an informal branch newsletter

GEOGRAM

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December, 1989, no. 28

What Quebec-born former GSC explorer/geologist, and contributor to Canadian literature lived here following his successful service as Director of the New Zealand Geological Survey?

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GEOLOGICAL SURVEY
COMMISSION GÉOLOGIQUE

Answer on p. 5

Canada

Energy, Mines and Resources Canada

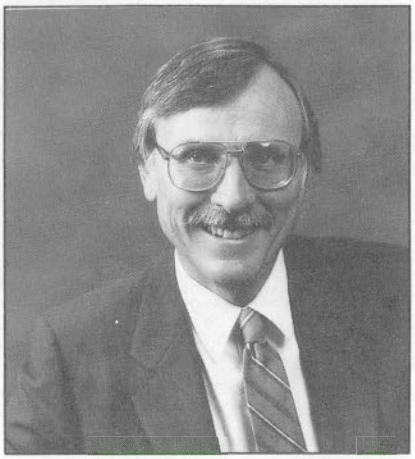
Énergie, Mines et Ressources Canada

Reorganization of the Geological Survey of Canada

In a memo to all GSC staff, dated 5 July 1989, our Assistant Deputy Minister (ADM), Ken Babcock, announced a reorganization of the four Branches of the Survey, as shown in the accompanying chart. The reorganization consists of the following main changes.

The Chief Scientist will no longer be responsible for running an operations branch but will act as a senior advisor to the ADM on all aspects of GSC science programs. Robin Riddihough will occupy this position initially, although it will be a rotating one.

The operations branch (Information and Services) will have Pierre Lapointe as Acting Director General (DG) and will be responsible for all non-research operational, administrative, policy, and financial aspects of the Survey. Divisions include Program Coordination and Planning, Geoscience Information (Acting Director, Annette Bourgeois), and Administrative Services. The Polar Continental Shelf Project will be part of this branch, but its Director will report directly to the ADM.



Ken Babcock

Chris Findlay remains as Director of the Minerals and Continental Geoscience Branch which includes three Divisions: Continental Geoscience (formerly Lithosphere and Canadian Shield), Mineral

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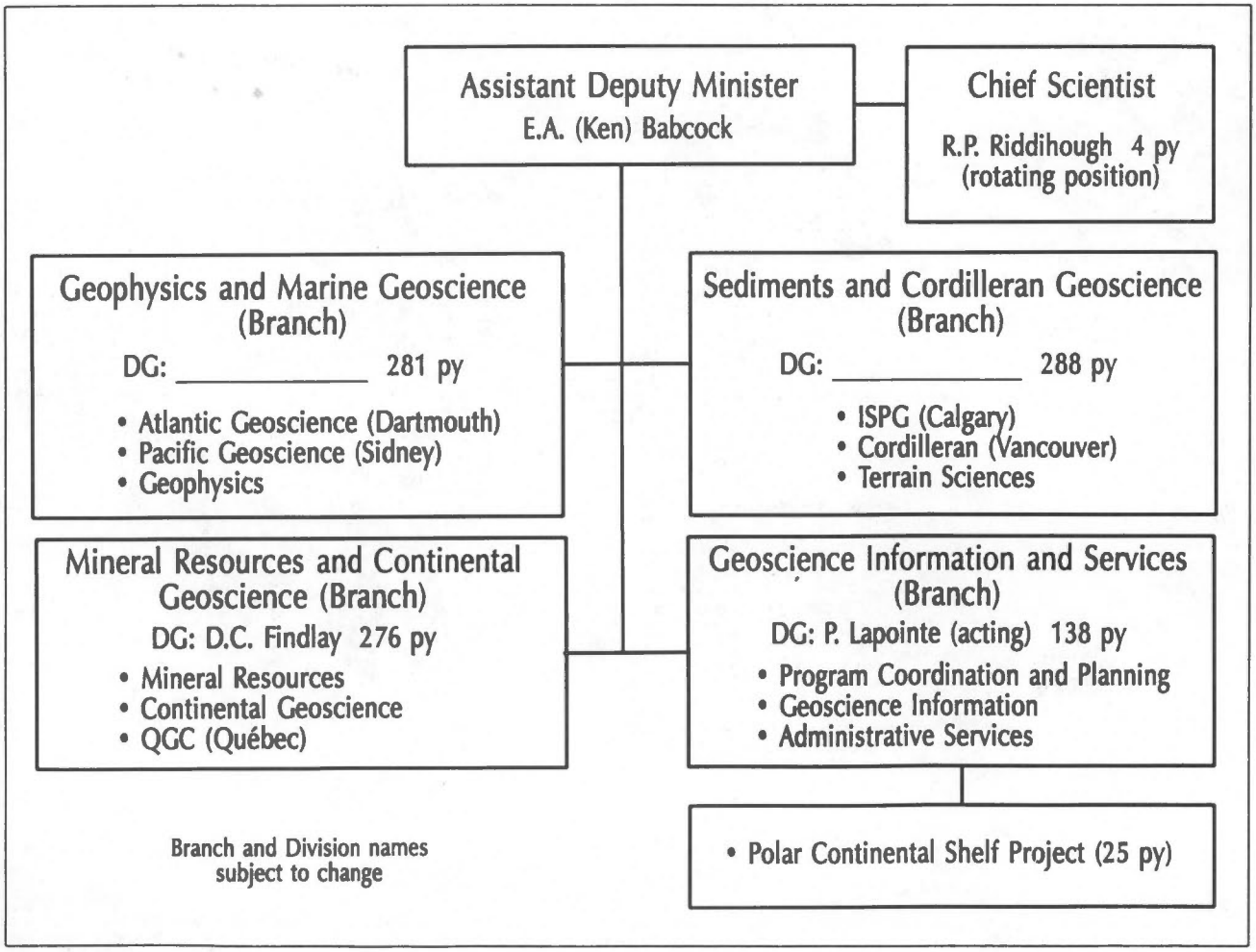

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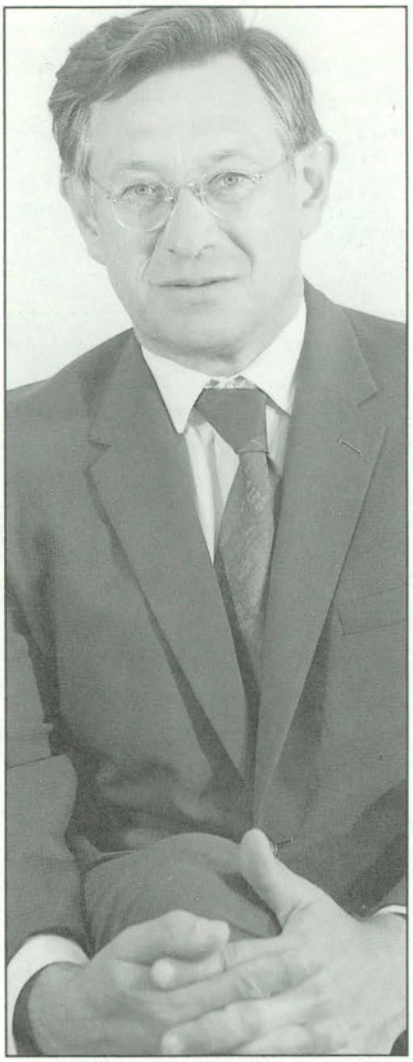
J.A. JELETZKY

It is with great sadness that we report the death on 4 December 1988 of George Jeletzky, a long-time member of the Geological Survey of Canada. He was born Jurij Alexeyevich Romanov at Pensa, Russia in 1915. With adoption by his stepfather in 1930 he changed his name to Jeletzky and a further name change occurred when he exchanged Jurij for George after coming to Canada in 1948.

George completed his graduate work at the University of Kiev in 1941 and was there when the German armies arrived. When the Russian forces returned in 1943, George and his family moved west to Poland and then on to Germany. Through all of these moves George managed to keep possession of his collection of Cretaceous belemnites.

George came to Canada in 1948 to work for the Geological Survey of Canada, having already published several works on Cretaceous stratigraphy and belemnites. He retired from the Survey in 1981, but continued to work hard even after being afflicted with cancer a few years ago.

He worked on Vancouver Island initially producing geological maps and structural and stratigraphic reports and this work was followed up with studies of correlative strata in southern British Columbia. His second major area of study was the northern Yukon where he elucidated the stratigraphy, structure, and paleontology of Mesozoic rocks. His outstanding contribution to the work of the Geological Survey of Canada was sustained research on the Cretaceous stratigraphy and fossils of Canada. George was a prolific writer and made major contributions to paleontology, particularly the study of Cretaceous ammonoids, the bivalve *Buchia*, and the Mesozoic coleoids, particularly belemnites on which he began his paleontological career. Indeed, George was engaged in the production of the volume on coleoids for the Treatise on Invertebrate Paleontology when he died. He was a great champion of the role that fossils play in biochronology and development of the Phanerozoic time scale. George had broad interests that impacted upon many aspects of geology including paleogeography, tectonics, and eustacy.



1915-1988

George thrived on challenge and controversy. He was a formidable opponent in any scientific debate and will be greatly missed by his colleagues around the world. His accomplishments have been recognized by the award of the Miller Medal of the Royal Society of Canada, of which he was a fellow, and the Billings Medal of the Paleontology Division of the Geological Association of Canada.

During his illness, George demonstrated the spirit that characterized his scientific work; his fortitude during these difficult past few years has been a source of admiration to all those around him. His passing marks the end of an era in Canadian Mesozoic paleontology.

Godfrey S. Nowlan

L.E. STEPHENS

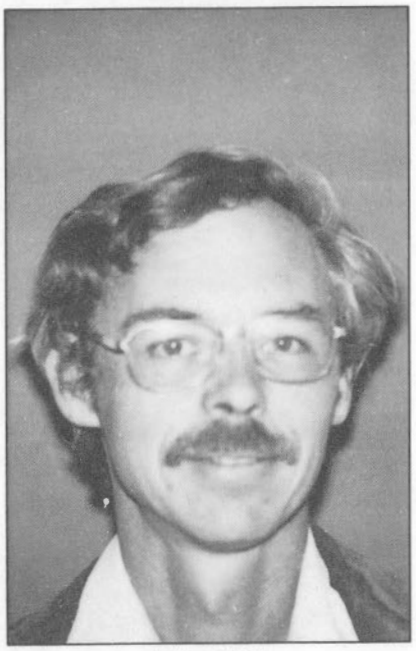
Lawrence Ellsworth Stephens died at his home in Aylmer, Quebec on 4 May 1989, at the age of 48. He is survived by his wife, Raymonde Gagnon, and his children, Doug, Martin, Eric, Anne-Marie, Elizabeth, and Rachel.

Larry was born in Holbury, Hampshire, England on 11 September 1941, was educated in Ontario and Alberta, and received his Honours B.Sc. (1965) and M.Sc. (1970) in Geophysics from Queen's University.

Larry joined the staff of Energy, Mines and Resources in the fall of 1966. Until 1980, he worked in the Gravity Division of Earth Physics, based first in Ottawa and later at the Pacific Geoscience Centre. During these years he took part in gravity surveys, data analysis, and interpretation, with field work from Arctic Canada to offshore Eastern Canada.

For the last nine years Larry applied his talents in the Resource Geophysics and Geochemistry Division and subsequently Mineral Resources Division of the GSC to electrical and electromagnetic methods of geophysical exploration and physical rock properties measurements. He maintained his enthusiasm for field work and developed a keen interest in computer technology.

In the field of electromagnetics, Larry investigated a wide variety of applications which ranged from deep sounding stratigraphic mapping, and overburden and bedrock topography mapping, to archaeological investigations prior to excavation for the new Museum of Civilization, overburden exploration in Malaysia, mapping of groundwater contamination from local land fill sites, and most recently his highly successful work in the Arctic where he used EM methods to map offshore permafrost in the Beaufort Sea.



1941-1989

Larry will be missed by his many colleagues and friends, and remembered by them for his energy and enthusiasm. He took a personal interest in guiding and advising students pursuing geophysical studies. He was always willing to share his knowledge, helpful to co-workers who were less well versed in his specialties. We knew him as a good field man; he was a dependable comrade in the Arctic, and always a kind and friendly colleague.

Keith Richardson

(from page 2)

Resources, headed by Murray Duke, and the newly established Quebec Geoscience Centre in Sainte-Foy, Québec, headed by Aicha Achab.

A Geophysics and Marine Geoscience Branch (DG to be announced) has been formed from three Divisions: Atlantic Geoscience, headed by Dave Ross, Pacific Geoscience (formerly part of the Cordilleran and Pacific Geoscience Division), Acting Director Dieter Weichert, and Geophysics, headed by Mike Berry.

The fourth Branch, Sedimentary and Cordilleran Geoscience, also with DG unannounced, consists of the Institute of Sedimentary and Petroleum Geology, headed by Walter Nassichuk, the Cordilleran Division, headed by Dirk Tempelman-Kluit, and the Terrain Sciences Division under the direction of Denis St-Onge. Chris Barnes, DG of the former Sedimentary and Marine Geoscience Branch, left the GSC in September 1989 to become Director of the Centre for Earth and Ocean Research at the University of Victoria in British Columbia.

Generally speaking, under the new organization, the branches will be more uniform in size, each will have a national mandate, and all Directors General will have staff in the National Capital region.

COVER

Answer:

JAMES MACKINTOSH BELL

James Mackintosh Bell (b at St. Andrews, Quebec, 23 September 1877; d at Almonte, Ontario, 31 March 1934) as a youth lived at Almonte where his high school classmates were James Naismith and Robert Tait McKenzie, later to become, respectively, the inventor of basketball and the noted surgeon-educator-sculptor. "Mac" Bell graduated from Queen's University and received excellent summer training as a geologist from Robert Bell (1841-1917), later Acting Director of the Geological Survey of Canada. James Mackintosh Bell began his professional career in the service of the Geological Survey of Canada and explored parts of the Mackenzie River District, N.W.T. and the James Bay area of Quebec and Ontario (1899-1901). He undertook postgraduate courses at Harvard University and received his degree of Doctor of Philosophy. From 1902-1904 he studied the Precambrian rocks near Lake Superior, first for the Lake Superior Corporation and afterward for the Ontario Bureau of Mines. In 1905, while a lecturer at Harvard, he was appointed Director of the New Zealand Geological Survey, an office he served with distinction from 1905 to 1911. He reorganized the survey and developed a new geological mapping program in selected areas of potential economic importance.

In 1911 he left New Zealand, and after making some geological investigations in New Caledonia, joined a mining and financial firm in London, England. In the course of his association with this firm, Dr. Bell conducted exploration for copper deposits in the Kara Kum desert, Turkestan and in the Urals of Siberia. In 1915, Dr. Bell joined the Seventy-third Battalion of Montreal (Royal Highlanders) and served as a captain with that unit overseas and in France until 1917. He then transferred to the British Military Mission in Russia, as a general staff officer of the Intelligence Branch until 1919. Major Bell was mentioned in dispatches and was conferred the Order of the British Empire for his war service.

Dr. Bell later served as Canadian managing director of the Atlas Exploration Company and the Huronian Belt Company. He was also affiliated with the Northern Lead Zinc Company Limited. One of his successful exploration ventures was his discovery of additional ore at the Keeley silver mine, Cobalt district. Dr. Bell's reasoning led him to explore the possibility of enriched ore at depth in this mine. This led to discovery of bonanza ore at 400 feet, averaging more than 7000 ounces per ton over 4.5 feet. Throughout his career other commercial enterprises took him to China, Ceylon, Egypt, Japan, France, Spain, Switzerland, and throughout Canada, from Gaspé Peninsula to British Columbia. Dr. Bell published extensively in scientific journals on geological subjects, including his concepts of the genesis of lead-zinc deposits at Pine Point and silver deposits in the Cobalt district. Fifteen bulletins of the New Zealand Geological Survey were prepared under his direction. Fourteen of his Geological Survey of Canada notebooks plus two maps, two volumes of papers, and seven additional field notebooks are preserved in the National Archives, Ottawa.

Pictured on the front cover is "Old Burnside", the Almonte home of James Mackintosh Bell where he contributed greatly to Canadian literature with four books: "The Wilds of Maoriland", "Tales of the Red Children", "Sidelights of the Siberian Campaign", and "Far Places". These described some of his wide travels as GSC exploration geologist, mining consultant, and soldier. The house was designed by famous architects Nobbs and Hyde. A historical note including previously unpublished field instructions to JMB from GSC Director George M. Dawson in 1900 is included in the section "Of General Interest".

STAFF NEWS

ADMINISTRATIVE SERVICES DIVISION

Since January 1987, there have been several new arrivals to the Administrative Services Division of the GSC.

Danielle Bonney became the new secretary for the Director of Administrative Services in November 1987. Before joining the GSC, Mrs. Bonney was employed with the Petroleum Incentives Administration Program of Energy, Mines and Resources.

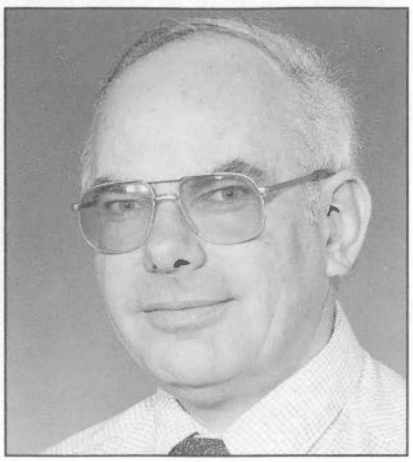
There have been several new arrivals to the GSC Registry as well. **David Hayes** took up his Classifier duties in February 1987. Before joining the GSC, Mr. Hayes worked for a number of years with the Restrictive Trade Practices Commission of Canada.

Terry King joined the Registry Office also as a Classifier in the summer of 1988. Prior to this, Mr. King held a number of contract positions with various federal departments.

Doug Janney, formerly the senior Personnel Officer for the GSC, transferred to the Health, Safety and Security Office in the summer of 1987 where he is the supervisor of that section.

ATLANTIC GEOSCIENCE CENTRE

The new Director of the Atlantic Geoscience Centre is **David I. Ross**. After graduating with a Ph.D. in Marine Geophysics from Victoria University of Wellington, New Zealand in 1966, Dr. Ross joined the Bedford Institute of Oceanography as a Research Scientist. In 1973 he was appointed Head, Regional Reconnaissance Subdivision of



D. Ross

the newly formed Atlantic Geoscience Centre. In 1978, he left the Institute to take up a position as Director of Operations at NORDCO Limited in St. John's, Newfoundland and Technical Director of Geonautics Limited. He returned to BIO as Assistant Director, AGC in 1984 and was appointed Director in September 1988. Dr. Ross' scientific interests encompass all aspects of marine geoscience. He has participated on scientific cruises in the north and south Pacific, north Atlantic, and Canadian Arctic regions, and has been an author or co-author of some 50 publications and reports.

Ron Macnab has ended a one-year term as Acting Head, Regional Reconnaissance subdivision ending September 1988. **Matt Salisbury** (from Dalhousie University) is the new Head of Regional Reconnaissance and will also be working on crustal properties. **Mike Keen**, previously Director of AGC, is now doing comparative studies of offshore basins with Regional Reconnaissance. Under the Young Scientist Program, **Gianna Bassi** from Institut français du pétrole and **Bob Courtney** from the University of Toronto, have joined Regional Reconnaissance to do geodynamic modelling. Congratulations to **Ruth Jackson** who has completed a Dr. Philos degree from the University of Oslo.

Alan Law, one of AGC's technicians, has left the federal government and is presently working with Canadian General Electric. His position was filled by **Bruce Wile**, formerly with Department of Fisheries and Oceans.

Vern Coady, a technician with AGC for 25 years, retired on 30 May 1988. He was presented with a long service award at a luncheon in his honour.

Sebastian Bell, a Research Scientist with AGC for two years, transferred to ISPG in Calgary.

Robert Taylor replaced **David Piper** as Head of Environmental Marine Geology (EMG) in an Acting capacity on 1 April 1988.

On 1 April 1988, **Dan Praeg** left EMG to pursue postgraduate work at the University of Illinois.

On 14 May 1988, **Karen Saunders** left her position as Palynological/Paleontological technician for the Eastern Arctic to Labrador section of EMG to pursue her career elsewhere.

On 26 September 1988, **Shelley Thibaudeau** commenced work as a Palynological/ Paleontological technician with EMG.

With the termination of the Northern Oil and Gas Action Program (NOGAP) on 30 September 1988, two positions filled by **Gary Sonnichsen** and **Phil Hill** were lost. Phil Hill started up his own contracting firm "Hill Geoscience Research",

and Gary Sonnichsen won a competition for a position commencing 5 October 1988 in the Southeast Canadian Margin section, which was previously held by **David Mosher**, who left EMG on 30 September to pursue his Doctorate degree in the Oceanography Department of Dalhousie University.

On 26 September 1988, **John Hughes-Clarke** commenced work at EMG under the postdoctoral fellowship program.

On 28 October 1988, **Lisa Drummond** terminated her part-time position as word processor operator for EMG, and commenced a full-time word processing position with Administration.

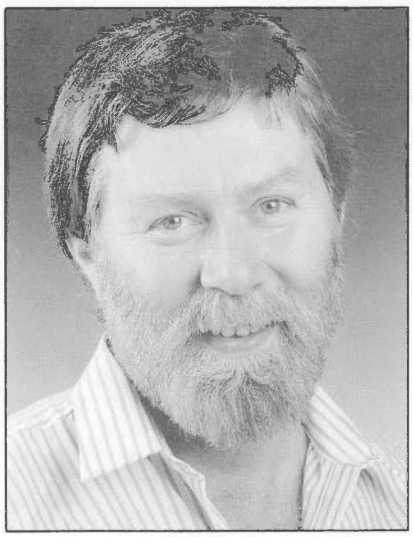
On 1 December 1988, **John Shaw** terminated his postdoctoral fellowship at EMG.

CORDILLERAN DIVISION

Jack Sweeny, the Division expert in gravity data analysis, moved to the Vancouver office from the Pacific Geoscience Centre. He will continue to use gravity and other geophysical data to solve problems in the Cordillera. His presence allows a nucleus of resident geophysical expertise close to exploration clients.

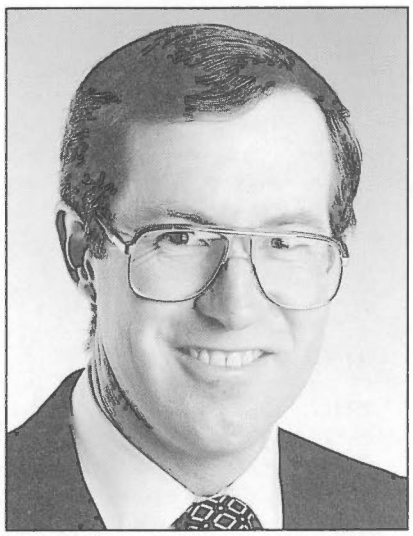
The Vancouver office is now the home of the Canadian Journal of Earth Sciences (CJES). **John Clague**, Terrain Sciences Division, is the new editor of this prestigious journal. Aiding him in his editorial duties is editorial assistant **Jeannine Lefebvre** who came to CJES from Simon Fraser University.

Two talented and energetic young scientists, **Murray Journeay** and **Cathie Hickson**, have been added to permanent staff this year. Journeay, an expert in strain fabric analysis in metamorphic rocks, will continue work in the southern Coast

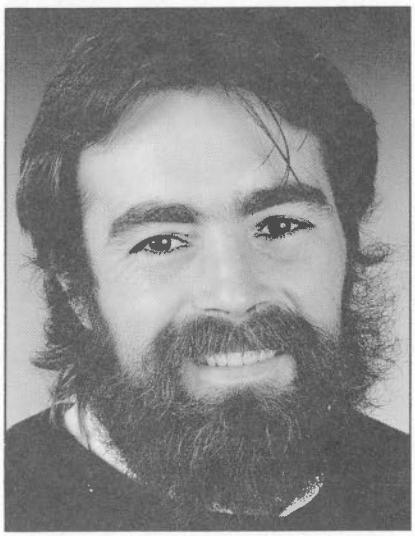


J. Sweeny

C. Hickson



J. Clague

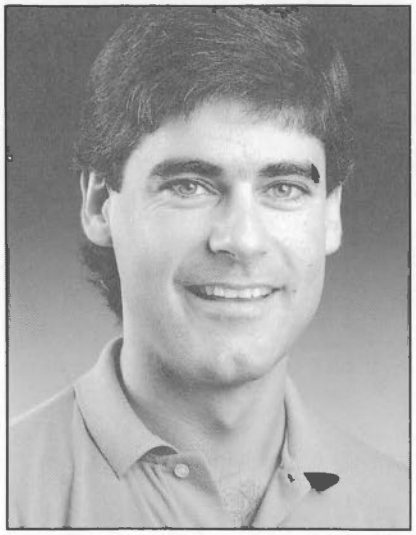


M. Journeay

Mountains that he began as a postdoctoral fellow (PDF). He completed his Ph.D. at Queen's University in 1985, taught at the University of Ottawa, did research at Carleton University, and was an assistant professor at Middlebury College, Vermont, before joining the GSC in 1988.

Hickson, a physical volcanologist, had been a PDF for some time. She has contributed to the understanding of the Masset volcanics in the Queen Charlottes project. Hickson completed her Ph.D. in 1987 from the University of British Columbia. She will begin new work in the Chilcotin-Nechako region, which will substantially improve understanding of the region geology and hydrocarbon potential.

Ever expanding computing requirements are now in the capable hands of **Arthur Haynes**, the new computer systems manager. An Honours graduate in mathematics and physics at the University of British Columbia, Haynes has wide ranging international experience in scientific programming and systems management. His first task will be the implementation of a new computer system for the office.



A. Haynes

Tony Christie is on a year's exchange visit from the New Zealand Geological Survey. Christie swapped positions with **Ken Dawson**, Mineral Resources Division. While here, he has been investigating epithermal gold occurrences at Grew Creek in Yukon Territory and at Cinola in the Queen Charlotte Islands. He completed his Ph.D. at Victoria University of Wellington, New Zealand in 1982 and worked for B.P. prior to joining the New Zealand Geological Survey in 1985.

Four exceptional PDFs, **Bob Turner, Greg Lynch, Don Murphy**, and **Peter van der Heyden** are presently at the Vancouver office. Turner, a PDF with the Mineral Resources Division, is a specialist in stratiform sediment-hosted lead-zinc deposits. Following a Ph.D. at Stanford University in 1986, Turner worked for Westly Mines before coming to the GSC. He intends to continue his investigations at MacMillan Pass, Yukon, and possibly at the Sullivan deposit in southeastern British Columbia.

Lynch completed his Ph.D. at the University of Alberta in 1988. He will expand the scope of his doctoral investigation of the Keno Hill silver-lead district to include the inter-relationship of hydrothermal mineral deposits and plutonism in this region.

Murphy completed a Ph.D. at Carleton University in 1986. His thesis topic dealt with the structure and tectonics of the Cariboo Mountains. Prior to coming to the GSC, he was a PDF at the University of British Columbia and a consultant to the Department of Indian Affairs and Northern Development. His regional mapping skills will be an asset to the Division.

Van der Heyden is from the University of British Columbia, where he defended his thesis in January 1989. His doctoral research was concerned with the U-Pb and K-Ar geochronometry of the Coast Plutonic Complex. He will collaborate with Cathie Hickson in the Chilcotin-Nechako region. This project will benefit substantially from his experience in Coast Ranges geology.

GEOPHYSICS DIVISION

The Division recently added two scientists to expand capabilities in research and interpretation of potential field (gravity and magnetics) data in the Gravity and Aeromagnetic programs. **Pierre Keating** joined the Division under the Young Scientist Program after completing his Ph.D. in Geophysics from McGill University in 1987. Dr. Keating's professional experience has included consulting in geophysics for ASCI Geoscience, Québec City, while completing his doctoral studies. **Mark Pilkington** also received his doctorate in Geophysics from McGill (1985). Prior to joining the Geophysics Division in 1987 as a postdoctoral fellow, he was employed by Urquhart-Dvorak of Toronto.

Benoit St. Louis graduated from Université de Sherbrooke in 1987 with a B Eng in electrical engineering. Benoit, a specialist in computer hardware and software, had spent all four of his university co-operative work terms at the Geophysics Division's Geomagnetic Laboratory on Anderson Road in Ottawa. Now a full time employee since early 1988, Benoit will continue to provide expertise in the development of instrumentation for field and observatory studies in the Seismology and Geomagnetism programs of the Division.

Jim Helferty is an Electronics Technologist who has taken over responsibilities for instrumentation in the seismology data lab. Prior to joining the Division a year ago, Jim was employed in a similar function with the Radiation Protection Branch of the Department of Health and Welfare.

Wim Knappers, who has been part of the Aeromagnetic Program since 1972, and who has managed contracted geophysical surveys in Canada and abroad for the GSC, has been seconded to CIDA for a two-year period that commenced in April 1988. Wim now divides his time between Ottawa and Bangkok, where he provides advice to the Government of Thailand and oversees airborne geophysics surveys being carried out for that government by Canadian industry. During his secondment **Joan Tod** has been recruited to oversee contract aeromagnetic surveys carried out under base and MDA programs. Joan's professional experience includes a position as the first geophysicist with the Newfoundland Department of Mines and Energy and, more recently, with Geoterrex Ltd. where she was involved in the data compilation and

Among other presentations, Bryan Boyd (right), Geophysics Division, receives a sweatshirt, emblazoned MCP for Mapping and Charting Program, from Charles (Chuck) D. Hill, Deputy Director, Programs, Production and Operations, Headquarters Defense Mapping Agency, Washington, D.C. in recognition of his 18 years of service to the Canada-United States Mapping and Charting Subcommittee.

interpretation phases of aeromagnetic surveys.

Spiros Pagiatakis received his Ph.D. in Geodesy from the University of New Brunswick in the spring of 1988, and took up a postdoctoral fellowship in the Geophysics Division a few months later. During his tenure he will be involved in the Geodynamics Program's activities connected with Very Long Baseline Interferometry (VLBI), satellite geodesy, and polar motion monitoring.

Lyman Warren, former Head, Cartographic Drafting and Design Section, retired after a 37-year career in the Public Service, which included 19 years on Observatory Campus with the Observatories Branch/Earth Physics Branch/Geological Survey. His cartographic skills have been retained on a one third-time basis to complete the National Earth Science Series Gravity maps. His successor, **Earl Maahs**, moved to Observatory Campus in mid-summer 1988 from the GSC Cartography Section at 601 Booth Street, where he was Supervising Cartographer of a mapping unit. **Lawrence Campbell** transferred from Indian and Northern Affairs Canada to also join the Geophysics Division Cartographic Drafting and Design Section.

Although **Dr. Margaret Bower** officially retired in December 1988 from the Aeromagnetics Program of the Division, she will continue her research in the position of Scientist Emeritus. Dr. Bower joined the Geophysics Division of GSC in December 1950. Most of her career since 1962 has been spent in association with the National Aeronautical Establishment, NRC now located at Uplands. Her expertise in airborne data acquisition and development of navigation techniques for remote areas have been combined in many aeromagnetic surveys that provided much of the offshore data for the recently published Magnetic Anomaly Map of North America.

Howard Knapp retired following a career with the Geophysics Division of the GSC that began in April 1954. Besides establishing and handling the base-station communications operation for the initial helicopter surveys in Operation Baker and Operation Thelon, Howard also was responsible for the maintenance and development of all GSC field radios, as well as training on their use for field officers. Howard was instrumental in the development of the first proton magnetometers for airborne surveys, and of the high resolution aeromagnetics system for the NAE Northstar aircraft. Subsequent projects included modification, improvement, and compaction of the system for the lighter Queenair survey aircraft, and development of the first fixed gradiometer system for airborne operation. Both are now widely used in the Canadian aeromagnetic survey industry.

J. Bryan Boyd, Head of the Gravity Surveys Section, retired in December 1988 after 36 years in the Department of Energy, Mines and Resources (and its forerunners). Although trained in geology, Bryan's first position was with the Department of National Defence, 1949-51, compiling phototopography. His subsequent 11 years with Topographical Surveys included assignments to Polar Continental Shelf Project and Observatories Branch to run various survey programs. Bryan has participated in, led, or organized most of the gravity mapping surveys in Canada

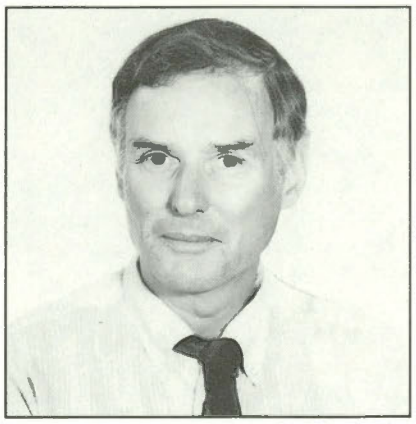
during the past 24 years as a result of his transfer to the National Gravity Mapping Program (now Gravity Section, Geophysics Division). Bryan was also responsible for the considerable logistics required for the LOREX and CESAR multidisciplinary projects from the Arctic Ocean ice, under the auspices of the Earth Physics Branch. These duties were interrupted by a two-year secondment to the Pacific Geoscience Centre in 1984-86 as Program Manager for Boundary Dispute Surveys; he resumed his duties in Ottawa at the time of the Earth Physics Branch–GSC merger. His extensive experience in the logistics of field operations in every part of the country has been drawn on by all Division field officers for planning summer and winter programs, a fact that has contributed to the excellent efficiency and safety record of these activities. Recently Bryan was honoured by his Canadian and U.S. colleagues at his last attendance of the Canada-United States Mapping and Charting Subcommittee of the CANUS Military Cooperation Committee, where he has represented the GSC and former Earth Physics Branch since 1970.

Doreen Higgs completed a 34-year career in the Departments of Forestry, Environment, and Energy, Mines and Resources with her retirement in December 1988. During her nine years as a data lab technician with the Earth Physics Branch and GSC she has been responsible for seismic records and data from the Eastern Canada Telemetred Network, the Ottawa Standard seismograph station, and the Yellowknife array.

Awards of Merit and Recognition: EMR has recognized the outstanding contribution of a group of scientists and technicians through the Award of Merit to the Aeromagnetic Research and Development Group of the Aeromagnetic Program, Geophysics Division. The team, led by **Peter Sawatsky** and comprising **Richard Flint, Dwayne Olson, Aurele Dicaire**, and **Howard Knapp**, received the award for its work for a period of more than ten years, dating from 1973, in the development, testing, and technology transfer to the Canadian mineral exploration industry of the very successful aeromagnetic vertical gradiometer system. The team was commended for its unusual level of dedication, skill, perseverance, and professionalism, and above all for the team effort without which the technology transfer and the resultant benefit to the Canadian economy would not have been possible.

GEOSCIENCE INFORMATION DIVISION

Retirement has finally lured a long-time GSC employee – **Bob Blackadar**. Bob's first contact with the Survey was as a cook for Hugh Bostock during the summer of 1947. He continued to work during summers for the GSC until he completed his doctorate in 1954 at the University of Toronto with a thesis on "Assimilation and differentiation in the Logan Sills".



B. Blackadar

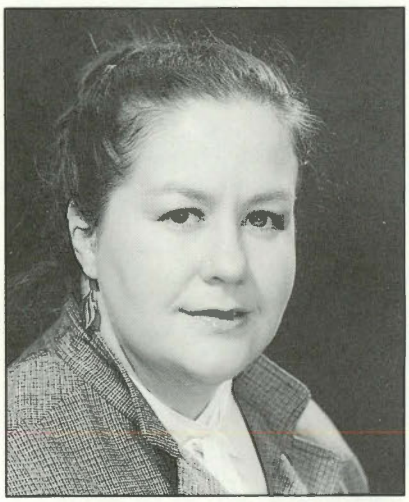
Bob started full time as a Survey geologist in 1953, working mainly in the Precambrian of the Canadian Arctic. He participated in Operation Franklin and planned and directed Operations Prince of Wales, Admiralty, and Amadjuck.

In 1965 he joined the editorial staff of the GSC, becoming Chief Scientific Editor in 1970, and Director of GID in 1979. Throughout his career Bob published numerous geological maps and reports, but the publications he probably enjoyed producing the most were of a historical nature, such as a On the Frontier, Canadian Landscapes, and short histories of the GSC. Although Bob asked that nothing special be done for his retirement, he did receive, amongst other gifts, a handsome scroll illustrated by Mike Enright of Cartography, which listed many of his accomplishments and interests including: "field operations manager; Fellow, Arctic Institute of North America; Member, Geological Society of America; first Canadian geologist to reach Canada's northernmost Cape Columbia; horticulturist; historian; peruser; skier; musher of huskies; sailor; wine aficionado; hunter of the great white bears; gourmet chef for the 1947 Bostock field party to the Yukon; home designer; polyglot (English, Inuktitut, bureaucratese); champion for field party etiquette and gracious living in the field".

Bob's final day of work at the Survey was on 31 March 1989, and he officially retired in late August 1989. He is looking forward to gardening, reading, and travelling.

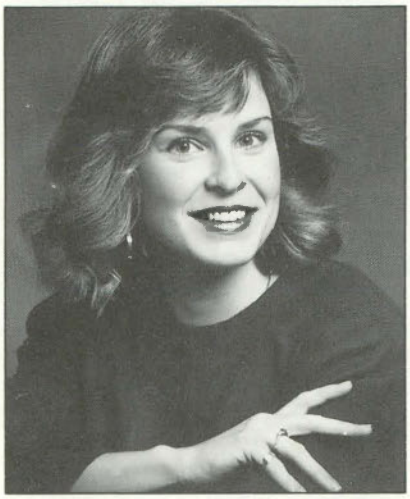
The new Acting Director of GID as of April 1989 is **Annette**

Bourgeois. As Chief Librarian of GSC from 1977 to 1989, Annette managed 22 employees and was a member for several years of the Steering Committee of the Council of Federal Libraries. During her tenure, the library's catalogue system (now GEOCAT) and the acquisitions process were automated, and the library took over the responsibility of GEOSCAN, the National Geoscience Bibliography, a federal-provincial data base. Annette chaired the annual meeting of the Geoscience Information Society (an affiliate of GSA) in 1985, "Micros and mini-computers", and was President of the society in 1986. She began her career with Public Works and was the Ontario Area co-ordinator of the Department of Agriculture libraries from 1975-1977. Annette has degrees in Library Science and English and French literature (University of Ottawa) as well as a teaching certificate (Queen's University).



A. Bourgeois

Sally Elliott-Meadows joined GID on term in August 1988. She is the scientific editor responsible for the editing of papers written under the federal-provincial Mineral Development Agreement (MDA) programs. Sally brings her experience as scientific reviewer from the Ontario Geological Survey in Toronto. She received a B.Sc. in Geology and Chemistry from Carleton University and an M.Sc. in Earth Sciences from the University of Waterloo.



S. Elliott-Meadows

Pascale Côté, who has been supervising the French document production team for over a year now, has a B.Sc. in Geological Engineering and an M.A. in Terminology and Translation. Pascale also worked as an assistant to the Assistant Deputy Minister.

Don Brown retired from the Cartography Section on 20 May 1988 after nearly 34 years of service. A luncheon was held in his honour at the Nepean Sportsplex, with friends and colleagues filling the place. We wish him a happy retirement pedalling around town on the bicycle presented to him on retirement.

Ed Dumbrell, supervisor of Cartography Unit C, retired on 31 December 1988 after nearly 40 years with the GSC. A farewell luncheon, attended by over 70 friends and colleagues, was held on December 12, barely beating the start of Christmas parties. A gift certificate from Chuck Brown's was presented to Ed, so he should be sharper than ever on the golf course this spring.

John Ferguson was declared the successful candidate to fill the supervisory position in Cartography left vacant after **Earl Maahs** transferred to the Geophysics Division. Mr. Ferguson assumed his new duties in early June 1989.

In July 1989 **Karen Blacklock** resigned after 12 years as secretary/typesetter in the Cartography Section to accept a position as typesetter with a company in San Diego, California.

Dave Elwood transferred to GID in November 1987 from the Data Systems Unit to help develop the automated mapping program at GSC.

In early June 1989, six cartographers began training on three new map editing stations located in the Cartography Section. These stations will be used to provide digital colour separations for multicoloured maps, thereby eliminating the traditional time-consuming method of peelcoat separation.

Since **D'Arcy Beckstead**'s retirement, the Library has taken on responsibility for the GSC Photo Library. This unit is under the direction of **Sam Alexander**, Head of Technical Services.

David Reade, **Diane Lessard**, and **Le'Anne Frieday** were involved in a project to convert ISPG catalogue records to a format compatible with the Ottawa Library system. This project will standardize catalogue activities at these two locations, and facilitate data exchange.

Various staff members are currently involved in the planning process for an automated circulation system, to

compliment the Library's on-line catalogue.

Tara Naraynsingh, Map Librarian, accepted a position with Statistics Canada as their Systems Librarian. **Tim Ross**, who has filled the position since her departure, has just accepted the position of Map Librarian at the University of British Columbia in Vancouver, and will be leaving in August 1989.

Morris Mason, Monograph Technician, left the Library for a more senior position at Labour Canada, joining **Wendy Stark**, also a former GSC Library staff member.

Mike Foster, well known to most GSC staff in his position as Circulation Clerk and official library greeter, is on extended paternity leave to care for his young daughter Tessa.

Marielle Larche, who worked in the areas of photoreproduction, circulation, and acquisitions, moved on to a term position in Publications.

The Library's only recent staff acquisition is **Françoise Castagne**, Secretary to the Head of Library Services.

C.R. Clarke (Bud) retired 6 September 1988 after 30 years of service. Bud was the Revenue Clerk at the Publication-Distribution Office of the Geological Survey of Canada.

Daniel Gariépy joined the staff 23 March 1988 as Junior Publication Clerk. He then took over as Revenue Clerk when Mr. Clarke took his retirement.

INSTITUTE OF SEDIMENTARY AND PETROLEUM GEOLOGY

The past year has seen a number of staff changes at the Institute of Sedimentary and Petroleum Geology (ISPG) in Calgary. In August 1988, paleontologist **John Wall**, who has worked in Calgary for the GSC since 1974, retired. He is, however, continuing his paleontological studies at the Institute. Recognized for his expert knowledge of Mesozoic microfossils of the Foothills and Arctic regions, John has completed biostratigraphic studies of several formations located in Alberta, the Arctic Islands, and Saskatchewan. He has been responsible for the identification of many new species as well as for the detailed description of numerous others. Prior to joining the Survey, John was employed as a micropaleontologist by the Alberta Research Council, and has also lectured on paleontology at the University of Alberta for 12 years. The meticulous way in which he approached paleontological studies earned him the respect of his colleagues throughout his career. John is currently lending his vast knowledge of Arctic micropaleontology to the USSR-Canada Scientific Exchange Program.

Newly appointed Emeritus Research Scientist **Owen Hughes** (Terrain Sciences Branch) has been located in Calgary since 1974, and is a 36-year veteran of the GSC, mainly studying the Quaternary geology of Nova Scotia, Ontario, Quebec, British Columbia, the Northwest Territories, and the Yukon. Owen graduated from the University of British Columbia as a geological engineer in 1950 and began working with the GSC in the Geology and Groundwater Section (now Terrain Sciences Branch) as a graduate student in the Vancouver area. Over the years, Owen has been involved in several joint projects, including ones with the National Museum of Man (evidence for the existence of early man in northern Yukon) and the Land Resources Research Institute, Department of Agriculture (correlation of glacial events with soil ages and types, to produce soils maps in the Yukon).

In June 1988, research scientist **Bob Christie** relocated to Ottawa, where he is responsible for logistical operations related to the Polar Continental Shelf Project. The Polar Shelf group not only facilitates work by GSC scientific researchers in the Arctic but also comes to the assistance of groups, organizations, and individuals outside of government who wish to undertake Arctic studies. One of the primary mandates of the Polar Shelf group is that of maintaining a Canadian presence in the High Arctic, thus serving to protect Canadian sovereignty of the area.

After 10 years as a library technician, **Fontaine Hwang** left Calgary to take up a similar position in the Cordilleran Division library under Mary Akehurst. Fontaine will always be remembered in Calgary for the friendly efficient way in which she provided information to ISPG researchers. **Anne Seif**, who had been a word processor in the Word Processing Centre for eight years, resigned from her position in July 1988 in order to pursue university studies in Gerontology. **Pat Greener** and **Hilde King** of the word processing/typesetting centre are to be congratulated for their recent promotions; they were reclassified to the general technical category in 1988.

Jean Spirritts resigned from the Publications Sales office after nine years, and has moved to Kelowna, B.C. **Danny Li** resigned from his accounting position at the Institute in order to move to Yellowknife and open a business.

In May 1988, **Colleen Boyle**, a junior cartographer on term at

ISPG since 1985, left to study Computer Science at the University of Calgary. **Barbara Acker**, a SCI 3 in the Paleontology Subdivision, has taken up residence in Vancouver, B.C. and will be attending a university-level business program there. Term employee **Julian Mamo**, who was working with Elspeth Snow in the Regional Geology Group, accepted a position with ARD Resources in March 1988. **Orri McEwan**, a public servant for over 32 years, retired from his position as a sedimentary technician in the Lapidary Services lab in June.

At a western style "Burger Burn" held on a beautiful June evening on the grounds of the Institute, **Mary** and **Alex Stadnyk** celebrated 43 and 25 years, respectively, of continuous service as public servants. They received long-service certificates signed by the Prime Minister and commemorative ISPG plaques. They also were presented with a painting created by former ISPG laboratory technician, Elsie O'Keefe, of an Albertan landscape, as well as other gifts of appreciation. Alex was very helpful to staff in his role as electronics technician and Mary was an exemplary pay and benefits clerk, known for her fair treatment of all staff. The Stadnyks are wished a happy and enjoyable retirement.

ISPG is experiencing an invasion by former Edmontonians. Pay and benefits clerk **Karen Paull** assumed her duties in the personnel office under Pearl Broad in August 1988. Karen is a former Health and Welfare pay and benefits clerk working out of the Charles Camsell Hospital in Edmonton for 5½ years. Co-worker **Janice Dwyer-Ball** was hired in June 1988 in a term position as an administrative support clerk. Janice graduated from Memorial University with a B.A. in 1982 and was employed as the office administrator of the regional office of the Canadian Human Rights Commission in Edmonton. **Patti Barnett** has replaced Danny Li in Accounts and is planning to undertake university-level courses toward accounting and management degrees.

Geologist **Wendy Warters** has been hired in a term position to map gas pools in the Devonian for the Petroleum Geology Subdivision as part of the Western Canada Gas Assessment Project. **Paul Pheby** is working as a general draftsperson in a term position as well. **Dale Issler**, a postdoctoral fellow from Dalhousie University is also on term, and is presently developing modelling techniques related to the origins and evolution of the Beaufort-Mackenzie Basin and environs.

Receptionist/switchboard operator **Teresa Jeanson** began fielding calls in May 1988. No stranger to ISPG, Teresa had worked for 18 months on term as a secretary for Alf Darragh in the Mineral Policy Sector office.

Dianne Cornelius, originally of Regina, Saskatchewan, moved to Calgary from Athabasca, Alberta, in January 1988. For approximately five years she was employed as the Secretary to the Administrator and Director of Patient Services at the Athabasca General and Auxiliary Hospital. She began work in the Administration Subdivision of the Institute as a SCI 2 in August 1988 and was promoted to a SCI 3 position in the Paleontology Subdivision in November, replacing Barbara Acker. **Jim Jenson** replaced Dale McInroy (now of Curation) as Storesman 3 in May 1988. Before moving to Calgary, this Regina native had studied two years of engineering at the University of Regina. **Wayne Pickering**, also formerly of Saskatchewan, graduated from the University of Saskatchewan in engineering physics with an MSE and, prior to becoming the Senior Lab Systems Analyst at ISPG in January 1988, he had provided computer support services at the Computer College attached to the University of Saskatchewan and had also been employed by service bureaus in Calgary. Formerly of Sudbury, **David Allen** replaces Alex Stadnyk as electronics technician. David spent eleven years with Transport Canada working at airports in Terrace, Prince Rupert, and Vancouver in a similar capacity. **Daniel Graham** is now assisting Bernie Walker as Instrument Development Technician in the Machine Shop. He had worked as an oil field equipment repair technician with Metro Machine of Calgary before joining the Survey. He is also a certified millwright.

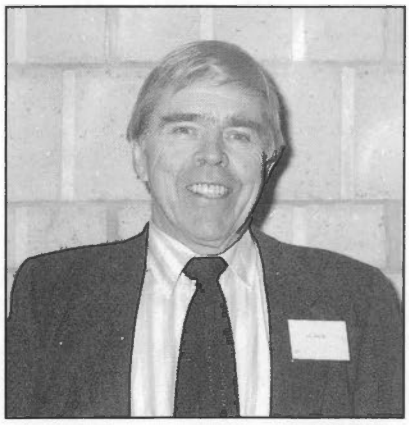
Godfrey Nowlan arrived in Calgary in July 1988 to become the Head of Paleontology Subdivision. **Terry Poulton**, also of the Paleontology Subdivision, became a section head about a year ago. The Petroleum Geology Subdivision also gained two new section heads: congratulations to **Dale Leckie** and **Randell Stephenson** on their promotions.

Research scientists **Paul Brooks** (mass spectrometrist currently engaged in biomarker geochemistry research) and **Mike Cecile** (regional geologist) also received promotions this past year.

CONTINENTAL GEOSCIENCE DIVISION

John McGlynn's retirement in August 1989 marks the end of an episode of Survey history in which John himself was a key player. His career spans a period of rapid evolution in techniques

of geological mapping and research, from scattered areas of 4 mile mapping and local detailed studies, to helicopter supported mapping which led to more quantitative techniques such as geochronology and paleomagnetism. John has participated in the various stages of this evolution and in later years managed an important part of it. Hence, he has well earned the satisfaction of being at the forefront of the change that marked one of the Survey's most illustrious periods.



J. McGlynn

John graduated from Queen's University in 1948, took his M.Sc. there in 1949, and then moved on to the University of Chicago (Ph.D., 1953). His Ph.D. thesis was based on the classical problem of the Kisseynew Complex -- Amisk Group relationships in Manitoba. Following permanent employment with the Survey in 1952 he spent six years in Yellowknife as Resident Geologist (1953-1959). During this time he acquired a familiarity with the geology of the Mackenzie District which was a basis for later syntheses and interpretations on the geology and tectonics of the Slave Province.

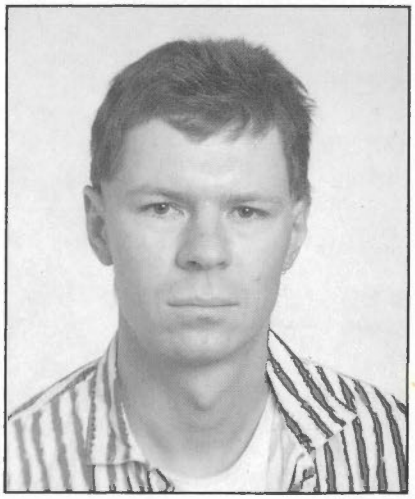
From about 1971 until his accession to the directorship of the Precambrian Division (LCSD) in 1981, John, chiefly in collaboration with Ted Irving, engaged in paelomagnetic studies which aided tectonic interpretations of the Canadian Shield.

John McGlynn retires after eight and a half years as Director of the Precambrian Division, during which he has managed division interests through two major reorganizations. Who would dispute his desire now to stand down and enjoy his other interests.

Kenneth E. Eade retired in November 1987, after 35 years service. Ken obtained his B.Sc. in geology from Queen's University, and field work on the gneisses of the Clyde area in eastern Baffin Island in the early 1950s led to the award of a Ph.D. by McGill University in 1955. From 1953 to 1955 Ken was in Angola, mapping the Precambrian Shield in the central and southern parts of the country. He joined the permanent staff of GSC in 1955 and worked first in northern Quebec and Labrador. An outcome of this large-scale reconnaissance work was one of the first attempts (in co-operation with W.F. Fahrig) at determining the bulk composition of the Canadian Shield, a study that is still widely quoted some 20 years later. For the rest of his career, Ken worked mainly in the Keewatin District of N.W.T., south of Baker Lake. He also spent 1966-67 at the Bureau of Mineral Resources (BMR) in Canberra, Australia, in the first GSC-BMR exchange, and, in the period 1970-74, set up and subsequently monitored a major CIDA-funded geological mapping project in southwestern Ethiopia.

Two new Research Scientist appointments to the Petrology Section were made effective January 1988.

Jean H.J. Bédard obtained his B.Sc. and M.Sc. at McGill University. He moved to the University of Montreal for doctoral research, completed in 1985, on the petrology and geochemistry of Siluro-Devonian volcanics in Gaspésie, White Mountains magmatism at Mount Mégantic in southeastern Quebec, and Monteregian lamprophyre dykes, and the mechanics of rifting in the White Mountains and Monteregian igneous provinces. During the next two years, Jean held an NSERC Fellowship at Cambridge University, where he worked on Cretaceous alkaline rocks from Portugal, did modelling of magma chambers in H.E. Huppert's laboratory, and conducted field studies of the Tertiary Rhum igneous complex in Scotland. At GSC, Jean works mainly on the Bay of Islands ophiolite (crust-mantle transition rocks, ridge dynamics) and the Muskox intrusion (magmatic processes).



J. Bédard

Robert G. Berman completed a B.A. in anthropology at Amherst College. In 1977 he came to Canada to study geology at University of British Columbia, where he obtained an M.Sc. and, in 1983, a Ph.D. His doctoral research, supervised by T.H. Brown, was on the

thermodynamics of silicate melts. Rob stayed on at UBC as a research associate from 1983-87 on an AECL-funded project on radioactive waste disposal and in 1986-87, supported by a federal government grant, on creating microcomputer software for the calculation of phase diagrams. Rob is continuing his work in theoretical petrology at GSC, developing a general computer method for accurate thermobarometric analysis of rock and mineral systems.

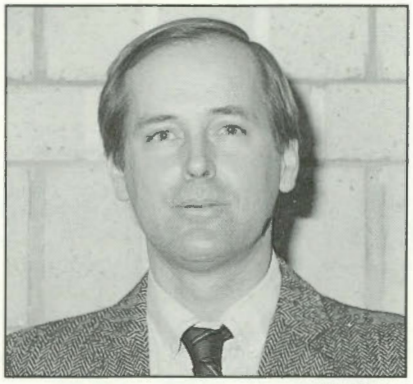
Ernst Hegner took up a two-year NSERC Visiting Fellowship at the Geochronology Laboratory in April 1988. Born in Germany, he studied geology in Mainz, both at the university and the Max-Planck Institute. His doctoral research, carried out under the supervision of A.W. Hofmann and A. Kröner, involved field and geochemical studies of the

E. Hegner

Archean Usushwana and Pongola igneous suites of South Africa and Swaziland. In 1984-86, Ernst held a NASA-funded postdoctoral fellowship in M. Tatsumoto's laboratory at the USGS in Denver, working on the isotope geochemistry of basalts from Hawaii, Juan de Fuca Ridge, and the Red Sea rift. Ernst spent the next two years in Saskatoon, where, as an NSERC postdoctoral fellow, he set up the University of Saskatchewan's radiogenic isotope laboratory. At GSC, Ernst is working on the Pb, Sr, and Nd isotopic geochemistry of rocks from the Thelon Tectonic Zone, Slave Province, Cape Smith belt, and Shield terranes of the Eastern Arctic.

MINERAL RESOURCES DIVISION

Murray Duke was appointed Director of the Mineral Resources Division in December 1988. Murray obtained his B.Sc. and M.Sc. degrees from McGill University. Following his Ph.D. from the University of Connecticut (1974), Murray worked at the University of Toronto for two years as a



M. Duke

postdoctoral fellow, and joined the Economic Geology and Mineralogy Division of the GSC in 1976. His principal research interests are the petrology of magmatic segregation sulphide and oxide deposits, mineral deposit modelling, and the petrology of serpentinites. Murray has recently completed a term on the Editorial Board of the Journal of Economic Geology and is currently President of the Mineralogical Association of Canada.

PACIFIC GEOSCIENCE CENTRE

Dieter Weichert is the Acting Director of the Pacific Geoscience Centre as of April 1989. After attaining a Bachelor of Applied Science in Engineering Physics at the University of British Columbia (1961), an M.Sc. from McMaster University (1963), and a Ph.D. in Geophysics from UBC (1965), Dieter joined EMR in the Seismology Division of the Earth Physics Branch, working on underground nuclear explosion detection and identification using the Yellowknife seismic array. He transferred to PGC in 1978, working in Seismic Hazard and Strong Motion seismology, and was Assistant Director during 1988-1989. Dieter is a member of the Canadian seismic engineering Committee on seismic provisions for the National Building Code. He was also Canadian investigator to the Guatemala earthquake zone in 1976 and a team member for the Mexican earthquake investigation in 1985.

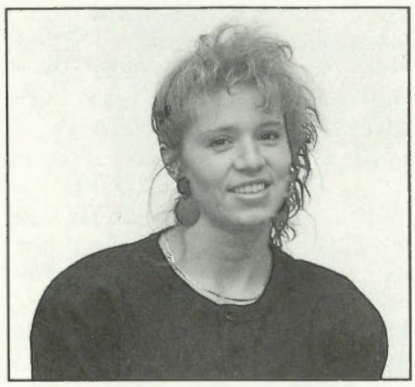
PROGRAM COORDINATION AND PLANNING DIVISION

Effective 1 September 1988, **Malcolm J. Drury** transferred from Lithosphere and Canadian Shield Division to Program Coordination and Planning Division, where he will act as Scientific Executive Officer to the A/Chief Scientist. Malcolm is now located on the second floor, 601 Booth Street.

Chantale Patenaude resigned from the Program Coordination and Planning Division effective 4 September 1988, to take up a position at the University of Montreal.

Linda Richer, who replaced **Rita Laprade** (secretary to Chris Barnes, of the former Sedimentary and Marine Geoscience Branch) on an acting basis from September 1988 to February 1989, has since been appointed secretary to John Harrison, the Director of Program Coordination and Planning, and Jane McGill, Senior Science Coordinator. Linda replaces **Celeste Burnie**,

who held the position for 1½ years until accepting an offer from the Minister's office in April 1989.



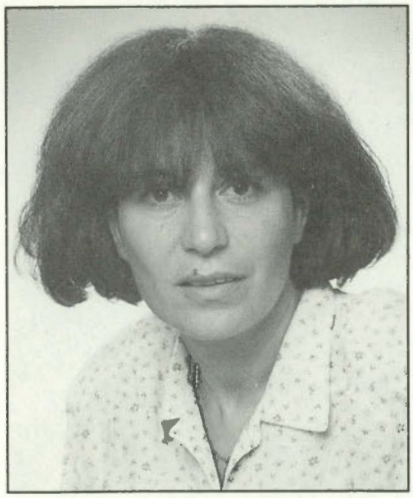
L. Richer

QUEBEC GEOSCIENCE CENTRE

Located at the Ste-Foy science complex, the Quebec Geoscience Centre (QGC) became operational on 1 October 1988, following an agreement between the GSC and the Institut National de la Recherche Scientifique (INRS).

The centre is a Division of the Survey in the Mineral Resources and Continental Geoscience Branch. It is run by a Director who answers to both the GSC and INRS, the co-signatories of the agreement. It is expected that in 1991-1992 the centre will have about 50 people drawn in equal measure from both institutions. Currently, there are 34 people working at the centre: 22 of them come from the INRS (11 scientists, 9 technicians, and 2 administrators) and 12 from the GSC (11 scientists and 1 administrator). The centre's scientific plan was drawn up to fit in with mandates of both partners, and research is undertaken in regional geology, metallogeny, and quaternary geology. By providing a Francophone working environment in Quebec, the QGC enabled the GSC to increase the number of its Francophone scientists.

The director of the QGC is **Aicha Achab**. Mme Achab has a B.Sc. in Earth Sciences (1967) and a postgraduate degree in Geology (palynology) from the University of Algiers, a degree in Administration (1979) from Laval University, and a Ph.D. in Geology (palynology) from the University of Rennes (1987). Since 1973 she has been working for the Institut National de la Recherche Scientifique (INRS), where she has successively occupied the positions of trainee (1973-1974), research associate (1974-1976), and professor (1976-1988) at the centre INRS-Géoressources. In August 1988, she was appointed the centre's director, a position that since 1 October 1988, has been combined with that of director of the Centre géoscientifique de Québec.



A. Achab

The following staff have also been hired:

Esther Asselin studied at Université Laval in Québec, achieving a B.A. and M.Sc. in geology. Esther has experience in micropaleontology (Palynology) with INRS-Géoressources.

Tyson Birkett received a B.Sc. in geological engineering in 1973 and an M.Sc. in geology in 1974 from Queen's University. Following his Ph.D. in geology at École Polytechnique de Montréal in 1982, Dr. Birkett worked for Whitehorse Copper Mines, Madeleine Mines, and Shell between 1969 and 1982 (base metal exploration), and the Iron Ore Company of Canada (IOC) from 1982 to 1983 (iron ore processing/mineralogy). He has been with GSC since June 1984 doing work in regional metallogeny (GSC, Ottawa) and the geology of high-tech metals (IOC and GSC).

Andrée Bolduc is presently finishing her Ph.D. in Quaternary geology at Lehigh University, Pennsylvania, and is expected to begin at QGC in September 1989. She has studied Quaternary geology in the Labrador region.

Kelly Coghlan is the Administrative and Financial Services Coordinator and received a Bachelor's of Business Administration specializing in Accounting at Université de Moncton, New Brunswick in 1987. Kelly worked for Surveys and Mapping at the Canada Centre for Geomatics in Sherbrooke, Québec before coming to QGC in November 1988.

Robert-André Daigneault has a B.Sc. in Physical Geography from Université de Sherbrooke (1982) and an M.Sc. in Terrain Sciences from Université du Québec à Montréal (UQAM) (1986). Robert-André has also been a research technician at UQAM, and should begin doctoral studies in Fall 1989.

Benoit Dubé received an M.Sc. in geology from Université Laval in Québec and is presently finishing a Ph.D. in structural geology and gold deposits at Université du Québec à

Chicoutimi (UQAC). Benoit has worked as a geologist with Noranda and Ministère de l'Énergie et des Ressources du Québec (MERQ).

Tomas Feininger has a B.A. in geology from Middlebury College, Vermont (1956), and an M.Sc. and Ph.D. in geology from Brown University, Rhode Island (1960, 1964). Dr. Feininger has worked for Texaco Petroleum Co. (1956) and the USGS (1956-1969). He was a postdoctoral fellow at the Smithsonian Institute, Washington, D.C. (1969-1970), and Dean of the Geology Faculty at École Polytechnique de l'Équateur from 1971-1978. He has also worked as a research scientist for Université Laval (1978-1980) and then as a member of their National Scientific Research Council (1981-1983). Tomas has been with the GSC since 1983.

Robert Godue has a B.Sc. in geology (1984) and an M.Sc. in metallogeny and mineral deposit geology (1988) from UQAM. Robert has experience in Appalachian geology and the Labrador Trough.

Denis Lavoie has a B.Sc. in geological engineering (1982), an M.Sc. in sedimentology and structural geology (1985), and is presently finishing a Ph.D. in sedimentology and the geochemistry of carbonates at Université Laval in Québec.

Serge Paradis has a B.Sc. in geography (1977) and an M.Sc. (1980) from the University of Ottawa. Serge has worked for Terrain Analyses and Mapping Services Ltd., and was an assistant geologist for the GSC during 1976-1978.

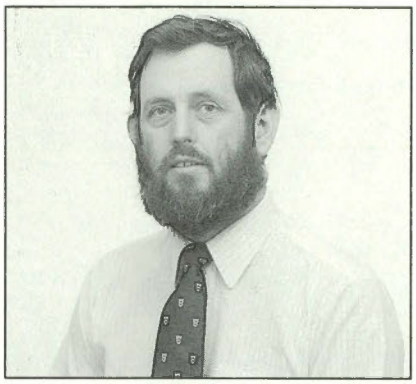
Suzanne Paradis received a B.Sc. in geology at UQAM (1981) and an M.Sc. in geology from Université de Montréal (1984). She is currently finishing a Ph.D. in geology from Carleton University. Suzanne has worked in the mining industry with Minnova Inc. (Falconbridge Copper) during 1984-1987.

Michel Parent has a Ph.D. in geology from Western University (1987). Michel worked with Terrain Sciences last year, and previously had experience at the GEOTOP lab at UQAM later carrying out research in collaboration with the Université de Sherbrooke and UQAM.

TERRAIN SCIENCES DIVISION

David G. Harry became Chief of Quaternary Environments Subdivision as of 1 January 1989. David takes over from **B.R. Pelletier** who is now completing work on the Beaufort Sea Atlas in his capacity as Emeritus Research Scientist.

Brian Luckman has recently joined the Terrain Sciences Division on an Interchange Canada assignment from the University of Western Ontario where he is a professor in the Geography Department. He assumes the duties of Scientific Co-ordinator, Global Change Program and will co-ordinate the activities of Terrain Sciences Division (TSD) related to IGBP and develop university/TSD contacts. Dr. Luckman sits on the Royal Society of Canada Global Change Committee (CGCP) and is acting co-chairman of the CGCP Resources Group on proxy environmental data. After obtaining B.A. and M.A. degrees from the University of Manchester and teaching for a short time at the University of Liverpool, Brian came to Canada in 1967, completed a doctorate at McMaster University, and has taught at Western since 1971. His research interests have focussed on alpine environments beginning with talus slopes and geomorphic hazards (rockfalls, snow avalanches, and debris flows). Over the last ten years he has concentrated on elucidating the record of Holocene environmental change and glacier fluctuations, particularly over the last 1000 years and the "Little Ice Age". His current major interests are the application of dendrochronological and dendrogeomorphic techniques in Canadian alpine environments.



B. Luckman

Don Lemmen joined the Quaternary Geology Subdivision in November 1988. Don completed a B.Sc. in geography at the University of Alberta, and obtained his M.Sc. from Queen's University where his thesis dealt with glaciolacustrine sedimentation on Baffin Island. Returning to his native Edmonton, Don completed his Ph.D. thesis on the glacial and sea-level history of northernmost Ellesmere Island in August 1988. His research within the Western Region will concern the Quaternary history of the south shore of Great Slave Lake, N.W.T.

After 18 years with Terrain Sciences Engineering and Sedimentology Laboratory, **Barbara Rivoire** took early retirement. She had previously worked with the Department of Agriculture.

EMERITUS RESEARCH SCIENTIST PROGRAM

In November 1987, the Emeritus Research Scientist Program and other flexible part-time/term work programs were announced as a means of guaranteeing the Department of Energy, Mines and Resources' tradition of on-going scientific excellence. These programs enabled EMR to retain the services of its most experienced scientific and professional employees while, at the same time, freeing up person years for the recruitment of new scientists.

Traditionally, on-the-job collaboration and daily exchange between new and senior scientists have been the most effective ways to transfer and preserve the vast store of specialized scientific knowledge, skills, and expertise upon which the GSC relies for the effective and efficient operation of its programs. Similarly, the recruitment of new scientists is vital, bringing to the GSC the latest scientific expertise and thought, and forming a continuing pool of creative talent for scientific and technological advances and scientific leadership.

Increasingly, with today's limited resources, recruitment opportunities are being determined by staff turnover, which in the case of GSC is largely due to retirements. With this being the case, the Survey loses the vital "bridging" of knowledge and experience between the senior and new scientists. This is where the Emeritus Research Scientist Program can help.

Under this program, selected scientists can continue their research after retirement for an indeterminate or specified period – each case is formalized with a contract tailored to best serve the needs of both the scientist and the Survey. The Emeritus Scientists are provided with all office, laboratory, and field support necessary to carry out their work.

Since February 1988, six of GSC's research scientists have been appointed under this program – John Fyles (former Chief Geologist), Margaret Bower (Geophysics Division), Owen Hughes (Terrain Sciences Division), Bernard Pelletier (Terrain Sciences Division), Peter Hacquebard (Atlantic Geoscience Centre), and Gordon Gross (Mineral Resources Division).

Part-time or term employment is another option open to retired employees in the Scientific and Professional Category involved directly in scientific work. As with the Emeritus Research Scientist Program, contracts are set up by consultation between the employee and management on a case-by-case basis.

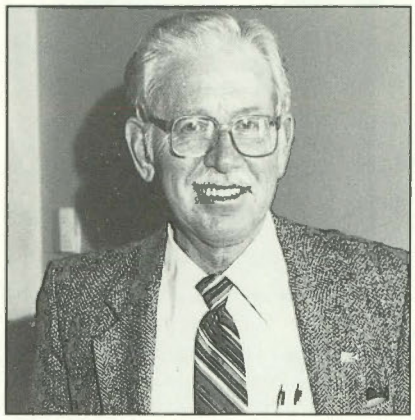
Both these programs provide attractive possibilities to employees nearing retirement who meet the specifications of these programs. Interested employees should contact their Division Directors, or Judy Smallridge, Emeritus Research Scientist Program Coordinator, GSC Sector, for further details.

E.A. Babcock
Assistant Deputy Minister

EMERITUS RESEARCH SCIENTISTS

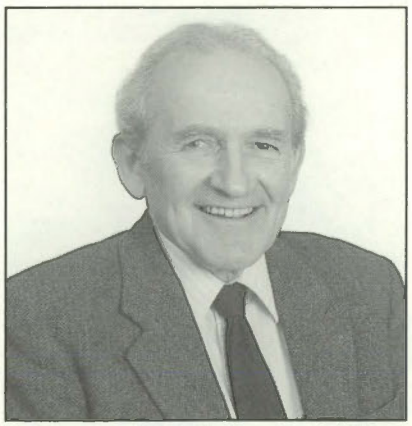
John Fyles *is investigating Early Quaternary and Late Tertiary geology and geomorphology in the Arctic Islands, concentrating initially on the Beaufort Formation (Late Tertiary) and related deposits. This project, in collaboration with other GSC scientists, builds on Fyles' earlier field investigations done largely during the sixties.*

Owen L. Hughes *is doing research on the surficial geology of McQuesten and Mayo map areas in central Yukon.*



Peter Hacquebard *will be completing the important work in progress on coal quality and coal seam variations offshore Sydney, Nova Scotia.*

Miss Margaret Bower *is continuing her research with the National Aeronautical Establishment of the NRC, on several projects of direct interest to the GSC.*



Bernard R. Pelletier *is continuing work on the Marine Science Atlas of the Beaufort Sea, and is completing another project, the Quaternary Paleo-sealevel Map of Canada.*

Gordon A. Gross *will continue research on the metallogenetic significance and geochemistry of iron formation.*

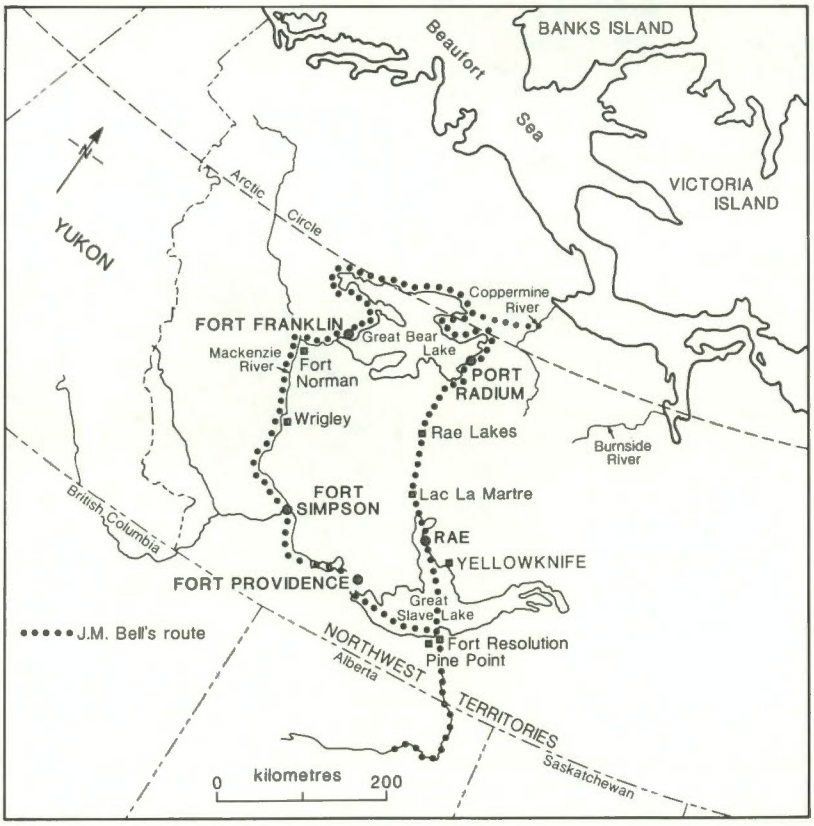
OF GENERAL INTEREST

HISTORICAL NOTE – FIELD INSTRUCTION, 1900

Based on the following letter of instructions by Director George M. Dawson, the Geological Survey of Canada's pioneer work in the Great Slave Lake and the Great Bear Lake regions was an important prelude to mineral resource developments, particularly Eldorado (Port Radium) Mine and gold mines near Yellowknife and Pine Point Mine.

In addition to his 1899 explorations of Great Slave Lake with his uncle Robert Bell, James Mackintosh Bell (1877-1934), to whom these instructions are addressed (see also cover), returned to the Pine Point area many times later in his career (in 1921, 1922, 1928, 1929, and 1930) to examine lead-zinc deposits. His recommendations, as a mining consultant, targeted the area as favourable for mineral development, which occurred after construction of a railway to the site. Pine Point Mine closed in 1988, but stockpiled ore will be shipped south for another two years. An interesting sidelight of JMB's studies of these lead-zinc deposits in 1928, was to act as a guide for his friends Dr. Frederick G. Banting and A.Y. Jackson and to accompany them on a trip across Great Slave Lake.

In his published GSC report of exploration of Great Bear Lake, James Mackintosh Bell described cobalt and copper staining in cliffs on the northeastern side of McTavish Arm (1902, p. 27C). Later, a prospector, Gilbert LaBine, while flying over the area in the autumn of 1929, noted the staining that JMB had reported and realized that copper and cobalt commonly accompany



Sketch map of the Great Slave Lake and Great Bear Lake region. The route travelled by James Mackintosh Bell during April to September 1900 is shown. JMB named Camsell River (NTS 86E) after J.S. Camsell, Chief Factor, Hudson Bay Company and his son, Charles Camsell, Geological Survey of Canada. JMB named Jackson Islands and Harris Island in Great Slave Lake (NTS 85H - 75 km northeast of Fort Resolution) in honour of members of the Group of Seven. Jackson Lake and Banting Lake (NTS 85J - 20 km north of Yellowknife) were named to commemorate their visit to the area, in 1928, with James Mackintosh Bell.

"J.M. Bell Esq.,
Fort Resolution,
Great Slave Lake

January 20th, 1900

Dear Mr. Bell:

When you were nominated to accompany Dr. R. Bell as assistant, early last summer, it was arranged that, if circumstances rendered it desirable, you should remain after Dr. Bell's departure to complete as much work as possible in the vicinity of Great Slave Lake and to continue work during the summer of 1900 from that lake as a base. I understand from Dr. Bell that, thinking it advisable under the actual circumstances, he instructed you to winter at Fort Resolution on Great Slave Lake with the above objects in view. I have no doubt that you will have endeavoured to carry out such explorations as may have been found possible during the winter and early spring in accordance with the indications afforded to you by Dr. Bell. I am now writing with the object of instructing you in regard to work for the coming season.

After consultation with Dr. Bell, it has been decided to instruct you to explore the route from Great Slave Lake to Great Bear Lake by way of Lac la Martre, if possible, together with the shores of Great Bear Lake, or as much of these shores as you may be able to examine during the time of open water. After completing this work to the best of your ability, you will return to Edmonton in the autumn or winter of the present year, by whatever route may appear to be the most advantageous for travel. It does not seem probable that you will be able to traverse new ground on your return, as it will be necessary to give much time to the extended shores of Great Bear Lake and its vicinity.

Assuming that you go by the Lac la Martre route, you will try to define the boundary between the Palaeozoic rocks to the westward and the Archaean to the eastward, which is supposed to lie approximately along this route, as well as to make an accurate survey of the route actually followed.

On reaching Great Bear Lake, it will become your object to make as complete a geographical and geological survey as possible of its shores and of the surrounding country where short excursions from the lake may be feasible; but whether the circuit of the lake should be begun by turning first to the eastward or to the westward, after leaving McVicker Bay, must be left to your decision at the time. Much will depend on the arrangements you may be able to make in regard to transport and supplies.

In order to make the most of the short summer for the carrying out of these instructions around Great Bear Lake it may be advisable for you to leave Fort Resolution by dog team as soon as the early spring travelling becomes good, say in April. In this case your dogs might either draw your wooden canoe over the ice, or you might start without it and procure at Fort Rae or further on, two of the largest bark canoes made in the country and send back your dogs by the Indians going out with their furs. The dogs you take from Fort Resolution may be sent back from Fort Rae whether you begin your canoe journey at the latter or obtain fresh dogs to go forward.

Observations for latitude, barometer readings, and meteorological observations, including the temperature of the water, should be taken as regularly as possible in conformity with the practice with which you are already acquainted.

A complete collection of rock specimens should be made, particularly where it may appear difficult to name or class the rocks met with in the field. Fossils should be carefully looked for and collected wherever the Palaeozoic limestones are met with in place. It is probable that Cretaceous rocks, sandstones, shales or conglomerates may be met with in the western part of Great Bear Lake and any fossil obtained from such rocks will also possess particular interest.

I am sending you with this a copy of "Notes on Northern Geology", which includes a synopsis of observations heretofore made on the country to be covered by your exploration. This will serve as a basis of reference, and anything not included in these notes as serving to modify or change the statements given in them will be of especial importance.

With this I am also sending you a Letter of Credit for $1200, and I am writing to Mr. Chipman, Commissioner of the Hudson Bay Co., asking him to furnish you with a letter of recommendation to the various posts of the Company, instructing the officers in charge to afford you any facility in their power.

The work you are to undertake must be carried out in conformity with the printed instructions to field parties of which copy is also enclosed, and you will take every opportunity of communicating to me, directly, in regard to the progress made. In conclusion, I would direct your attention to the peculiarly favourable position you now occupy for carrying out an important geological and topographical exploration of a region heretofore very imperfectly explored, and express the hope that you will employ your best efforts in carrying the important work intrusted to you to a successful issue.

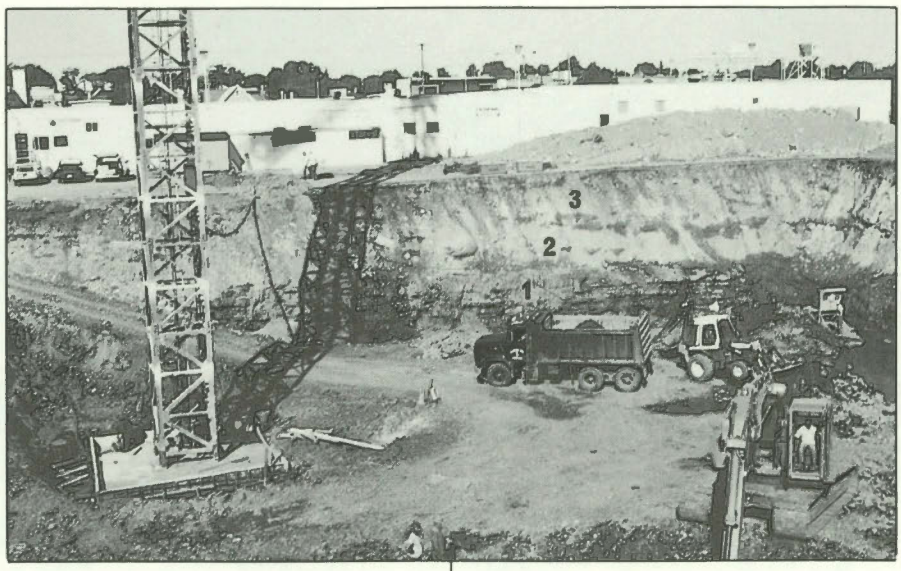
Yours truly,

George M. Dawson"

high-grade silver ores. LaBine returned to McTavish Arm as soon as he could (April 1930) and discovered silver-pitchblende mineralization. He staked the area that became Eldorado Mine and developed the site, for its radium content, with the help of his brother Charles LaBine. Their mine went into production in 1933 and this sparked international attention that led to the first staking rush in the Northwest Territories. Some 300 prospectors descended on Great Bear Lake when the radium discovery was announced. Many arrived to find the good prospects were already staked. A few returned south on foot and prospected on the way. They discovered quartz veins with visible gold in the area near Yellowknife. This discovery plus other factors, such as publication of Dr. Cliff Stockwell's Geological Survey of Canada reconnaissance map in the spring of 1933, led to a new staking rush, for gold, that started in 1934.

LOCAL GEOLOGY, OTTAWA

An excavation for a new office tower near GSC headquarters and the Queensway provided further evidence of faulted Ordovician strata and Pleistocene glaciation in the Rochester-Booth Street area. (1) Horizontal Ordovician limestone and shale; these strata are tilted 25 degrees in the northeastern corner of the excavation. (2) A large, 2 m, ice transported boulder of Precambrian gneiss. This erratic occurs in till overlying a smooth and striated bedrock surface. Above this basal till are sandy deposits (3) of the Champlain Sea.



J. TUZO WILSON MEDAL

Len Collett was awarded the 1989 J. Tuzo Wilson Medal by the Canadian Geophysical Union to honour his outstanding contribution to geophysical research and development in Canada. Over the years he has played a vital role in stimulating the transfer of technology to the geophysical exploration industry of many products developed by GSC scientists. Len's current efforts are focussed in encouraging the development in Canadian industry of aeromagnetic data acquisition instrumentation and techniques.

BILLINGS MEDAL

Tim Tozer was awarded the Billings Medal by the Geological Association of Canada for his outstanding achievement in producing an authoritative and tested global biochronological scale for the Triassic System, which has received enthusiastic and universal acceptance. Described as unique, the scale represents the result of many years of field work and research in North America and in many other parts of the world. The Billings Medal is a biennial award presented in recognition of distinction and excellence in Canadian paleontology.

E.B. BURWELL, JR. AWARD

G.H. Eisbacher and J.J. Clague are recipients of the 1988 E.B. Burwell, Jr. Award of the Engineering Geology Division of the Geological Society of America. The award is given for the best paper in engineering geology, in this case for Eisbacher's and Clague's GSC paper entitled "Destructive Mass Movements in Mountains: Hazard and Management" (GSC Paper 84-16).

The award was presented at the Engineering Geology Division Luncheon at the Geological Society of America Annual Meeting in Denver, on 1 November 1988.

GSC 20TH ANNUAL GOLF TOURNAMENT — 7 JUNE 89

This year's tournament was held at the nine-hole Larrimac golf club. The shotgun-start format appears to be popular: you come, play your golf, have your food and drinks, do your socializing, collect your prize, and go, all in seven to eight hours!

The ladies' low gross winner this year was Roxanne Banville who shot a 119. The men's low gross trophy was shared by past winners Greg Martin and Louis Renaud, who shots 78s. First, second, and third flight low net trophy winners were Ken Ford (71), Bruce Blair (75.5), and Ken Anderson (77.5), respectively. Most accurate drive was performed by Norm Grenier, and closest to the pin contest was won by Bryne Hearty.

Thanks to all golfers who participated and to the volunteers, particularly Fred Quigg and Mike Sigouin, for helping to make this day a success.

Larry Côté

X-RAY LAB CELEBRATES AN ANNIVERSARY

The fortieth anniversary of the installation of the X-ray powder diffraction unit in the Mineralogy Lab by Dr. S.C. (Binks) Robinson occurred on 21 December 1988. This important acquisition marked a departure from classical methods of mineral identification, to a modern technique, now universally used.

Dr. Robinson was the original and, initially, the sole operator of the unit, setting up a file of standard patterns and providing identification services to field officers. A galena specimen, locality unspecified, produced the first X-ray pattern. Early efforts focussed on establishing standard patterns of economic minerals from Canadian and foreign localities. The Survey's collection of minerals, now known as the systematic reference series of the National Mineral Collection, provided the required specimens for the standard patterns. This source was supplemented in the 1950s by loan of X-ray mounts of radioactive minerals from the US and UK geological surveys and from Harvard University. A few years later, when the GSC standard file expanded to include most of the common minerals, the loan was reversed, the Survey then providing X-ray mounts to universities and institutions setting up their own labs. At present, there are 1992 standard patterns in our file.

The fifteen log books recording the 77 500 X-ray patterns taken to date, read like a history of field operations and prospecting activity in Canada over the past four decades. The first GSC field officers to submit specimens for identification were mineral resource geologists Hugh S. Bostock, L.P. Tremblay, H.V. Ellsworth, and A.H. Lang, as well as S.C. Robinson. During the 1950s uranium prospecting rush, many specimens collected by prospectors, including Franc Joubin, J.M. Yates, and A.H. Shore (noted for their geological work in the Blind River, Huttersfield Township, and Bancroft areas, respectively), found their way to the X-ray lab via the Radiometric Lab. The original X-ray diffraction unit, shown here, was updated in 1970. Currently, three units are in operation in the X-ray lab, providing for the expanded service work in mineral identification and research.

Andy Roberts
Ann Stenson

Dr. S.C. Robinson, former Chief of the Mineralogy Division, attended the University of British Columbia, specializing in geological engineering. During World War II he served with the Royal Canadian Navy on Atlantic patrol. He joined the Survey staff in 1948; his work in the Mineralogy Division included mineralogy, petrography, geochemistry, and isotopic analysis to investigate the age and origin of minerals and fuels.

GSC X-ray laboratory installed in room 111A, Victoria Memorial Museum; X-ray diffraction unit on left with operator Joan Climo (1955).

FRENCH DOCUMENT TEAM

The GSC has set up a translation and editing team at 601 Booth Street to produce French versions of special scientific publications. The team, under the interim supervision of **Pascale Côté**, is made up of translators, editors, and terminologists on special assignment from the Department of the Secretary of State. This project, which is the result of an agreement between the GSC, the Terminology Directorate, and the Translation Bureau, makes it possible to centralize all stages of the translation process within the Survey, where the participants can work together and have access to scientists, editors, and the library. The team has produced the French versions of the earliest volumes of the Geology of Canada (DNAG) series as well as documents on the assessment of Canada's oil and coal resources.

Following negotiations with the Translation Bureau of the Department of the Secretary of State, the GSC obtained three translators on special assignment: **Normand Lemieux** and **Judith Kingsley**, who have been working full-time on the French version of DNAG since 11 January 1988, and **Michel Veyrat**, who has been dedicating 60% of his work load to this since 17 October 1988. **Linda Guay** also worked for a year until March 1989, on resource assessments and DNAG.

In late February 1988, the Terminology Directorate of the Department of the Secretary of State agreed to participate in the project; it has undertaken the updating of its geoscientific terminology data base and is carrying out term searches aimed at solving translation problems. The Canadian Government's Terminology Bank will benefit greatly from the GSC's work on the Geology of Canada volumes. This follow-up to translation will hopefully lead to the joint publication of specialized Earth Sciences dictionaries and glossaries.

Members of the team would be delighted to advise the Survey's scientists on linguistic matters. Pascale Côté also co-ordinates the Geological Survey's other translation requests and ensures that the Branch's requirements on the quality of the French, deadlines, and text presentation are met.

French document translation and editing team, from left to right: Linda Guay, Michel Veyrat, Chantal Cormier, Normand Lemieux, and Pascale Côté. Absent from the photo is Judy Kingsley.

"STALKERFEST"

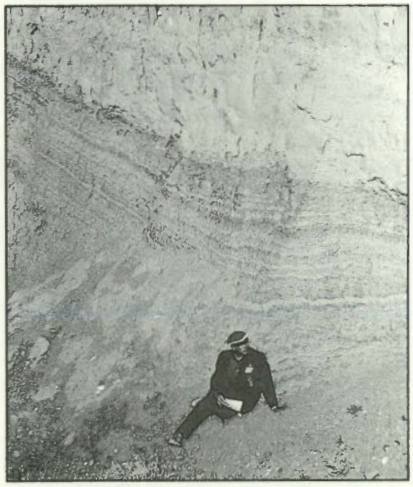
The University of Lethbridge again chose to honour (1984 honourary doctorate) an adopted son, Archie Stalker (retiree, TSD), in a special way when it staged a three-day "Stalkerfest", 27-29 October 1988. Organizers Frank Jankunis, René Barendregt, and Michael Wilson of the Geography Department centred this unique celebration around the theme "Palliser Triangle Mosaic: Spacial and Temporal Aspects of a Region". The theme was developed by 18 invited speakers who dealt with topics in the fields of archeology, vertebrate paleontology, agriculture, soils, and paleoenvironments. The sessions were followed by a day-long field trip examining exposures of "Archie's enigma" -- bedrock megablocks enclosed in drift in the vicinity of Lethbridge.

Activities that involved about 100 participants from St. John's to Vancouver (including GSC cronies Vic Prest, Bert Lee, Owen Hughes, and Leon Price) got underway at the Opening Session on the Thursday afternoon. The highlight of this part was Denis St-Onge's sliderama "Western Canada — My Country" which, with its visual and sound imagery, revealed the soul of the Prairies and let us understand why Archie spent some 40 field seasons here. Friday's program was a full day centred on talks by invited and volunteer speakers on topics ranging from Pleistocene lions to the paleolimnology of saline prairie lakes. A monograph-type

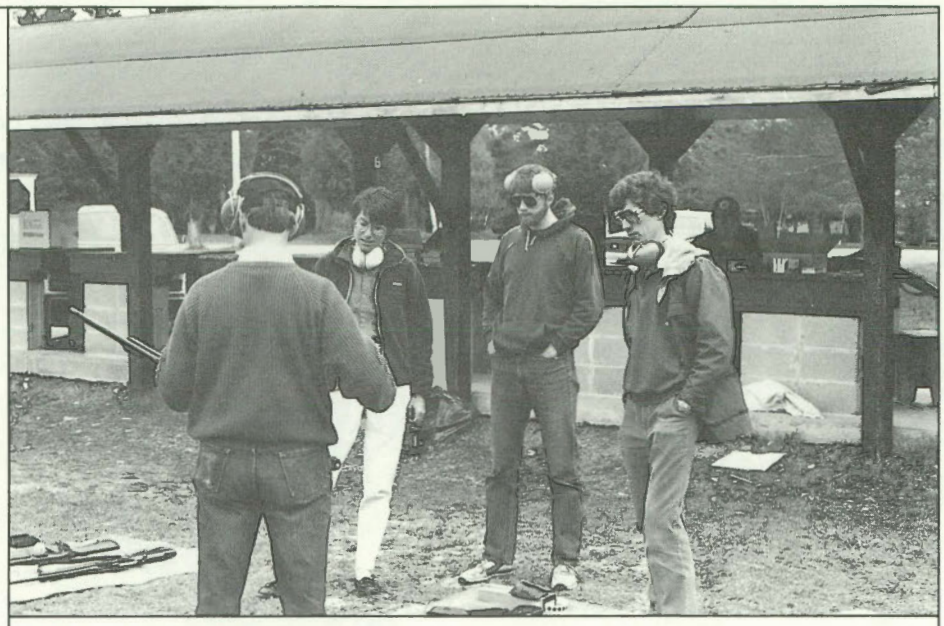
publication of papers authored by the speakers and by Archie is to be undertaken by the University of Lethbridge.

On a field trip, Saturday, Archie led a group of about 40 to several relatively unknown sections along Oldman River. He considers the sections representative of some of the types of megablocks on the southwestern Plains of Canada. A glossy guidebook entitled "Megablocks East of Lethbridge", co-authored by A. MacS. Stalker and R.W. Barendregt, was printed for the occasion by the University.

Ottawa may yet lose this recently retired scientist on a full-time basis to Lethbridge, where he now resides while on an invited 'visiting scholarship' during fall terms.



River banks exposure of ice thrust bedrock overlain by massive glaciolacustrine silt. Dr. Stalker is offering an interpretation of more complex relationships seen beyond this view to the right. He admitted that his initial reaction to the geology seen here was a cry – "help". A largesse of verbal help was available from participants – including his wife Marion – whether it served to enlighten was not determined.



Floyd Heney, GID, demonstrates safe handling of a shotgun to Janet King, Tony Peterson, and Randy Parrish of LCSD under the watchful eye of Doug Janney.

GUN SAFETY COURSE

During the field season, many officers of the Geological Survey of Canada find themselves working in remote areas of the country that may also be inhabited by bears. While every effort is made to minimize bear/human encounters, they are sometimes unavoidable and for this reason the Geological Survey offers training in the use of firearms. The training consists of classroom and practical instruction in the safe use of rifles and shotguns. These arms, which are issued by Technical Field Support Services, may be called upon to save the life of a member of a field party and field officers must be proficient in their use.

Doug Janney (Sector Safety Officer), Floyd Heney (Geological Information Division), and Steve Green (Mineral Resources Division) conduct the practical training in May and October at the Stittsville Rifle Range. Twenty to thirty field officers and their students take the training every year.

If you are interested in finding out more about this training, either for yourself and/or your summer assistants, please contact Doug Janney at 995-8504.

CANADA-WIDE INDUSTRIAL MINERALS CONFERENCE

Geologists from all provinces participated in the 5th Biennial Federal/Provincial Meeting of Industrial Minerals in Ottawa, organized by MPS. Mineral Resources Division representatives at this October meeting were Bud Cumming and Hugh Dunsmore; Scott Swinden, formerly of MRD, led a Newfoundland-Labrador delegation.

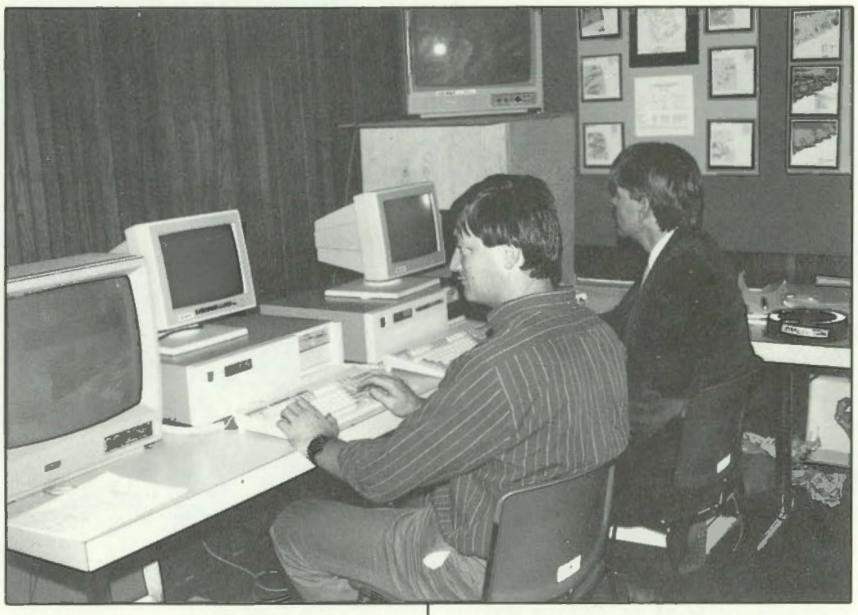
GEOMATH AT GSC

There were over 350 participants in the Colloquium on "Statistical Applications in the Earth Sciences" held in Camsell Hall, 14-18 November 1988. The event was hosted by Geological Survey of Canada and co-sponsored by five international and Ottawa-based scientific organizations. Out-of-town guests included 43 staff from provincial surveys and mining departments, 62 industry representatives, as well as participants from national geological surveys or geoscience research institutes of Australia, Finland, France, Great Britain, Israel, Italy, New Zealand, Sweden, and USA.

Frits Agterberg and Graeme Bonham-Carter were convenors of the Colloquium which involved 10 microcomputer demonstrations, 27 posters, and 70 oral presentations. Main themes for the event were spatial data, integration, statistical analysis of geoscience data, and quantitative stratigraphy.

During the Colloquium banquet, Professor Michel David of École Polytechnique, Montreal, was awarded the 12th William C. Krumbein medal, the principal scientific award of the International Association for Mathematical Geology, presented by President John Davis. Richard B. McCammon, USGS, Reston, Virginia delivered the after-dinner address "Applications of Artificial Intelligence in the Earth Sciences".

Frits Agterberg and Graeme Bonham-Carter (at keyboard).



Danny Wright (left) and Andy Rencz demonstrated geographic information systems acquired in 1987 by the Mathematical Applications in Geology Section for the spatial integration of remote sensing data with other types of geoscience information.

GEOCHEMICAL BACKGROUND INFORMATION

A Canadian Geoscience Council Advisory Committee on Geochemistry held several meetings in Ottawa and conducted interviews with twenty GSC scientists and managers, chiefly from the Mineral Resources and Terrain Sciences divisions. This six-member committee, comprising representatives from academia, industry, and provincial governments, required extensive background information on geochemical projects within GSC. This information was collated by Roy McLeod (MRD).

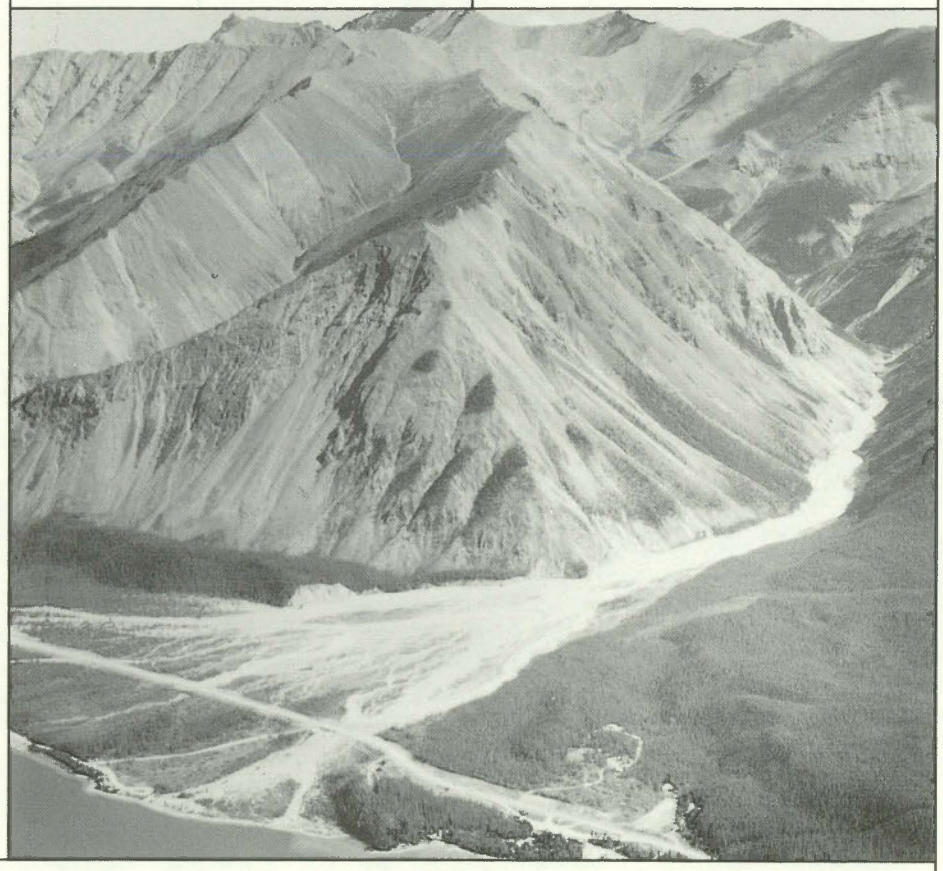
CGC Advisory Committee on Geochemistry, from left to right: W.K. Fletcher, Department of Geological Sciences, University of British Columbia; P.H. Davenport, Newfoundland Department of Mines, St. John's; A.H. Green, Falconbridge, Timmins; M.A. Bouchard, University of Montreal; I.L. Elliott, Cominco Exploration, Vancouver; J.A. Coope, Chairman, Director of Geochemistry, Newmont Exploration Company Ltd., Denver.

RAIN-TRIGGERED LANDSLIDES IN THE CORDILLERA

Rain-induced landslides are a major geological hazard in the Canadian Cordillera which impacts directly on the economic infrastructure of the region, causing millions of dollars of damage each year. GSC terrain scientists Steve Evans and John Clague investigated landslides that occurred in July 1988 when heavy rains triggered debris flows and related sediment-water flow processes in the vicinity of the Alaska Highway. These landslides severed the Alaska Highway in three areas: Muncho Lake, British Columbia; Rancheria, Yukon; and Kluane Lake, Yukon. The events drew national attention and paralyzed travel in the region for several days. In addition, the heavy rainfall caused widespread landsliding over a large area of the northern Cordillera. One of the largest events was a complex failure at Nahanni Butte, Northwest Territories.

The direct cost of restoring the Alaska Highway was in the order of $1.8 million. The results of the investigation by Evans and Clague point to the vulnerability of transportation facilities in mountainous terrain where the location of routes necessarily involves the traversing of active geomorphic surfaces.

S.G. Evans



Rain-induced debris flow on alluvial fan at Muncho Lake, British Columbia. The Alaska Highway, seen in the picture, traverses numerous fans in the vicinity of Muncho Lake and was severed at six locations during the heavy rains of July 1988.

CSPG CONFERENCE ON SEQUENCES, STRATIGRAPHY, AND SEDIMENTATION, CALGARY

The principles and concepts used in the development of sequence stratigraphy analysis, an offshoot of seismic stratigraphy, have attracted the interest of industry and academic geologists, reservoir engineers, and geophysicists since the technique was first developed in the late 1970s. A Canadian Society of Petroleum Geologists' (CSPG) technical conference, held during 14-16 September 1988 at the Core Research Centre of the Energy Resources Conservation Board in Calgary, attracted 1100 registrants from Canada, the United States, Europe, and South America to discuss and integrate recent advances in siliciclastic sequence concepts and knowledge of the sedimentology of surface and subsurface strata. Field trips, core displays, poster sessions, and talks brought together information related to surface and subsurface regional studies of areas such as Peace River, Drumheller, Fort St. John, Queen Charlotte Islands, and Pincher Creek, as well as methodologies for undertaking integrated studies of sequence stratigraphy, reservoir quality, sea-level fluctuations, and depositional environments. The proceedings of the conference, *Sequences, Stratigraphy, Sedimentology: Surface and Subsurface* (CSPG Memoir 15) and field guides, were released at the time of the meeting.

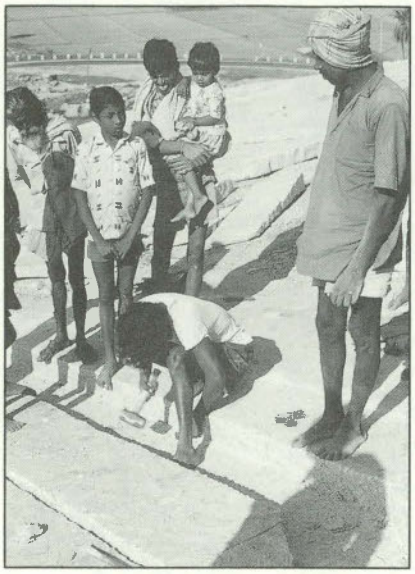
Lynn Machan-Gorham

FIELD WORKSHOP ON THE DEEP CONTINENTAL CRUST OF SOUTH INDIA

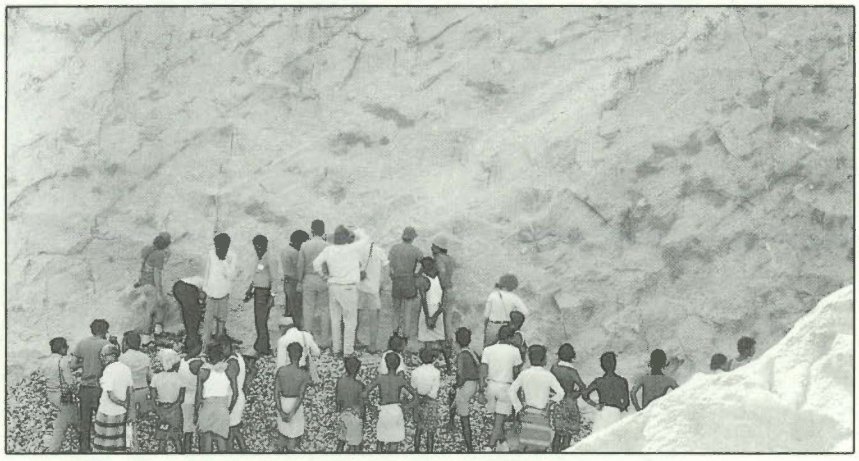
In January 1988, J.A. Percival (LCSD) was an invited participant at an Indo-U.S. workshop sponsored by the Geological Society of India, Lunar and Planetary Institute (LPI), NASA, U.S. National Science Foundation, Indian Department of Science and Technology, and the Geological Survey of India. The purpose of the meeting was to bring together 35 western and 36 Indian scientists for a 16-day period, to examine the geology of the south Indian shield, within the context of broader questions related to crustal genesis and the origin of granulites. Bangalore, at the northern end of the transect, was the jumping-off point for a logistically challenging, 11 day journey of more than 900 km, which ended in Trivandrum. In addition to visits to dozens of classical and controversial quarries along the route, four days of technical sessions were held in Bangalore, Mysore, and Trivandrum. Superb organization by K.V. Krishnamurthy (Geological Survey of India) and Pam Jones (LPI) took care of details to the point of arranging tea one afternoon in specially erected tents at the expense of Doddakanya Magnesite Mines, one of the quarries visited.

The transect included visits to the Kolar gold fields, where gold deposits are hosted in carbonated shear zones within greenschist facies metavolcanic rocks of Archean age. Adjacent Peninsular gneisses (3.4 Ga) were followed southward to the amphibolite-granulite facies boundary zone, exposed in spectacular detail in several classical quarries, which display evidence for the passage of dehydrating fluids, probably rich in carbon dioxide. Discussions that began on these outcrops, on the significance of carbonic fluids in granulite metamorphism, continued for the remainder of the workshop. Following a transect of the Nilgiri "Hills" (3000 m of topography which would be considered mountains in most other countries), the two bus-loads of geotourists and their hundred of kilos of rocks swept over the Tamil Nadu plains, into the Kerala khondalite belt. Here, textures in granulites are also strongly suggestive of flushing by carbonic fluids, yet the metamorphism in these rocks is 2 billion years younger (Pan African) than that to the north. It was generally agreed that there is something fundamentally different about the Indian granulites such that carbonic fluids may not be the driving force behind all granulite metamorphism as had been proposed. However, the quarries visited provided excellent laboratories in which to study the effects of fluids on rocks at high temperatures.

John Percival



Kambha quarry university of stone-cutting. The skill of extracting slabs of the required dimension and shape is passed along through apprenticeship. Here, at least three generations of craftsmen are at work, providing advice or encouragement. Note stringent use of safety glasses, hard hats, and steel-capped toes.



People watching people watching rocks, Kottavattom quarry. The large group of geotourists evoked curious responses from locals everywhere along the route. Here, quarry workers take a break to watch geologists at work examining dark patches (granulite) in amphibolite-facies host rock (light). Hot carbonic fluids percolated through fractures about 550 million years ago, driving off water and converting the rock to granulite along channelways.

MINERAL DEPOSITS MODELLING WORKSHOP IN CHINA

Rod Kirkham (MRD), organized and co-ordinated an IUGS/Unesco workshop "Stratabound Copper Deposits and Exploration Techniques" held in Taiyuan, China (12-24 October, 1988).

Rod and Cees van Staal (LCSD) also participated as principal lecturers. The workshop included five days spent in the field examining mineral deposits and geology in the Lower Proterozoic Zhongtiaoshan District of Shanxi Province. Hosts were the Ministry of Geology and Mineral Resources (MGMR), Shanxi Bureau of Geology and Mineral Resources, and the Zhongtiaoshan Nonferrous Metal Corporation. The workshop was deemed a great success, and one that will have an important effect on future exploration for copper in China.

With the help of many people, a workshop notebook and a reprint volume were prepared at the GSC in Ottawa. Important contributions were by D.F. Garson, R.D. Lancaster, W.D. Sinclair, J.J. Carrière, K. Nguyen, G.S. Fulton, A. Douma, S.A. Kostiew, and staff of the Word Processing Centre.

FIFTH INTERNATIONAL CONFERENCE ON PERMAFROST

The Norwegian Technical University, in the city of Trondheim, was the venue for the V International Conference on Permafrost, 2-5 August 1988. Some 300 scientists and engineers from 18 countries participated. Canada, as one of the "Big Four" permafrost countries (th others are China, USA, and SSR), was well represented ith a delegation of 50 plus accompanying persons. Canadians presented 45 papers and about 12 posters. Canadians also gave invited presentations to each of the three plenary sessions: W. Smith (Carleton University) spoke on climate change; J.A. Hunter (TSD/GSC) spoke on coastal permafrost processes; and D.W. Hayley (EBA Engineering) spoke on transportation engineering.

In association with the conference, the International Permafrost Association held two Council meetings. Achievements included the election of a new executive, the formation of standing committees to carry on the business of the IPA, and the creation of six working groups to promote research in key areas and the exchange of ideas.

The new executive committee comprises: T.L. Péwé, USA, as President; V.P. Melnikov and Cheng Guodong as Vice-Presidents; and J.R. Mackay, Canada as Secretary-General. Canada continues to host the secretariat and, with the support of NRCC, fund its operations. Canadians are well represented in the committees and working groups. H.M. French chairs the Finance Committee, and, with J-F. Nixon, has been nominated to the Editorial Committee. R. van Everdingen chairs a working group on Permafrost Terminology and A.S. Judge (TSD/GSC) is secretary of a working group on Climate Change and Permafrost. In addition, a Canadian is being nominated for ordinary membership in each of the working groups. The other four working groups are on Mountains Permafrost, Foundations for Structures in and on Permafrost, Permafrost Data, and Periglacial Environments. This latter working group is a joint activity with the International Geographical Union.

The VI International Conference will be held in China in 1993 and it is hoped that Canada will host the VII Conference in 1998.

J.A. Heginbottom

Organizing Committee and Workshop Leaders. (Back Row): Ken Maiden (Consultant, Australia), John Slack (USGS, USA), Gregor Borg (Federal Institute of Geosciences and Natural Resources, West Germany), and Cees van Staal (GSC, Canada). (Front Row): Huang Chongke (MGMR, Beijing), Sun Renyi (MGMR, Beijing), Rod Kirkham (GSC, Canada), and Cheng Ping (Bureau of Geology and Mineral Resources, Shanxi).

CANADA/USSR ARCTIC SCIENCE EXCHANGE PROGRAM:

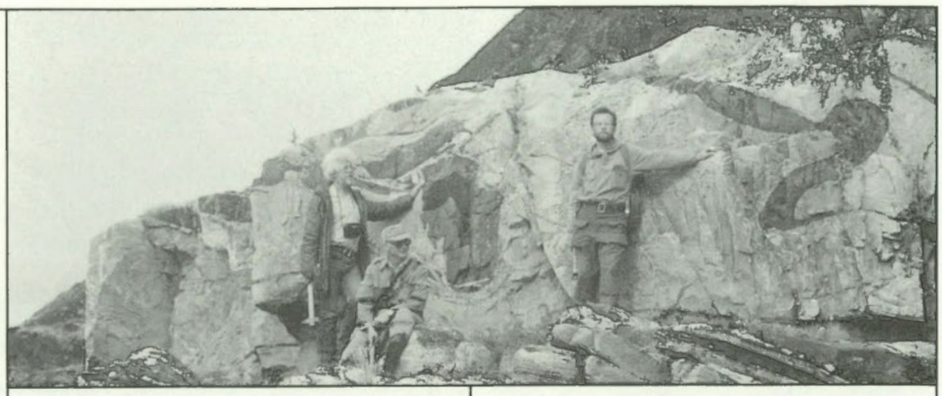
THE HARD ROCK SIDE, II

The second field excursion to the USSR under the "Geology of the ancient cores of platforms" theme of this exchange agreement (Geogram 26) took place in August 1988, when Garth Jackson and Thomas Frisch (LCSD) visited the Fennoscandian (Baltic) Shield in Kola Peninsula.

Following a tour of Peter the Great's Versailles-like summer palace 30 km south of Leningrad, the participants travelled to Apatity, 1000 km north of Leningrad in west-central Kola Peninsula with their two chief guides, Professor Viktor Glebovitsky (Geogram 26) and Dr. Sergei A. Bushmin of the USSR Academy of Sciences' Institute of Precambrian Geology and Geochronology in Leningrad, and the interpreter, Miss Natalia Drubetskaya. In Apatity, they were met by members of the Kola Branch of the Academy of Sciences, headquartered in that city.

The following week was spent mostly examining outcrops of early Archean "grey gneisses" and late Archean supracrustal rocks on and near Lake Imandra, just west of Apatity. Also visited was the remarkable Khibiny intrusion (Carboniferous), the world's largest alkaline massif (1600 km^2), where open-pit mining recovers apatite for phosphate and nepheline for aluminum.

The next two weeks were spent in the Por'ya Bay area on the south coast of Kola Peninsula, eight hours by fishing boat from



From left to right, Viktor Glebovitsky, Oleg Belayev (USSR Academy of Sciences, Kola Branch) and Sergei Bushmin, in the White Sea (Lapland) Geosuture, Por'ya Bay.

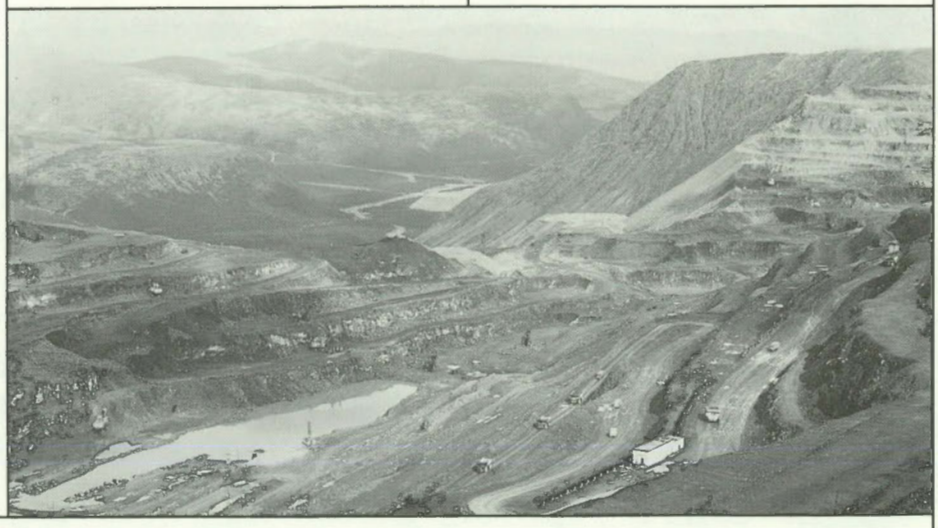
Kandalaksha, the town at the head of the Gulf of Kandalaksha, a long arm of the White Sea. The area is a game sanctuary, open to geologists only during August each year. Accommodations were in cabins used by the game wardens near the abandoned village of a former fishing collective. A distinct contrast to the Canadian Eastern Arctic, the "banana belt" environment here, north of the Arctic Circle, was marvelled at: mushrooms and berries grew in profusion in the verdant forest and fat raspberries ripened outside cabin windows.

The local rocks, excellently exposed on shorelines and numerous islets, belong to the Soviet extension of the Lapland granulite belt and have an involved tectonic history stretching from the Archean into the Proterozoic. They include various meta-igneous and -sedimentary types, in part emplaced or metamorphosed under high-pressure conditions in a suture zone separating the Kola megablock from the rest of the Fennoscandian Shield to the south. High-strain deformational features are particularly well displayed by rocks of the Kataranski complex, an Archean layered gabbro-anorthosite body exposed for more than 50 km along the Gulf of Kandalaksha.

Weighed down by approximately equal volumes of rocks and mushrooms, the participants continued on to Leningrad, then Moscow.

A reciprocal visit to Canada by Soviet Precambrian geologists is planned for 1989.

Thomas Frisch



Mining operations using mainly Japanese-built vehicles in the Khibiny massif, which stretches to the most distant hills.

INTERNATIONAL GEOPHYSICAL SYMPOSIUM, PRAGUE

The 33rd International Geophysical Symposium, the most important meeting of Eastern European geophysicists, was held in Prague, 24-28 October 1988. For the first time, the Society of Exploration Geophysicists (SEG) and the European Association of Exploration Geophysicists (EAEG) sent official delegations. The changing political climate in Eastern Europe has made increasing scientific and commercial contacts between East and West not only possible but desirable.

The symposium was attended by over 500 participants from 22 countries. As a member of the SEG delegation, George Palacky (MRD) presented a paper entitled "Application of modern airborne electromagnetic systems in geologic mapping and mineral exploration".

Eastern Europe is home to about half of the world's geophysicists, but their industrial sector cannot keep up with the developments in geophysical instrumentation and computing technology in the West. As resource exploration and exploitation remain priority areas to Eastern Europeans, scarce foreign currency will be found to import state-of-the-art geophysical instruments, if their superiority can be proven. Introduction of Eastern European professionals to advances in instrumentation by Canadians is an important step in securing a share in this vast but difficult market. An increased interest in geophysical applications, particularly in non-seismic instrumentation, could benefit Canadian manufacturers who are among the world leaders.

From the left, SEG speakers, Dr. G.J. Palacky, GSC, Canada, Dr. O. Yilmaz, Mr. S. Jones (SEG Associate Director), and Mrs. Jones.

The symposium was an excellent overview of geophysical activities in Eastern Europe, where geophysical methods are extensively used in mineral exploration and environmental studies such as the protection and exploitation of water resources, soil conservation, waste management, landslide prevention, and seismic zoning, as well as urban planning and civil construction.

G.J. Palacky

Many thanks to those who contributed to this issue of **Geogram**.

Nous remercions sincèrement les participants à ce numéro de **Geogram**.

Editor / Rédactrice - *S.R. Elliott-Meadows*

French Editor / Rédactrice française - *M.-F. Dufour*

Editorial Advisors / Conseillers à la rédaction - *M.J. Copeland, W.C. Morgan, P.J. Griffin*

Layout / Mise en page - *M. Kiel*

Word Processing / Traitement du texte - *G. Léger, S. Kostiew, K. Lamer*

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