our product.

Statistics indicate that petroleum geologists have been extremely successful in replacing consumed oil and gas reserves. Our members have certainly found their fair share, and have significantly increased the supply and life expectancy of Canada's gas reserves since 1970. Although the present prognosis is that demand will remain constant, there is significant opportunity for Canada to increase natural gas sales, especially to the United States.

The huge potentials of Canada's heavy oil and tar sand resources are being gradually transformed into hydrocarbon reserves which will eventually be the major supply of Canadian oil. Canada could become a net oil exporter as these resources are developed. To have such development, on an economic basis, will require extensive geological analysis and research.

Canadian geologists have worked on, and continue to work on, numerous worldwide projects and our input into finding world reserves has been impressive. Although world oil demand has dropped substantially since 1980, it is now projected by most economists to remain at the present level. On a national basis the demand for geological exploitation work on Canada's oil resources should continue to grow. For the past three decades, while prices remained low, there was considerable growth in hydrocarbon demand. However, price increases, due mainly to taxation, have encouraged conservation and the introduction of competitively priced energy sources. How will this recent drop in demand affect the long-term requirement for new geologists and the continuing education programs for our current members?

The executive, aside from regular committee business affairs, spent considerable time during the year working on some new and long-term projects which we hope will be of benefit. These projects encompass: education, accreditation, office and related computer services, 50th Anniversary Trust Fund financing, convention and publication planning. I would like to briefly summarize several aspects of these new programs.

Education is a priority function of the Society. The dissemination of scientific theory through our many publications, and the study of reported and published phenomena through our many technical programs are the major activities of the Society. In order to evaluate our performance, and as an aid in considering future scientific programs for our members and for society at large, the

executive has set up during the past year a special Executive Advisory Committee on Education. The mandate of the committee is to produce by June, 1985 an interim status report and by December, 1985 a final advisory report. This report is expected to outline a path which the Society would consider in planning or expanding our education programs for the future. It was felt that such a study is in order, as there have been numerous requests and suggestions by individuals and by companies during the year concerning many aspects of our education programs, and possible new programs. The Society is honoured to have such a knowledgeable group of geologists join the Advisory Committee. The members are: Peter Haines (Chevron), Chairman; Pat Purcell (Husky), Leon Matwe (PanCanadian), Denny Duff (Independent), and Andrew Baillie (Independent). I believe we can look forward to a comprehensive and innovative report.

Accreditation is an important item of interest to many of our members. Although registration as a professional geologist in Alberta has been an ongoing concern for several years, the real issue for geologists in Canada is now focused on accreditation. The history, the problem, and a proposed solution was written up in *The Reservoir* in July, 1984. I am happy to report that the Canadian Geoscience Council (CGC) has unanimously agreed to accept responsibility for proceeding with the establishment of a Canadian Geological Accreditation Board. At the December meeting of the CGC in Ottawa, the CSPG tabled Terms of Reference for such an accreditation board. The CSPG-APEGGA liaison representatives prepared the above-mentioned Terms of Reference. The document caused considerable national interest and favourable response. For the spring CGC meeting a complete "source" document on registration and accreditation is being prepared in order that geologists across Canada will have access to the fundamentals and meaning of an accreditation system. This document will be distributed to all geological technical societies and all university geology departments in Canada.

During the past year, activity continued in modernizing and upgrading the Society office and its profile. The physical improvements were written up in the December *Reservoir*. From a planning and management viewpoint the major present effort is to implement budget planning and a publication inventory system on the IBM computer. A start has been made and our office staff has attended courses on computer use. The computer will also be used for electronic mail and the system is currently being tested. The mail system should be especially valuable during 1985 when our President is officed in Edmonton. Regarding the office profile, it is hoped that photos of all Presidents back to 1928 will become available to decorate the Society boardroom.

Another item of interest regarding Society profile is that the Executive approved during 1984 the design and manufacture of a CSPG tie. This will be manufactured in two styles. One style will be a standard club tie, the other style is referred to as a scarf or floppy bow and is especially attractive for ladies or for men wishing to dress in a casual, European manner. The ties will be silk, navy in colour, and the CSPG logo, monogrammed in red and gold, will be suitably located on the neckwear. These ties should be very attractive and reasonably priced. It is anticipated the product will be available for sale at the 1985 convention.

The 50th Anniversary Trust Fund was set up in 1978. It is meant to provide ongoing financing for the Student Industry Field Trip. Currently the Fund totals \$266 000. Based upon past earnings, the Executive decided the size of the principal must be substantially increased. In order to raise the significant amounts required a Special Fund Raising Committee has been established. The committee, at present composed of Fred Calverly, Chairman; Bob Creed, Bob Fraleigh, Gerald Kvill and David Burton, has evaluated the feasibility of an art auction. Pieces will be selected from submitted art, which may represent a Canadian geological landscape, a geological event, a related industry activity, or other geological phenomena. The selected pieces will be auctioned by the Society, with the net proceeds directed to the Trust Fund. The committee has the assistance of professional advisors. The proposal will hopefully come to financial and esthetic fruition during the coming eighteen months.

Convention and publication planning is an ongoing responsibility of every executive. This past year there was some extra soul-searching, as consideration was given to having a major convention outside of Calgary (i.e. distant from most members). The 1985 year will be somewhat of a test case when our Annual Convention is held in Edmonton. As the east coast of Canada develops into an economic petroleum province the Society is looking forward to an Annual Meeting in Eastern Canada. Being a naturalized Western Canadian I am no longer certain how far east of MacLeod Trail one must travel to be in Eastern Canada, and so an eastern convention has been deferred to a future executive.

In 1985 the Society will sponsor, with the People to People Citizen Ambassador Program, a delegation of petroleum geologists to visit the People's Republic of China. Howard Stafford, Assistant Manager, Geology Department of the Alberta Energy Resources Conservation Board will be delegation leader. The Canadian delegation will represent various aspects of petroleum geology in technical exchanges with Chinese scientists. There will also be a supplementary program of cultural activities. Although only a very few people (20-30) will be able to attend due to logistics, future trips could be organized if desirable.

In the matter of publications, significant progress was made during the year as a result of the By-Law changes approved by the membership. The presence of a Senior Editor at executive meetings, free from the heavy task of editing the *Bulletin*, now gives required continuity to all publication efforts. During the year new editors and committee workers came forth to work on the long awaited Oil and Gas Pools, and Western Lexicon volumes. These major works should now continue to have a high priority with the new executive until they reach publication. It was a great pleasure for this past year's executive to see successful publication of a number of volumes in 1984.

The most impressive aspect of the Society is the manner in which the numerous groups of volunteer geologists effectively and efficiently plan and carry out the various scientific, social and recreational programs. This has been a very active year. The executive and the members at large owe a hearty vote of thanks to the many committees and to our eight divisions which organized numerous technical luncheons and meetings throughout the year. A special salute to the authors and speakers who made the major contributions to these events. The activities of these groups is summarized in the 1984 Report of activities published in the CSPG Bulletin.

In summary, 1984 has been a record year for the Society in many areas.

John B. Maher

6. The Canadian Society of Soil Science

The Canadian Society of Soil Science held its annual meeting at the Banff Centre, Banff, Alberta on August 26-29, 1984. The program highlighted three topics: 1. Conservation of the land resource, 2. Reclamation of disturbed/degraded lands and, 3. Agricultural use of the land resource. Each topic was introduced by Keynote speaker(s) followed by volunteer presentations. A total of 110 papers were presented in 11 technical sessions. Sixteen poster sessions were also presented. The broad range of topics reflected the diverse interests of the members of the Canadian Society of Soil Science. An interesting technical program plus the favorable location no doubt both contributed to a record attendance of 270 participants, 64 spouses and 38 children. Two field trips, one to examine foothill and prairie soils and another to study mountain soils and landscapes were attended by 37 and 60 participants respectively.

The Society honored Dr. J.A. Robertson, University of Alberta, with recognition as a Fellow of The Canadian Society of Soil Science. This year was also the second in which CSSS has presented an award to an "outstanding paper" presented to our annual technical session by a student. The 1984 C.F. Bentley award including a \$500 cash prize was won by Sandra Brunsting, University of Guelph.

In June 1984 President Miller spoke to soil scientists in the four western provinces on the topic of "Soil factors as they affect root growth, phosphorous absorption and crop yield". This speaking tour allowed the President to meet with Society members and become familiar with Society issues.

The Society has also been actively supporting the cause of soil and water conservation through submissions (in cooperation with Agricultural Institute of Canada) to the MacDonald Commission on Canada's Economy and the Senate Subcommittee on Agriculture, Forestry and Fisheries on soil degradation. At its 1984 summer meeting the Agricultural Institute of Canada supported a resolution submitted by CSSS to organize a multidisciplinary national conference on soil and water conservation. In order to live up to our goal of "fostering all aspects of soil science in Canada" we encourage membership in CSSS by individuals with a wide spectrum of interests.

G.M. Coen

7. Canadian Well Logging Association

The Canadian Well Logging Society has enjoyed another year of growth and activity in 1984. The apparent end of the economic downturn, the increased optimism in the petroleum industry and the enthusiasm of the membership have contributed to the success of the Society.

Meetings

Our Vice-President, Al Lye, arranged a variety of speakers for our monthly luncheon meetings. The change of venue to the Palliser Hotel has been well received by the membership. The meetings enjoyed good attendance by members and non-members alike. It was encouraging to see many of our members using the telephone call-in service and some pre-buying tickets, for the luncheons. I hope this trend continues, as it results in a more efficient use of our resources and serves the Society well.

Preparations for Symposium 85 are well under way, thanks to the efforts of General Chairman Ted Griffin and his committees. Their efforts and the continuing support of the membership will ensure a successful Symposium this fall. I am looking forward to seeing all of you there.

Membership

The Society has enjoyed a steady growth in membership this year due to the efforts of our Membership Chairman, Ralph Rouleau. Continued efforts in this direction next year should result in a total membership in excess of 800 members.

This year your executive has elected G.E. Dawson-Grove as an Honorary Member of the Society. "D-G", as he is known to all, has served on past executives as vice president and president. He has served on numerous symposia committees and has also served two years as our Canadian Geoscience Council representative. D-G has written and presented numerous papers on the science of formation evaluation. D-G's election, as our eighth Honorary Member, is a long overdue recognition of his contributions to the well being of the CWLS.

Publications

Publications Chairman, Chak Chakravorty has been untiring in his efforts, to collect sufficient material for the CWLS Journal. His dedication to the task will result in a quality publication this spring.

Work on the Log Analysis Handbook by the committee chaired by Bernie Cosett continues, with the publication of the first volume anticipated this summer.

The RW catalogue update is progressing well under the joint chairmanship of Dave Orman and Case Struyk. Publication of this much used catalogue is scheduled for late spring.

Sales of Society publications through the A.P.E.G.G.A. office have done well this year due to the efficiency of the Christl Ganz and her staff.

Financial

The Society is in good financial health as indicated by Treasurer Steve Cheshire's report. Luncheon ticket prices were raised this year to meet increased costs, but no increase in membership dues will be required this year.

Awards

The winner of last year's President's Award for best paper on formation evaluation was Dare Keelan of Core Laboratories for his paper "Reservoir, Rock Properties and their Influence on Downhole Log Response".

Moe Thornton and his President's Award Committee are thanked for the work done in reviewing all the Luncheon presentations last year. Ted Jennings, chairman of this year's President's Award committee will announce the recipient of this year's award at the Annual Meeting.

This year the Society offered two Bursaries of \$750 each. The competition was open to dependents of members and student members, who were enrolled in post-secondary educational institutions and demonstrated an interest in pursuing a career in formation evaluation. The Bursary committee chaired by Chak Chakravorty awarded the bursaries to Jeffery Nelson Stewart and Ronald Hinds. The Society thanks Chak and his committee for choosing such fine recipients of the Society's newest award.

1985 is the 30th anniversary of the founding meeting of the Society. Some of our Honorary Members attended that meeting and took an active role in laying the framework for our Society. Your executive has decided to present all Honorary Members with a suitably inscribed scroll and Cross pen in recognition of their esteemed status.

Last fall the Society held a Fall Social/Awards Banquet at Heritage Park. The evening was enjoyed by all who attended and the Society thanks the corporate sponsors who helped to make it a success. It is hoped that a function such as this will become a semi-annual event during the non-convention years.

The Society thanks Neil Collins who has served his second year as our representative on the Canadian Geoscience Council.

Thanks are also due to Al Blackie for serving as SPWLA Liaison Officer.

I also express my appreciation for those members of the executive not already mentioned – Tammy Cruikshank for serving as secretary and Mel Blackburn, past President, for his help and guidance during the year.

It has been an honour and a pleasure to serve the Society as President this past year. I encourage other members to become involved in the executive of the Society, the task is not as onerous as it may appear and the rewards are many. My best wishes to the Society and the incoming executive for a year of continued growth and success in 1985/1986.

Lorne Slusarchuk

8. The Geological Association of Canada

1984 was a year of consolidation and readjustment for the GAC as its new headquarters at Memorial University of Newfoundland settled down to full operation under Dr. John Malpas, Secretary-Treasurer, Maureen Penney, Cynthia Pitts and at the end of the year the Association's first Executive Director, Dr. A.R. Berger. The membership of the Association stood at 2977 on December 31, 1984.

The 1984 Annual Meeting with the Mineralogical Association of Canada was held in London, Ontario, with some 1100 registrants. The Logan Medal for 1984 was presented to Dr. D.W. Strangway of the University of Toronto for his outstanding services to Canadian earth sciences and for his achievements in the fields of earth and planetary magnetism, paleomagnetism and electrical properties. The Past President's Medal was awarded to Dr. R. Ludvigsen of the Department of Geology, University of Toronto for his brilliant research on Cambro-Ordovician trilobites of Canada. The Duncan R. Derry Medal of the Mineral Deposits Division of the GAC went to Dr. J.J. Brummer for his outstanding contributions in the field of economic geology. The Paleontology Division presented its Billings Medal to Dr. L.S. Russell for his work on Canadian vertebrate fossils.

No Special Papers were published in 1984, but several were in progress for release in early 1985. The second revised edition of GAC's highly acclaimed Facies Models, edited by R.G. Walker, was released in September, and Short Course Notes, Volume 4, on the Growth and Evolution of Volcanic Edifices with Implications for Precambrian Volcanoes (Eds: R.M. Easton and M. Gaiswinkler-Easton) was also issued.

The Association was officially incorporated and registered with the Registrar General of Canada on January 24, 1984.

A.R. Berger

9. Mineralogical Association of Canada

The Association had a successful year in 1984 and continues to maintain a sound financial position due to the continuing efforts of the Treasurer and the Finance committee.

The 29th annual meeting of MAC was held on May 14-16, 1984, at London, Ontario, in conjunction with the annual meeting of the Geological Association of Canada. Prior to the meeting was the 10th MAC short course Environmental Geochemistry. This was organized by Mike Fleet and Bill Fyfe, both of the University of Western Ontario. The course provided a chemical basis for understanding the interaction of rocks, soils, water and air with the biosphere, and discussed contemporary environmental concerns. There was one general session in crystallography/mineralogy, two general sessions in geochemistry and four general sessions in economic geology; in addition, the poster sessions proved a big hit, and many authors left the meeting as strong proponents of this method of presentation. There were some excellent special sessions and symposia: "Crystal and Surface Chemistry of Minerals", organized by Mike Bancroft, focused on novel techniques of mineral characterization, and was a great educational experience for all concerned; "The Cyprus Drilling Project: Ophiolites", organized by J.M. Hall and P.T. Robinson, expanded into two parts due to the great activity in this particular area; "Paleoatmospheres and Paleooceans: Theoretical and Economic Aspects", organized by Jan Veizer, attracted considerable interest; the symposium "Geochemistry of Mineral Deposits", organized by Rob Kerrich and Mike Fleet, was very well-attended and a wide variety of high-quality papers were presented; the session on silver-sulpharsenide vein deposits, chaired by A.J. Andrews and W. Petruk, was very interesting. All of these people, together with the local organizing committee, chaired by Bill Fyfe and 'vice-chaired' by Mike Fleet, deserve our thanks for such a successful meeting. There was an excellent social program, and a good time was had by all.

The MAC Luncheon was held at noon on Tuesday May 15th; the assembled throng slaked their thirst and occasionally took a bite of food after a high-powered presidential address by outgoing president Tony Naldrett. This is also the occasion on which the medals of the association are presented. The Past Presidents' Medal is awarded annually to an individual having a record of distinguished contribution to mineralogy and allied sciences in Canada. This year, the recipient is Professor Petr Cerny of the University of Manitoba. Petr is well-known throughout the world because of his wide-ranging studies on all aspects of granite pegmatology from crystal structure studies to paragenesis. The Hawley Award is presented to the author of the paper judged to be the best paper of the year in the Canadian Mineralogist. This year the recipient is Dr. Frank C. Hawthorne of the University of Manitoba for his short note on 'The Crystal Chemistry of the Amphiboles'.

Publication of the Canadian Mineralogist, the Associations quarterly journal, was highlighted by the special issue "Ore Deposits and related Petrology of Mafic-Ultramafic Suites", a compendium of papers arising from the special session on core deposits in mafic-ultramafic rocks at the Winnipeg meeting.

Frank C. Hawthorne

REPORTS OF THE ASSOCIATE MEMBERS AND REPORT COMMITTEES

1. *Geological Survey of Canada*

Introduction

The work of the Geological Survey of Canada (GSC) can be described in terms of three, main, interrelated activities which contribute to meeting the overall responsibilities 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.

The demand for new information to meet new needs is ongoing and in 1984-85 the GSC entered into several new programs which are extending and augmenting its fundamental, ongoing core program.

- The Frontier Geoscience Program involves a major expansion of petroleum-related geoscience investigations in the frontier areas offshore of the east and west coasts and in the Arctic. The focus is on frontier sedimentary basins, their evolution, deep geophysical structure and their resource potential. Geological hazards and constraints to petroleum and development are also being investigated.
- Federal-provincial mineral development agreements with Manitoba, Saskatchewan, Newfoundland, Nova Scotia and New Brunswick were signed in 1984 under the new Economic Regional Development Agreement. Each of these includes a geoscience component intended to stimulate and facilitate mineral exploration by private industry. Preliminary reports resulting from some of these projects were published in early 1985.
- A special program in the vicinity of boundary areas off Canada's Atlantic, Pacific and Arctic coasts involves studies in collaboration with Earth Physics Branch and Department of Fisheries and Oceans. These are in support of Canada's position on the location of our offshore boundaries.
- Early in 1985 Canada became a full participant in the new, multinational Ocean Drilling Program. This will create many new opportunities for marine geological and geophysical studies enhancing our capabilities in seismic interpretation, stratigraphic correlation and understanding the geological history and structure of the deeper offshore and ocean depths. Surveys during 1984 have provided information required for drilling in the Labrador Sea and Baffin Bay in 1985.
- Lithoprobe a new collaborative Canadian research program involves the co-ordination of geophysical, geological and geochemical techniques by scientists from universities, government and industry. The aim is to extend and relate surface geology to structures at depth. Deep seismic surveys across Vancouver Island have provided data that give new insights concerning the continental lithosphere and the oceanic rocks of the Juan de Fuca plate that are thrust beneath it. Seismic refraction surveys were conducted on the Kapuskasing structural zone in order to provide the framework needed to test the hypothesis that this structure provides a window on some of the oldest continental crust in Canada. In eastern Canada the Frontier Geoscience Program provided resources to contract a deep multichannel reflection seismic survey northeast of Newfoundland. The results are providing new information on the structure of the crust including the presence of several very deep sedimentary basins.

Transfer of the results of the GSC studies continued to be an important aspect of the Branch work. During the year about 5000 pages of scientific text were published in our own series, 146 geochemical, 287 radiometric and 122 aeromagnetic maps were released and 136 Open File releases were made. The branch continued to contribute significantly to technology transfer in the field of geophysical instrumentation including in 1984 the Huntec SEABED II ship-towed mapping system and a helicopter-mounted gradiometer system. The latter system was used under contract to GSC in Gaspé in the first survey of this kind flown with a helicopter.

A considerable part of the GSC's resources will be devoted, in the next few years, to the production of the 9-volume "Geology of Canada" series. In 1984-85 work was well advanced on manuscript preparation for several volumes including the Appalachian/Caledonian Region, Continental Margins: Eastern Canada, and Quaternary: Canada and Greenland. Publication of some of these in 1986 is anticipated.

In 1984-85 the GSC comprised eight divisions, of which three with about 40 per cent of the staff, are outside the National Capital region.

The Branch had an authorized strength of 735 person years and a budget of \$45.4 million. Special programs including the Mineral Development Agreements, Frontier Geoscience, and others increased the authorized strength by 79 person years and \$24.9 million. In the following section the allocation of these additional resources by division is not shown.

Organization

The Atlantic Geoscience Centre, Dartmouth, N.S. carries out geological, geophysical and geochemical studies in the Atlantic and Arctic Offshore areas and obtains data used in the search for hydrocarbon resources, in resource evaluations, in the protection of the marine environment, and in improving the safety of coastal and offshore engineering structures. The division's resources in 1984-85 were 94 person years and \$6.2 million.

The Cordilleran Geology Division, with offices, in Vancouver and at the Pacific Geoscience Centre, Sidney, B.C. studies the geology of the Cordilleran region and the adjacent Pacific Continental Shelf and margin. Results are used to assess mineral and hydrocarbon potential, and aid in land-use and environmental protection. In 1984-85 the budget was \$3.0 million with 46 person years.

Economic Geology and Mineralogy Division conducts geological studies of metallic and other mineral deposits to determine their distribution, origin and potential abundance thereby facilitating resource exploration, and policy formulation. The division provides analyses of rocks, minerals and ores needed by other GSC divisions. The 1984-85 budget was \$4.7 million and 88 person years.

Geological Information Division communicates the results of the Branch scientific programs by publishing maps and reports, maintains Canada's largest earth science library, and provides a public information system. In 1984-85 this division had 95 person years and \$4.2 million.

Institute of Sedimentary and Petroleum Geology, Calgary collects information on the sedimentary basins of western and northern mainland Canada, and the Arctic, regions which contain much of our oil, natural gas and coal resources. Estimates of Canadian potential oil and gas resources are prepared in co-operation with other federal agencies and a repository is maintained of samples, cores and other data derived from work done by the petroleum industry on Canada Lands. The 1984-85 budget of this division was 141 person years and \$8.3 million.

Precambrian Geology Division studies the bedrock geology of the mineral-rich Precambrian Shield to provide data used by industry in the search for mineral deposits and by government in developing mineral policies. The division provides isotopic age and paleomagnetic determinations and petrological information for all parts of Canada. 1984-85 resources were 73 person years and \$5.0 million.

Resource Geophysics and Geochemistry Division serves as a national centre for research and development into geophysical and geochemical methods used in the interpretation of geology and the search for mineral resources, and conducts systematic geophysical and geochemical surveys. Technologies developed are tested and made available to the private sector as well as to government. This division had a 1984-85 budget of \$7.4 million and 97 person years.

Terrain Sciences Division studies the geology of the unconsolidated materials of the landmass, processes that modify the landscape, and hazards that may affect our use of the land. Studies concerned with nuclear fuel waste management are co-ordinated by this division. The division had a budget of \$3.5 million and 64 person years in 1984-85.

Headquarters

Headquarters staff in Ottawa provide management direction and program administration and are supported by sectoral financial and personnel services. Branch-wide activities such as the International Relations Office, GSC input to the external research agreements program and the compilation of the 1:1 million Geological Atlas of Canada are also handled through this office which in 1984-85 had a staff of 37 person years and a budget of \$3.0 million.

Some Achievements in 1984

- an interdisciplinary project is studying the glacial history of east-central Ellesmere Island and adjacent coasts of Greenland. Studies include fluctuations of sea level, botany, rock weathering, climatic and geomorphic changes. GSC staff were joined by participants from Scandinavia and Canadian universities and research institutes.
- geological, geophysical and geochemical investigations of potential geothermal sources were augmented by bio-assays to test the effect of such waters on living organisms to determine their potential for fish and shellfish culture.
- emphasis in mineral deposits research was given to the study of west coast seafloor hydrothermal sulphides and similarities of these occurrences to ancient seafloor deposits in Cyprus. New ideas on the relationships between deposit types and terranes in the Cordillera thought to reflect past plate collisions were expanded and ideas on structural and stratigraphic domains for gold in Manitoba and Saskatchewan were described.

- GSC continued to provide expertise in producing mineral resource assessments especially those in proposed National Park sites in NWT and Yukon. In the course of such work in Artillery Lake Basin NWT new lead-zinc-copper occurrences were found.
- as part of its contributions to the EMR Petroleum Resource Appraisal Panels assessments were made of the Devonian and Pre-Devonian remaining oil potential of Western Canada.
- co-operative ice scour mapping program completed on Beaufort Shelf disclosed a significant number of new or deep scours. Core obtained from more than 12 boreholes near King Point and Phillips Bay are being used to assess nearshore geotechnical and permafrost properties of sediments.
- near-surface instability of the continental slope along much of the Labrador and continental margins including areas of well sites were examined using SEAMARK I. Iceberg scours were detected to water depths of 650 m. SEABED II work on Scotian Shelf in 2000 m of water revealed debris flows, pockmarks and relict iceberg scours.

New Facilities

The new joint University of Ottawa-Carleton University – GSC Stable Isotope Facility was brought into routine production. An inductive coupled plasma 48 channel optical mass spectrometer to facilitate isotopic analysis of hard-to-analyze elements such as boron was installed. This will enhance the understanding of mineralization processes and thus the discovery of new ore bodies. The newly opened geochronology laboratories provide some of the best clean-air facilities in the world and place Canada at the forefront of U-Pb geochronology.

Meeting the Public

As part of its program to keep the public and industry aware of its work the GSC held a 2-day Current Activities Forum in Ottawa in January attended by about 500 visitors. The Cordilleran Geology Division participated in a similar program in Vancouver sponsored by the BC and Yukon Chamber of Mines which attracted more than 900 registrant mainly from the exploration industry. Both events combined formal presentations and poster sessions. Some of the posters from the Ottawa Forum were displayed at the Prospectors and Developers Convention held in Toronto in March. The Branch also participated in the display activities of the Annual Geological Association of Canada meetings.

2. Quaternary Geoscience in Canada: Progress Report – 1984

During 1984 the Quaternary commission has held two well-attended meetings and has made substantial progress towards the final report. The first meeting, in May, at the University of Western Ontario was designed to introduce the new chairman (J. Brian Bird) to the work of the committee and to develop an appropriate program to analyse the major questionnaire that had been distributed to Quaternary scientists across Canada.

As a result of the meeting, responses to the questionnaire were divided into regional groups and committee members from each region were asked to analyse them before the second meeting of the year. This was held in Ottawa in November at the Geological Survey. Reports were received from all regions. They revealed comprehensive replies from the government and university sectors but a weaker response from the private sector. A personal interview program was established to remedy this shortcoming. The committee also received the first (from Ontario) of regional reports of the teaching status in Quaternary studies in universities.

At the November meeting a detailed discussion was held on the nature (and boundaries) of the Quaternary geosciences and the edited summary of this discussion will form part of the introduction to the final report. Agreement was also reached on the format of the final report and committee members have been allocated sections for preliminary drafts.

The next meeting of the commission will be at a national Quaternary meeting at Lethbridge in August, 1985. By that time it is planned that many of the draft sections of the report will have been written and the Chairman will have visited several of the regional members.

During the year Dr. D.A. St-Onge resigned from the committee and was replaced by Dr. Lynda Dredge of the Geological Survey of Canada. The committee has been aware of its responsibility to obtain additional funds. In response to more than a dozen approaches to organizations and governments across the country, \$2000 has been promised and there is some optimism that forthcoming personal interviews may produce some more.

J. Brian Bird

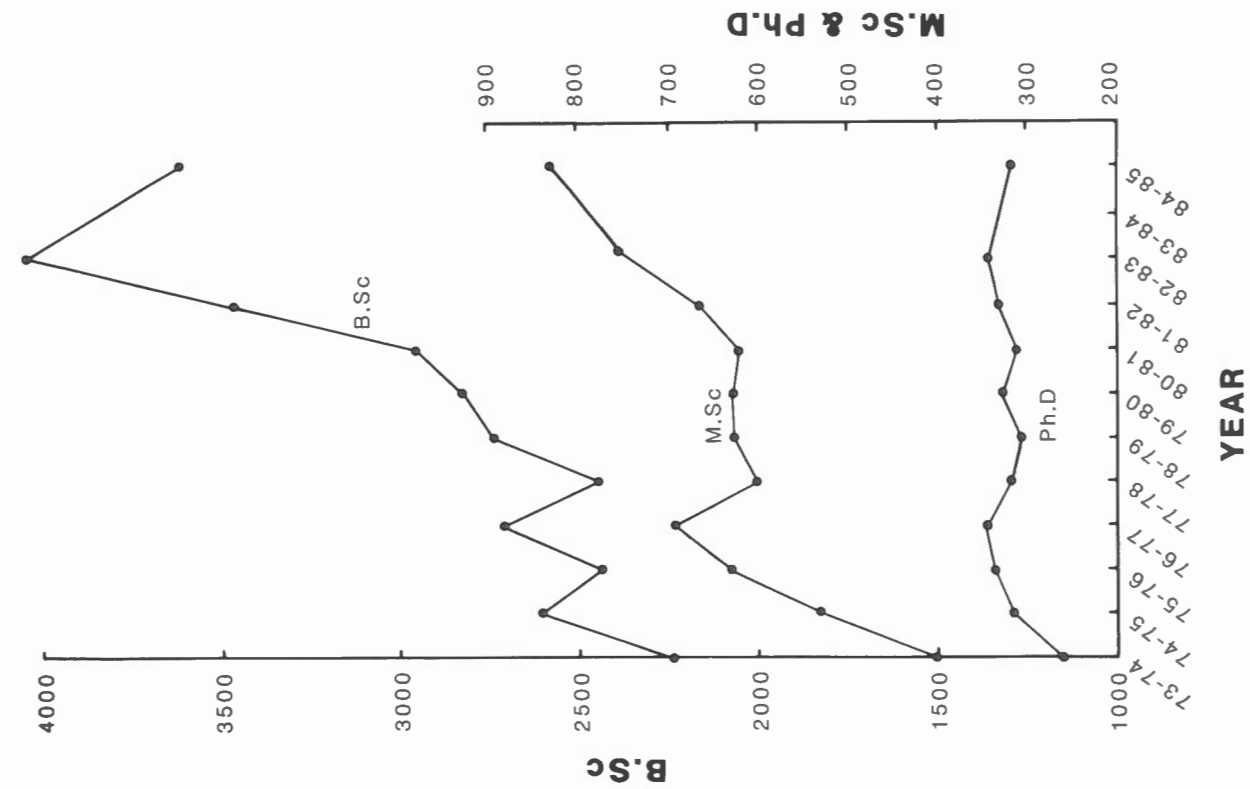


Figure 1. Undergraduate and graduate student enrolments 1973-74 to 1984-85 in Canadian earth sciences departments.

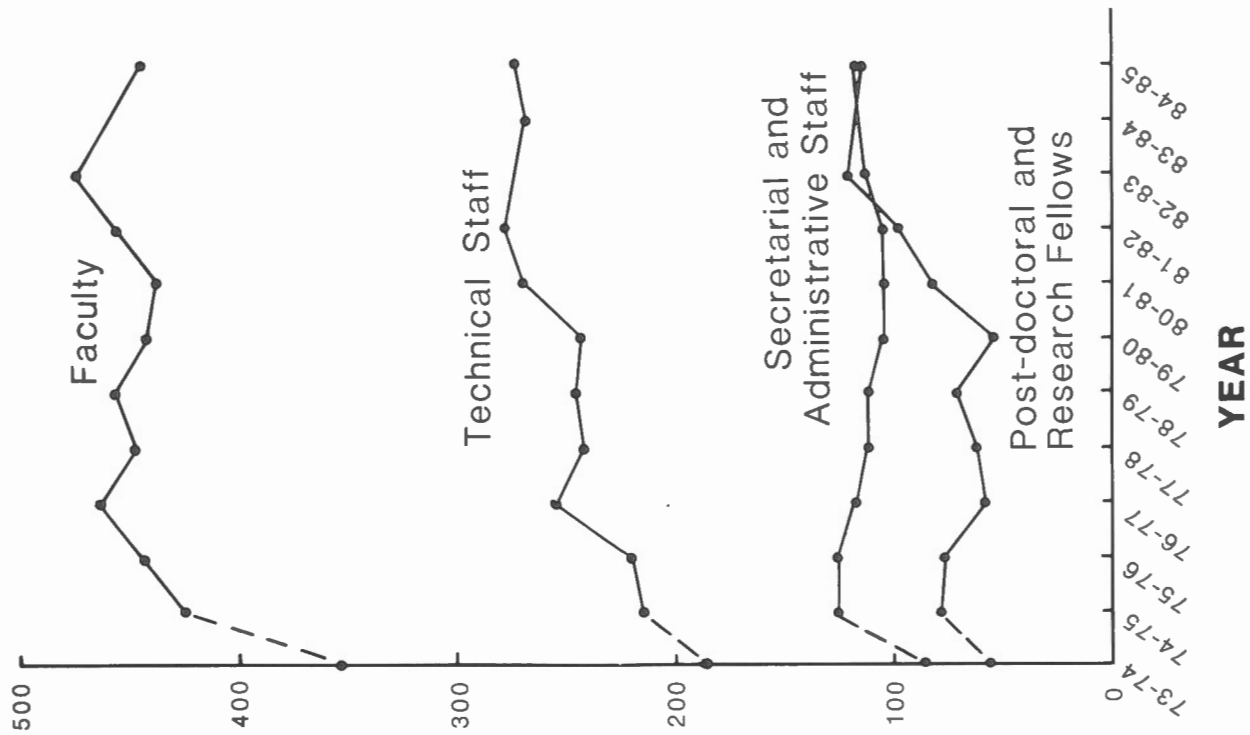


Figure 2. Number of Faculty, Staff and Research Fellows in Canadian earth sciences departments from 1973-74 to 1984-85.

REPORT ON ENROLMENT STATISTICS IN EARTH SCIENCES IN CANADIAN UNIVERSITIES: 1984-85

The Council of Chairmen of Canadian Earth Science Departments (CCCESD) has periodically provided statistical data on enrolment patterns in earth sciences in Canadian universities. Previous reports to CGC contained data up to 1979-80 (W.S. Fyfe in GSC Paper 81-6, Pt. 2, p. 17-19) and the 1980-83 data were reported by B.R. Rust (GSC Paper 83-6, p. 20-22). Both authors noted the incomplete nature of their data since some departments had failed to report. Department chairmen annually complained at CCCESD meetings about the number of questionnaires from both internal and external agencies requiring data on enrolment statistics. In 1983-84 the CCCESD agreed to work with EMR officials in designing a new form that would be used annually to gather such statistical data. The results will be published annually in the CGC Annual Report to provide a permanent record to allow comparison of trends. No data were collected for 1983-84 while this revision was being undertaken. The 1984-85 data reported herein are the first under the new questionnaire format and similar data will appear annually in this CGC document. Some minor revisions will be necessary in the next questionnaire to improve the evenness of reporting. It is unlikely that a complete submission from over 40 geoscience departments can be achieved in any one year. This year is no exception and the data were not submitted from the University of Guelph, the University of Saskatchewan (Geological Sciences), and the University of British Columbia (Geological Sciences) doubtless causing some distortion of the statistics. However, the data from most departments were submitted and allowed for the observations made below with supporting tables and graphs.

Undergraduate enrolment

i. Service and first year courses

The data reported (Table 5) show a sharp decline from over 10 000 in 1982-83 to 6618 in 1984-85. It is likely that some departments only reported their own first year introductory course rather than all their service courses for other departments.

ii. Undergraduate students

Second year majors (1140 total; Table 5) show a marked decline of 27 per cent over the last recorded registrations in 1982-83. This returns to a level of registration similar to 1980-81 and the late 1970s. The decline is felt in all regions except Quebec where a significant increase is reported.

Third year majors (1157 total; Table 5) also show a decline over the previous reporting year but of only 11 per cent. Again, only Quebec showed an increase over the previous year. These numbers represent the second highest enrolment since 1973-74.

Fourth year (final year) majors (1286 total; Table 5) show a 24 per cent increase over 1982-83 and record the highest levels ever achieved. All regions except Western Canada showed an enrolment increase.

The above figures reflect the end of an enrolment bulge that has passed through the universities in the last three years. This increased enrolment was undoubtedly influenced, if not caused directly, by the strong employment demand in the oil industry in the late 1970s and the early 1980s. The freeze in hiring in that industry in more recent years and the continued downturn in the mineral industry has probably caused the decline in registration in third and second year programs. In 1983-84 a total of 798 Bachelor degrees in earth sciences were awarded.

Graduate enrolment

i. Masters degree students

A total of 829 Masters degree students were reported as enrolled in 1984-85 (Table 5). This is a 10 per cent increase over 1982-83 enrolment and enrolment has increased by a similar annual increment since 1980-81 and is certainly at the highest level in the past decade. All regions, except Western Canada, showed an increase over the previous year. The increase is interpreted as a reflection of many students continuing into graduate school instead of being employed directly after their Bachelor's degree by the oil industry which was the anomalous pattern for a short period in the late 1970s and early 1980s. In 1983-84, 227 Master's degrees were awarded in the earth sciences.

ii. Doctoral degree students

Students registered for a Ph.D. program totalled 318 in 1984-85 (Table 5) for an 8 per cent decline over the 1982-83 enrolment. This is the first decline for about five years, but enrolments have been between 307 and 346 over the last decade so no major significance should be attributed to this change. In 1983-84, 73 Ph.D. degrees were awarded in the earth sciences.

iii. Regional and gender patterns in graduate enrolment

Table 6 shows the regional and gender patterns of enrolment for the Atlantic Canada, Quebec, Ontario, and Western Canada. Over 47 per cent of the graduate students are enrolled at Ontario universities. The same table includes data on the regional distribution of male and female graduate students, respectively. Female students comprise 27 per cent and 14 per cent of the total M.Sc. and Ph.D. students; these proportions are similar for Atlantic Canada, Quebec and Ontario but the percentage of female graduate students is notably lower in both degree programs in Western Canada.

iv. Subdiscipline patterns of graduate enrolment

The new questionnaire requested a breakdown of graduate student enrolment by subdisciplines, degree program, and gender of student. The data returned are compiled by region showing these categories (Table 7). The subdisciplines are grouped under the larger units of Geology and Geophysics with 25 and 10 subdisciplines in each, respectively. Regretably, these subdivisions cannot cover every subdiscipline nor can all students be readily assigned to them due to the continuum, and interdisciplinary nature of research. Engineering geology was unfortunately omitted and the majority of students listed as "Geology-other" fall into this category. Geophysics will require new subdiscipline categories since 62 students are classified as "Geophysics-other". In this category are included students in fields such as glaciology, physical oceanography, instrumentation and groundwater geophysics.

The data shown in Table 7 are partially restructured as Table 8 to rank the subdisciplines by enrolment numbers. The data are useful in predicting the potential supply of specialists for industry and government agencies in particular subdisciplines. Many of the subdivisions with high enrolments are strongly linked to the fields of most concern to the mining and petroleum industries. However, there are many subdisciplines with less than 10 graduate students enrolled which are significant for Canadian economic development. It is hoped that with only minor modifications to the subdiscipline categories, it will be possible to determine changing patterns of subdiscipline enrolment through future years of reporting. The sharp increase in enrolment in hydrogeology in recent years, for example, is a reflection of new programs in some universities. Students in Geology and Geophysics comprise 82 per cent and 18 per cent of the total graduate enrolment, respectively.

Faculty and staff in earth science departments

The number of faculty members, post-doctoral and research fellows, administrative and secretarial staff, technical staff, and instructors and demonstrators are reported in Table 5, grouped by region. The figures for Western Canada are lower than reasonably expected and these values partly reflect a lack of reporting by some departments in that region. Faculty numbers in Quebec and Ontario have remained relatively constant, while an increase is evident for Atlantic Canada. An increase in part-time faculty is seen in most regions, probably in response to budgetary cut-backs while coping with large enrolments.

The number of post-doctoral fellows and research fellows has also remained relatively constant with over 80 per cent being funded from research grants and contracts. Relatively few of the new NSERC University Research Fellowships have been awarded to earth scientists so this new program has not materially affected the ratio of about one PDF/research fellow to four faculty members.

The number of both secretarial and administrative staff and technical staff has also remained virtually constant since 1980-81. Cut-backs have been made in these areas but offset by faculty members contributing research funds to maintain such positions. For the first time in this reporting, the 1984-85 data (Table 5) show both university-funded and grant-funded positions under these categories. Likewise, instructors and demonstrators for laboratory courses are listed for the first time (Table 5). On average, for each faculty member there are 0.3 secretarial-administrative staff, 0.6 technical staff, and 0.08 instructor-demonstrator staff.

The static pattern of the number of faculty, PDF-research fellows, and all categories of staff noted extends back to 1974-75 (Fig. 2). This is in marked contrast to the increased enrolments in undergraduate and graduate students through the last decade shown in Figure 1. These data support many recent articles describing the serious situation that has developed in universities due to the combination of increase enrolments, reduced or constant operating budgets, and reduced levels of research funding. Enrolments now have peaked and show a modest decline to a more normal level; operating budgets show no improvement; NSERC research grants have shown a percentage increase in recent years whereas the total budget for EMR grants has remained constant for the last few years, effectively a significant real decline in constant dollar value.

These enrolment data for 1984-85 and the above analysis are presented to the federal Department of Energy, Mines and Resources by the Council of Chairmen of Canadian Earth Science Departments after compilation by the Executive.

Christopher R. Barnes
Chairman, CCCESD

Table 5

STUDENT AND STAFF NUMBERS IN CANADIAN EARTH SCIENCE DEPARTMENTS, 1980-1985

	Year	Atl.	Que.	Ont. ¹	West ²	Total ^{1,2,3}
All students taking 1st year courses and service courses	80-81	1048	102	3992	4058	9200
	81-82	1142	116	4661	3770	9689
	82-83	1402	142	4595	4067	10206
	84-85	685	73	3334	2526	6618
2nd year majors: Arts & Science & Engineers	80-81	150	150	490	386	1176
	81-82	192	132	593	447	1364
	82-83	208	169	721	469	1567
	84-85	156	259	421	304	1340
3rd year majors: Arts & Science & Engineers	80-81	82	145	379	305	911
	81-82	121	157	421	378	977
	82-83	174	147	544	439	1304
	84-85	147	234	459	317	1157
4th year majors: Arts & Science & Engineers	80-81	94	96	269	267	726
	81-82	92	125	307	345	869
	82-83	125	134	387	389	1035
	84-85	186	252	515	333	1286
M.Sc. (full-time & part-time)	80-81	46	137	282	158	623
	81-82	51	158	299	157	665
	82-83	55	180	320	199	754
	84-85	97	222	374	136	829
Ph.D. (full-time & part-time)	80-81	26	35	157	92	310
	81-82	29	41	165	95	330
	82-83	33	43	178	90	344
	84-85	42	41	170	65	318
PDF & Research Fellows	80-81	7	8	31.5	36	82.5
	81-82	8	6	44	41	99
	82-83	9	8	51.5	53	121.5
	84-85	4/13	6/14	6/45	1/26	17/98*
Faculty, full-time	80-81	52	75	175.5	135	437.5
	81-82	65	79	177	136	457
	82-83	69	80	188.5	138	475.5
	84-85	93/3	84/2	181	79/4	430/9*
Faculty, part-time	80-81	6	6	19	14	45
	81-82	6	6	13	16	41
	82-83	7	2	10	22	41
	84-85	12	6	34/6	6/4	58/10*
Secretaries & Admin. Assts.	80-81	15	17	38	34.5	104.5
	81-82	16	15	39.5	34	104.5
	82-83	16	16	46	35.5	113.5
	84-85	20/3	21/1	36/14	18/5	95/23*
Technicians	80-81	30.5	38	101.5	100.5	270.5
	81-82	33.5	37	107.5	99.5	277.5
	82-83	38.5	37	96	96.5	268
	84-85	38/39	28/9	62/41	29/28	157/117*
Instructors & Demon.	84-85	9	6	11	8	34
Degrees awarded						
B.Sc.	83-84	127	181	374	116	798
M.Sc.	83-84	27	86	90	24	227
Ph.D.	83-84	14	20	22	16	72

¹ No report from University of Guelph (Land Resource Science)² No reports from University of British Columbia (Geological Sciences) and University of Saskatchewan (Geological Sciences)

* Divided into university-funded and grant-funded positions, respectively.

Table 6

SUMMARY OF GRADUATE STUDENT ENROLMENT BY PROGRAM,
GENDER, AND REGION 1984-85

	M.Sc.		Ph.D.		<u>Total</u>
	M	F	M	F	
Atlantic Canada	73	24	35	7	139
Quebec	177	45	37	4	263
Ontario	291	83	142	28	544
Western Canada	<u>112</u>	<u>24</u>	<u>64</u>	<u>1</u>	<u>201</u>
TOTAL	653	176	278	40	1147

Table 7

GRADUATE STUDENT ENROLMENT BY A SUBDISCIPLINE 1984-85

GRADUATE STUDENTS BY SUBDISCIPLINE	ATLANTIC				QUEBEC				ONTARIO				WESTERN CANADA				Total
	MA		Ph.D.		MA		Ph.D.		M.Sc.		Ph.D.		M.Sc.		Ph.D.		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
GEOLOGY																	
Coal Geology	1				39	7	9	1	63	12	2	1	4				8
Economic Geology	8	5	6		7	2	6		2	2	9	5	12	3	4		195
General & Regional Geology	3				2		1		7			1					32
Geochemistry - Exploration	1																11
- Physical	1		1						20	8	18	6	1		1		55
- Organic	1				17	5	3		1	2							4
- Other	1		1			1			5	2	4	3					40
Geochronology									3	1	2	1					9
Geomorphology					4	1			1		2	2					2
Geomathematics					10	3	1		15	11	7	2	6	1	4		8
Hydrogeology																	60
Limnology																	0
Marine Geology	2	2		1							1	1	1		1		10
Mineralogy & Crystallography					1	1	1		3	2		1	2		3		15
Paleontology	10	3	4	2	1	3	1		10	6	9	1	3	1	1		55
Palynology	1								1	2	2	1					7
Petroleum Geology	2								1								17
Petrology	14	6	5	2	21	6	2	2	15	2	4	1	7	2	3		87
Quaternary Geology					9	1			16	2	5		4	2	1		50
Remote Sensing					2				2		3						7
Sedimentology	10		5	1	15	7	2	1	29	6	13	2	8	5	2		106
Stratigraphy	2		1		7	1	2		6	6	1				1		21
Structural Geology & Tectonics	8	6	4	1	14	1	3		15	9	10	1	12	1	4		89
Volcanology			1		4	1			1		2						9
Other: Specify	1		2		10	2			16	3	4		5	1	2		45
Total Geology	65	24	30	7	163	42	82	4	226	76	121	27	75	19	32		943
GEOPHYSICS																	
Exploration Geophysics					11	2	4		14		5						36
Geodesy																	0
Geodynamics							1		5	2	3		1		1		13
Geomagnetism			1		2				13	1	9		4	2	4		36
Geothermal			1						2		1		1				5
Gravity	2								2	1	1						6
Marine Geophysics	2		2						1	1	1						7
Seismic	1		1		1		1		7	1	1	1	14	2	7		37
Remote Sensing	2																2
Other: Specify	1								21	1			17	1	20	1	62
Total Geophysics	8		5		14		3	5	65	7	21	1	37	5	32	1	204
Total Students	73	24	35	7	177	45	37	4	291	83	142	28	112	24	64	1	1147

Table 8
NUMBER OF GRADUATE STUDENTS RANKED BY SUBDISCIPLINE (1984-85)

Economic Geology	195
Sedimentology	106
Structural Geology & Tectonics	89
Petrology	87
Geophysics – other subdisciplines	62
Hydrogeology	60
Physical geochemistry	55
Paleontology	55
Quaternary geology	50
Other subdisciplines (Eng. Geol.)	45
Geochemistry – other	40
Seismic	37
Exploration Geophysics	36
Geomagnetism	36
General and regional geology	32
Stratigraphy	21
Petroleum Geology	17
Mineralogy and crystallography	15
Geodynamics	13
Geochemistry – exploration	11
Marine geology	10
Volcanology	9
Geochronology	9
Coal Geology	8
Geomathematics	8
Palynology	7
Remote Sensing (Geology)	7
Marine Geophysics	7
Gravity	6
Geothermal	5
Geochemistry – organic	4
Geomorphology	2
Remote Sensing (Geophysics)	2
Limnology	0
Geodesy	0