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GEOLOGICAL SURVEY
COMMISSION GÉOLOGIQUE

FROM THE DIRECTOR GENERAL

As 1983 draws to a close, the GSC can look back with some satisfaction on a productive year, and can look forward with enthusiasm to the promises of the future. In spite of the addition of many new tasks to busy work schedules, the quality and quantity of our scientific results continue to grow. A vigorous and productive field program has been completed this year, along with the preliminary work on the next edition of *Geology and Economic Minerals of Canada*, and the various thematic maps associated with it, which, collectively, will be our contribution to the Decade of North American Geology, the centennial program being organized by the Geological Society of America.

New programs are being organized in co-operation with Provincial agencies; and new co-operative programs have been developed in the offshore areas, particularly with respect to metalliferous submarine hot spring deposits. The GSC played a major role in the successful CESAR operation. Our petroleum geologists at ISPG and AGC, in collaboration with other parts of the Department, have produced a new edition of *Oil and Gas Resources of Canada*. Our scientific staff has played a leading role in many Canadian, North American, and international scientific meetings. A number of our staff have received major awards for their scientific accomplishments and we have made new breakthroughs in communicating something of the nature and significance of our work to the general public. As a follow-up to many of the retirements and resignations noted in recent issues of *Geogram*, there have been important new additions to the staff, which will add new dimensions and strength to our work.

The current low in mining and petroleum exploration activities offers special opportunities and challenges to the GSC. New co-operative programs being developed with Provincial Geological Surveys to help stimulate mineral resource development will add to the scope and significance of our scientific program. A major effort is underway to develop collaborative programs with the university community. One such program, LITHOPROBE, offers the prospect of extending the study of geology of Canada into the third

dimension. Canada has joined the planning stage of the Advanced Ocean Drilling Program (AODP), which offers the prospect of new advances in marine geoscience. For the immediate future, a major focus for advancing our work will undoubtedly be the Decade of North American Geology project. It will provide an opportunity and an obligation to assess and synthesize much of what has been learned about the geology of Canada over the past few years, to outline the major advances and to identify some of the major challenges for the future. As we cross the threshold of a new and promising year, it is my pleasure to extend special greetings to all of the staff of the Geological Survey of Canada.

R.A. Price

MESSAGE DU DIRECTEUR GÉNÉRAL

En cette fin de 1983, la Commission géologique peut-être satisfaite de ce qu'elle a accompli au cours de cette année; elle peut, de ce fait, se tourner vers un futur prometteur. Malgré l'apport de nouvelles tâches s'ajoutant à un horaire de travail déjà bien chargé, les résultats des recherches continuent de croître en qualité et en quantité. Un programme dynamique et efficace de travaux de terrain a été réalisé cette année de conserve avec des travaux préliminaires en rapport à la nouvelle édition de la << Géologie et ressources minérales du Canada >> et de son atlas; cet ouvrage sera notre contribution à la << Décennie de la géologie de l'Amérique du Nord >>, ce projet axé sur la célébration d'un centenaire est sous la responsabilité de la << Société géologique de l'Amérique >>.

De nouveaux programmes sont organisés conjointement avec des organismes provinciaux; ainsi, des programmes conjoints ont été mis au point pour les zones de haute-mer, notamment en ce qui a trait aux dépôts sous-marins de sources métallifères chaudes. La Commission géologique a joué un rôle important dans l'opération CESAR. Nos géologues pétroliers de l'IGSP et du CGA, en collaboration avec d'autres collègues du Ministère, ont fait paraître une nouvelle édition des << Ressources du Canada en pétrole et gaz naturel >>. Nos chercheurs ont tenu un rôle de premier plan au sein de réunions scientifiques canadiennes,

américaines et internationales; un certain nombre d'entre eux a été le récipiendaire de récompenses notoires pour leurs travaux remarquables et nous avons accompli une percée nouvelle par la diffusion au grand public de la nature et de l'interprétation de nos travaux de recherche. Les récentes parutions de *Geogram* nous ont signalé un bon nombre de mises à la retraite et de démissions, ce qui a donné lieu à des apports nouveaux importants à notre personnel, amenant, de ce fait, du sang neuf et partant un regain d'enthousiasme à notre noble tâche.

Une activité plutôt réduite dans le domaine de l'exploration minière et pétrolière met au défi la Commission géologique; des nouveaux programmes conjoints sont en cours avec la participation des Commissions géologiques provinciales afin de stimuler l'essor des ressources minérales, ce qui s'ajoute à la portée et à l'importance de notre programme de recherche. Un effort majeur est déployé dans le but d'organiser des programmes en collaboration avec le monde universitaire. Un de ceux-ci, le LITHOPROBE, permet l'étude de la géologie du Canada suivant trois dimensions. De plus, le Canada s'est joint à la planification du << Advanced Ocean Drilling Program >> (AODP), ce programme permettra d'aller plus avant dans les connaissances des géosciences marines. Dans un proche avenir, nos principaux efforts doivent être concentrés sur le grand projet de la << Décennie de la géologie de l'Amérique du Nord >>. Ce projet nous donnera la chance et nous obligera, d'une part, d'évaluer et de synthétiser d'une façon plus approfondie nos connaissances de la géologie canadienne acquises récemment et, d'autre part, d'esquisser des prédictions et d'identifier quelques grands défis pour le futur.

Au moment où nous nous approchons à grands pas vers la fin de cette année, qu'il nous soit permis de souhaiter à tous nos meilleurs vœux pour le nouvel an.

R.A. Price

Canada

STAFF NEWS

DIRECTOR GENERAL'S OFFICE

Administrative Services

In the Word Processing Centre, Jacinthe Caron is now on and Claudia Clarke has returned from maternity leave. Christine Parkinson has won a competition with the Department of Health and Welfare.

The Building Maintenance and Vehicle Services section said good-bye to Michel Bradley in July. Michel won a competition with Materiel Management at Headquarters as an Inventory Clerk. Félicitations Michel.

We would like to welcome Daniel Chenier to Shipping and Receiving of the Procurement unit. Daniel comes to us from the Department of Supply and Services, National Printing Bureau section. Bienvenue Daniel.

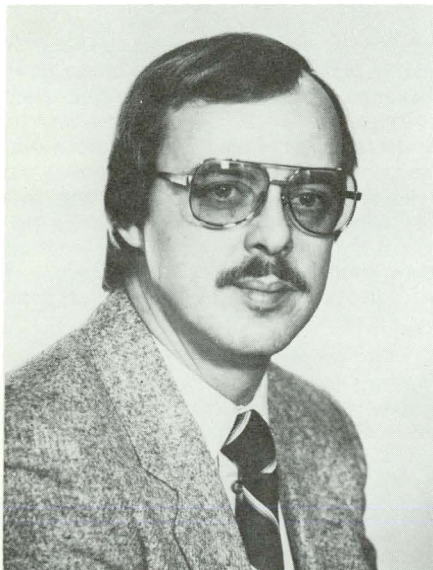
Accounts Office

The Accounts Office would like to wish Mrs. Trixie Toal a long and happy retirement. Trixie retired from the Survey on June 30, 1983.

GEOLOGICAL INFORMATION DIVISION

Cartography

John Bill started his duties as the new Chief of the Geological Cartography Section in August, and fills the vacancy created on March 1, 1983, when Mick Roberts was transferred to a special assignment. John came to the GSC in 1976 from Agriculture Canada as a journeyman draftsman. He competed successfully for a position as sub-unit supervisor in 1977 and a unit supervisor in 1980.



John Bill



Leona (centre) with members of her family at the reception in Alice Wilson Hall.

Newton McKenzie retired on July 19, 1983 after 18 years of service with the Survey. We wish him many years of happy retirement on his hobby farm near Rockland.

Norm Buck retired as Head of our Photomechanical Unit on October 24, 1983 after 27 years of service with the Survey.

A luncheon and presentation was held in his honour on October 20. A large number of the GSC staff attended, as well as his family.

Norm had daily contact with many employees of the Section and the Branch and his technical expertise and diplomacy in dealing with priority requests will be greatly missed.

Norm does not plan to remain idle in his retirement. He has planned some travelling for this winter, and if arrangements can be made, he may get to see parts of Africa on projects with CIDA and the United Nations.

Retirement of Florine Frappier

Florine Frappier, Administrative Officer with GID elected early retirement effective 31 December 1983.

Florine came to GID in January 1979 and her five years with the division were marked by increasing demands by central agencies which greatly increased the workload but with which Florine coped gracefully.

The more than sixty people who attended a luncheon held in Florine's honour on 14 December attested to our esteem and we were delighted that all four of her children were able to join us in wishing her all the best and to thank her for her 17 years of public service.

Retirement of Leona R. Mahoney

Leona Mahoney, who for more than 25 years, was the mainstay of the Publication Production Section, elected early retirement effective 31 December 1983.

At the reception held for Leona in Alice Wilson Hall on 19 December, Dr. Blackadar commented on some of the highlights of her career with the editorial side of the GSC program. When Leona began to work with manuscripts, reproduction copy was made from stencils. Errors were all but impossible to rectify but even in those circumstances Leona's great willingness to help was made evident to many an erring author. Her insistence on perfection is borne out by a high quality of GSC publications and the high esteem in which they are held.

Her friends wished to mark her long association with geologists in some tangible way and arranged for a pendant to be handcrafted from lapis lazuli. This and its gold setting and chain will, we hope, keep the earth sciences fresh in Leona's mind.

Many former members of the Survey as well as present colleagues enjoyed a pleasant social hour renewing old associations and reminiscing about the days in the old Museum Building.

Library

Jacques Bérubé est catalogueur de langue française à la bibliothèque de la Commission géologique du Canada. Il a fait ses études à l'université de Montréal où il obtint un baccalauréat spécialisé en linguistique et une maîtrise en bibliothéconomie.

Après avoir fait partie de personnel du collège Jean-de-Brébeuf, il travailla à la station de recherche d'Agriculture Canada de Lennoxville à titre d'assistant bibliothécaire. Il était catalogueur à la Société de crédit agricole avant d'occuper le poste actuel.

Morris Mason joined the GSC Library's Technical Services as a cataloguing clerk. He was a school teacher for several years before migrating from his native land, Antigua, West Indies.

He has completed a number of courses in the Library Technician Program of Algonquin College and continues to pursue a diploma in the same. Prior to his appointment to the Technical Services section of GSC Library, he was the archival clerk at the Directorate of History, National Defence Headquarters.

Tony Kopf-Johnson, a graduate in Geology from University of Alberta joined GEOSCAN in July. Formerly he was employed by the Information Research Unit, Esso Resources Canada, in Calgary.

Central Laboratories and Technical Services Division

Marie-José Goulet s'est jointe à nous en septembre dernier en tant que nouvel agent de la qualité de la langue française.

Elle continuera d'assumer les cours de français offerts auparavant par Richard Fortin. Les cours ont commencé en la première semaine d'octobre avec un horaire bien rempli et une impressionnante liste d'attente!

ECONOMIC GEOLOGY DIVISION

Reorganization - Earth Shaking News

The announcement of a reorganization within the Division to become effective on October 10 (Thanksgiving Day), was made by the Director, D.C. Findlay in a memo to staff on September 29, with few realizing the consequences of the event. Early on the morning of October 11, the Ottawa area was severely shaken by an earthquake, magnitude 4.2 centred in the North Gower area; it may be more than a coincidence that one of the Division's boat-rocking Research Scientists resides there. Seismologists at Earth Physics Branch have declined comment on any possible relationship between the reorganization and a 5.2 magnitude quake in northern New York a few days earlier.

Two new sections have been created: Regional Metallogenic Studies and Regional Mineral Resource Assessment. The former, headed by Stu Roscoe, will expand EG's investigations and interpretations of mineral deposits in regional (geographic and geological) settings, in the provinces and in the northern territories. The latter, incorporating the former Uranium Resource Evaluation Section is led by Vlad Ruzicka. It will continue systematic

national assessment of uranium and thorium resources for the Departmental URAG (Uranium Resource Assessment Group) process. It will also carry out specific multicommodity (deposit type) assessments as input to the inter-departmental (EMR-DINA-DOE) MERA (Northern Mineral and Energy Resource Assessment) process for evaluation of proposed national parks, ecological reserves, and northern land use planning regions. The northern assessment activity will be integrated with the northern regional metallogenic work of RMS section and will be co-ordinated initially by Don Sangster on a secondment from his home base in Mineral Deposits Geology Section.

Other Division changes include: the appointment of Roy McLeod to Assistant (Acting) to Director; Dave Garson as Head, Mineral Resource Information Services (formerly Mineral Data Bank); the renaming of the old Geomathematics Section (Frits Agterberg) as Mathematical Applications in Geology to more closely reflect the current and anticipated work of the Section; Bud Cumming moves to Special Projects with particular responsibilities for curation of EG's sample and reference collections; and, Richard Lancaster takes over Roy McLeod's former duties co-ordinating laboratory and technical services.

Murray Duke continues to head the Mineral Deposits Geology Section.

Three new RES recruits have joined EG. They are: Charles Jefferson, Howard Poulsen and Jon Scoates.

Charles Wilson Jefferson - Charles, as he is known to his friends, recently joined the Economic Geology Division to work in the newly established Regional Mineral Resource Assessment Section. Undoubtedly, Charles will be seen with the caribou migrating north each summer to assess Canada's frontier resources - one in search of moss and the other in search of metals.

Charlie comes to us from Cyprus Anvil Mining Corporation where he did extensive work on the Cirque and related stratabound lead-zinc deposits in the Ordovician to Devonian Road River and Earn groups of northeastern British Columbia. Before that he did a comprehensive study of the Upper Proterozoic Mackenzie Mountains Supergroup and contained strata-bound copper deposits in Redstone Copper Belt with emphasis on stratigraphy and sedimentation. This work was supported by the Department of Indian and Northern Affairs and constituted his Ph.D. thesis (1983) at the University of Western Ontario. As a student working in the summer, Charlie also gained experience with other Proterozoic and Archean sequences in such romantic places as the Nain and Churchill provinces in northern Labrador and Victoria Island and Hackett River areas of Northwest Territories.

Charlie is married with a young son and has interests in bicycling, skiing, hiking, squash, music and reading. He is a dynamic speaker and a prolific writer. We welcome him to Ottawa and expect that he will be active in many areas.

K. Howard Poulsen - Howard joined the Economic Geology Division in mid-August. He is a member of the Regional Metallogenic Studies and will concentrate his research work in the central Precambrian Shield. Howard has specialized in the role of structure, both in forming and deforming ore deposits; he will undoubtedly be applying his expertise to other areas, both within and outside the Shield.

Howard received his undergraduate training in physics at the University of Waterloo. He worked for some time as a geophysicist, and then joined Lakehead University in Thunder Bay in 1972, first as a Research Assistant, and later as a staff member, in charge of analytical laboratories. During his tenure at Lakehead, he completed his M.Sc. in structural geology. He attended Queen's University from 1980 until joining the GSC, and is about to defend his doctoral dissertation on metallogenic and structural aspects of the Rainy Lake region of northwestern Ontario.

R.F.J. (Jon) Scoates - A native of Ottawa Jon graduated from Queen's in 1961 (Hons. BSc) and continued graduate studies at the University of Manitoba (M.Sc. 1963; Ph.D. 1973). He worked as a graduate assistant at GSC on C.H. Smith's Ultramafic Rocks in Canada Project (1960-1964), being involved in studies of the Mount Albert Pluton, Muskox complex (Muskox Drilling Project) and Gordon Lake nickel-platinum deposit.

Since 1965 Jon has been with the Manitoba Department of Energy and Mines where he earned a solid reputation for his work on Manitoba ultramafic and related suites, including major petrological studies of the Fox River Sill and its associated volcanic package. In recent years Jon has become involved in the larger geological problems of the Churchill-Superior boundary zone in Manitoba and has directed detailed mapping and stratigraphic/petrological studies in Thompson Belt and Bird River Sill.

Jon joins the new Regional Mineral Resource Assessment group where his talents and broad experience will be utilized in regional metallogenic-assessment projects in the territories and in pursuing his research speciality in ultramafic and related rocks in various parts of the country.

Andrea Fabbri left the Geological Survey at the end of July returning to Italy, his native country, where his is now working at the Institute of Marine Geology in Bologna. During the last 14 years, he had

worked in the Geomathematics Section of the Economic Geology Division. At a farewell lunch, Andrea's GSC friends presented him with a Matachewan syenite porphyry paper-weight, one of the rock types point-counted in great detail by Andrea during his earliest days with the Survey.

Members of the Division wished all the best to two Research Scientists for their retirement, namely to Drs. L.P. Tremblay and J.Y.H. Rimsaite.

Dr. Tremblay retired after 37 years work for the GSC which included geological mapping in the Beaverlodge mining area, Saskatchewan, Contwoyto Lake area, Northwest Territories and several other areas of the Canadian Shield. Since 1975 until his retirement Dr. Tremblay was engaged in evaluation of uranium resources in Saskatchewan and Quebec and significantly contributed to the geological knowledge of the unconformity-associated uranium deposits. All of us appreciated his experience and the friendly character of a real gentleman.

Dr. Rimsaite has been recognized as a devoted and renowned research scientist in the field of mineralogy of uranium and phyllosilicate minerals and minerogenetic processes not only in Canada, but also internationally. We appreciated the perseverance, thoroughness and exactness in fulfilling her scientific assignments.

We wish many more fruitful years to both scientists.

Belated congratulations and best wishes to Ken Dawson who retired from the Economic Geology Division in April 1983 after 37 years service with the Survey. Ken, a quiet, methodical man, hails from New Brunswick where he graduated in 1946 with his B.Sc. Honours in geology. He began working with the GSC in 1944 as a summer student. He received his Ph.D. in 1951 from the University of Toronto for his studies of wall-rock alteration in uranium deposits at Goldfields, Saskatchewan.

During his tenure here, he worked on a variety of projects, including a comprehensive study of the Preissac-Lacorne batholith, a compilation of all GSC chemical analyses from 1846 to 1955, an investigation into the nature of the Abee meteorite, a compilation of the geology of niobium and tantalum deposits in Canada and his latest, the geology of barium, strontium and fluorine deposits. In 1963 he produced a pamphlet promoting the search for meteorites in support of research into the evolution of the earth, and was a member of the NRC Associate Committee on Meteorites from 1962 to 1965.

Ken's most recognized and lauded achievement, however, was his pioneering effort in introducing the computer as another tool available to the geologist.

Since the 1950s when he first dabbled with them, Ken has been a strong advocate of milking those mysterious black boxes for all their worth. Although he avoided being transformed into a programmer, he used the computer for statistical analyses on the distribution of elements in granitic plutons, for creating GEODAT, a computerized data file with chemical analyses of samples analyzed in GSC laboratories during the 1960s, as well as for his inventories of Ba-Sr-F and Nb-Ta deposits in Canada. He was a member on the EMR Committee on Electronic Data Processing from 1960 to 1970 and was always willing and available to patiently explain or discuss computer applications or problems with those who sought his assistance.

At a retirement luncheon this past spring, Ken was presented with several mementos including a set of bookends cut from clusters of zoned fluorite crystals for his library. Those who knew Ken expect that he will spend the many years to come enjoying a couple of his favourite hobbies – listening to the classical music he loves so much and observing and recording nature through photography and travel. All his friends at the Survey appreciated his patience, his dedication to thoroughness, and his gentlemanly nature, and wish him all the best in his retirement.

INSTITUTE OF SEDIMENTARY AND PETROLEUM GEOLOGY

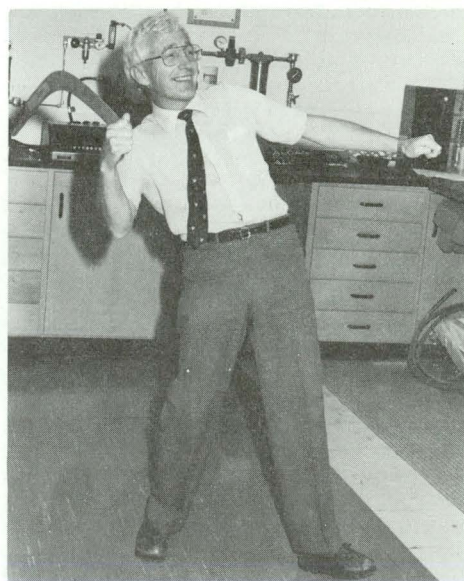
Trevor Powell – Last September, Trevor Powell, then Head of the Geochemistry Subdivision, left ISPG to accept a research position at the Bureau of Mineral Resources in Canberra, Australia. A flurry of activity preceded his departure: in a one-month period Trevor gave a series of talks to Institute scientists on various aspects of applied geochemistry and a history of the work of his unit since he took charge in 1974 as Section Head.

One of the first projects Powell co-ordinated was concerned with the petroleum geochemistry of the Alberta Basin and was carried out in conjunction with the Institut Français du Pétrole of Paris, France. Various families of crude oils and their source rocks were identified and the formation of Alberta heavy oil deposits was analyzed. An understanding of the nature and origin of oil and gas in Canada's frontier regions was Powell's next focus. In collaboration with Lloyd Snowdon, much of the groundwork for the development of petroleum generation models, exploration and play analysis and resource evaluation was initiated. Studies of hydrocarbon potentials in the Arctic Islands, Mackenzie Delta, Scotian Shelf, Labrador Shelf and Jeanne D'Arc Basin were begun. Another area of interest to Powell's group involved studies on the relationship between clay catagenesis and organic

maturation and migration behaviour. Research undertaken with Tony Foscolos led to work on the nature and controls of the formation of authigenic clay minerals in sandstones.

1981 was a year of frenetic activity in the oil industry in both the United States and Western Canada. It was a difficult time to attract geologists to ISPG because of the availability of high-paying industry positions. Boom times were in progress in the Stampede City. Thus it was that at a time when the professional staff of the Petroleum Geology Subdivision was depleted because of the oil boom, Trevor co-ordinated research teams from the various subdivisions in some of the Institute's first integrated and interdisciplinary basin analysis studies. Concurrently, he expanded the scope of the Petroleum Geology Subdivision by starting projects in crude oil correlation (using gas chromatographic and mass spectrometric techniques), mass balance studies on petroleum migration and accumulation, as well as studies on facies models, thermal histories, diagenesis, reservoir modeling, and oil shale occurrences, all funded by the Office of Energy Research and Development. Such projects required a sophisticated level of geochemical support and instrumentation. An SEM (scanning electron microscope), mass spectrometer, gas chromatograph and computer facilities were needed to analyze the growing inventory of geochemical hydrocarbon samples which ranged from the Hibernia oil field on the east coast to corehole samples from the Queen Charlotte Islands on the west.

Organic geochemistry was of particular interest to Powell and he related his work to practical problems of resource evaluation and predictive modeling of hydrocarbon occurrences. In one study, for example, Powell worked with Roger



Trevor Powell tests a theory in one of the geochemistry labs of the ISPG.

Macqueen of the University of Waterloo to determine the relationship of organic material to the formation of carbonate-hosted lead-zinc deposits at Pine Point. Contrary to conventional migration theories postulated to account for the presence of the minerals there, Powell and Macqueen concluded that generation of sulphide by in situ thermochemical sulfate reduction was a mechanism for precipitation of the lead-zinc metals.

Before leaving ISPG, Powell also studied the nature of petroleum source rocks in carbonates in the Middle Devonian formations of northern Alberta and the Ontario portion of the Michigan Basin, again in collaboration with Roger Macqueen.

While in Calgary, Powell used geochemical tools and techniques within the framework of geological research in a creative and useful way. Solid scientific research in geochemistry has been the hall mark of the ISPG over the past ten years. It is the hope of everyone that, like a boomerang, Trevor will return in the future to guest lecture and to witness progress in the geochemical research he began at ISPG.

Lynn Machan-Gorham

Steve Hopkins — Last October, palynologist Steve Hopkins elected to take early retirement from government service. This geologist began his career at the ISPG in 1968. Before accepting the position in the Paleontology Subdivision, he had completed his doctoral research at the University of British Columbia and, in 1967, had defended his Ph.D. dissertation on the palynology of Tertiary rocks from the Whatcom Basin. For two years prior to accepting a position at ISPG, Hopkins had been employed as a palynologist for the Pan American Petroleum Company located in Tulsa, Oklahoma.

Throughout his career in Calgary, Hopkins studied Cretaceous and Cenozoic pollens and spores from the Arctic and Western Canada. He was particularly interested in the Tertiary palynology of formations stretching from British Columbia to Yukon and the Arctic. Palynological studies of Lower Cretaceous formation of the Arctic Islands (such as the Isaacs, Christopher and Hassel) were his focus until 1972. After that date he was engaged in applied research projects in association with several Institute scientists: Hugh Balkwill, Tony Jenkins, Don Norris, Trevor Powell, and members of the Petroleum Subdivision. He assisted in the determination of ages of formations in British Columbia and the Arctic, based on his knowledge of the Tertiary and Cretaceous floras. For example, in one study of tectonic evolution, D.K. Norris made use of Hopkin's age determinations in a reconstruction of the tectonic history of the Bonnet Plume Basin.

In retirement, Hopkins has traded sobusting on his acreage in Alberta for the good life on a 20 acre parcel of woodland in Washington State, just minutes from the British Columbia border. We hope the fishing is good for him!

Lynn Machan-Gorham

Petroleum Geology Secretary, Brenda Baker, left the Institute in July to live in Saskatoon and her position was recently filled by Claudia Thompson who transferred from Central Registry.

Ann Ortman resigned from her position as typist in the Word Processing Centre to care for her son, Gary, now a healthy one-year old.

Other good news to come from the Word Processing Centre is that Maria Varalta is again back from Australia and adding her sunny disposition to the department. Margo Brown is back from maternity leave and working in the Administrative Subdivision.

Chuck Churchill, geochemical technologist, left the inorganic lab in October of this year. Ken Vanzeeventer has been working in the Maintenance Department since September and Barbara Acker, a recent graduate of Miss Murphy's Business College in Halifax, joined the administrative staff in September. Brian Ortman and Don Walter were promoted to the Draftsman 5 level in May 1983.

Plaques of Bruce Conglomerate from the Canadian Shield commemorating 25 years of service to the Geological Survey were presented by Walter Nassichuk to Donald Stott, Alex Cameron and Jim Aitken on October 17th in the Board Room of the Institute.

RESOURCE GEOPHYSICS AND GEOCHEMISTRY DIVISION

John Broome joined the Magnetic Interpretation Section of RGG in July. He is an engineering geology graduate of Queen's University with seven years experience with a local geophysical firm. John is responsible for establishing and maintaining an operating library of magnetic interpretation packages for our computer system. His experience in geophysics and computers makes him a welcome asset to our group.

Judy MacKeen-Vaive joined the Resource Geophysics and Geochemistry Division as a geochemical analyst in November of last year. She graduated with honours from Carleton University in 1980 in the field of biochemistry and has already gained diverse experience in analytical chemistry during her employment in the laboratories of Agriculture Canada, CANMET, and Health and Welfare. Her expertise in graphite furnace/atomic absorption spectrometry is proving particularly valuable in establishing methodology in water analysis here at the Survey.

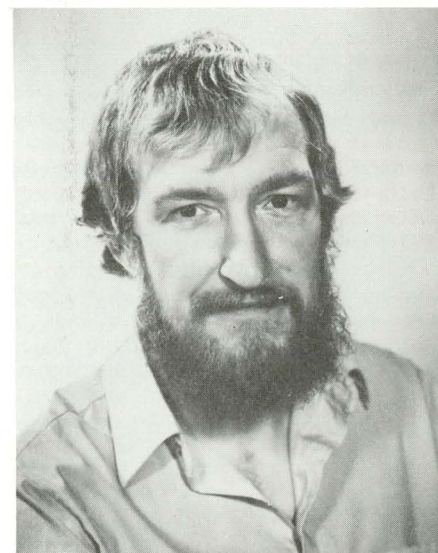
Eric Schwarz rejoined the Geological Survey after spending the last year and a half as a professor of geophysics at l'école Polytechnique in Montreal. Eric has joined the Magnetic Methods Section of Resource Geophysics and Geochemistry and is involved primarily with a multi-disciplinary study of the Abitibi belt in co-operation with a number of Quebec universities. Because of his knowledge of the magnetic properties of rocks, particularly sulphides, his wide experience with geophysical techniques, and his fluent trilingualism, Eric will be a definite asset to the Division.

In June, Derek Gresham joined the staff of the Resource Geophysics Subdivision. Derek received a B. Sc. in applied physics from the University of Waterloo and an M. Sc. in physics from Queen's University. His interest in education led him to take a B. Ed. at Queen's University and he taught physics, mathematics and electronics with the Carleton Board of Education from 1978 to 1981.

Before joining the Geological Survey of Canada, Derek worked as a physicist at Sander Geophysics Ltd., assisting in the collection and computer processing of magnetic, electromagnetic and spectrometer data. At the GSC he will be primarily working with electromagnetic techniques in the Borehole Geophysics Section.

TERRAIN SCIENCES DIVISION

David G. Harry joined the Geomorphic Processes Section in August as a Research Scientist. He comes to us from a teaching position at the University of Western Ontario and officially joined the Survey in Tuktoyaktuk, after participating in an international field excursion in the Yukon and Mackenzie Delta. Following an undergraduate degree in geography and



David G. Harry

geology at the University of Keele in England, David moved to Canada as a graduate student (M.A. Windsor, Ph.D. Ottawa). His doctoral thesis examined permafrost geomorphology on Banks Island and he brings a strong interest in this field to his new position. Current projects include monitoring of terrain performance along the Norman Wells-Zama pipeline route and analysis of ground-ice origin and distribution in northern Canada. Welcome to the Division.

Leanne Gill, who was selected for the Woman's Initiative Network (WIN) program in September 1981 after having provided excellent technical support to Bob Mott in Terrain Sciences' Paleoecology Laboratory since 1968, left the GSC in May 1983 to take up a new appointment as a junior auditor in the Internal Audit Branch of EMR. Good luck in your new position, Leanne!



Tracey Allen

Tracey Allen joined the Paleoecology and Geochronology Section in August as a term Physical Scientist to work with Dr. Sigrid Federovich. Tracey received her B.Sc. (Honours) in Biology from Carleton University in 1981, and from 1982 until joining the GSC she worked as a laboratory technician for Iotech Corporation, Ltd. Welcome Tracey!

The second new staff member of Paleoecology and Geochronology Section is Dr. John Smol, who took up an appointment as a Visiting Fellow in mid-September. Dr. Smol, a limnologist whose special field of interest is phycology, will be working on the lake sediment cores collected by Wes Blake in eastern Ellesmere Island and Greenland over the



John Smol at work on Knud Peninsula, Ellesmere Island.

last four years. Physically, John will remain at Queen's University in Kingston - his Ph.D. is from Queen's and he also spent a year there on a postdoctoral fellowship - in order to take advantage of the special laboratory facilities available there. John made his first trip to the high arctic in June, and in a matter of hours left 32°C weather in Montreal to arrive at Cape Herschel just prior to a full blizzard. He survived this traumatic experience and delighted in the fact that he collected more samples than anyone else in his six weeks in the north. The rest of us tried to get used to a strange being who had orange flagging on cap, camera, rucksack, and field notebook so that nothing would get lost!

Pat Higgins resigned after several years service in the Drift Chemistry and Mineralogy Laboratory in order to start another career in motherhood. Penny Henderson took educational leave from the same laboratory to begin a Ph.D. program of research at the University of Ottawa on the provenance of Hudson Bay sediments. Pam Midgley is serving as a term replacement for Penny. Adrienne Larocque joined the Sedimentology and Mineral Tracing Section to help Bill Shilts collect and interpret acoustic profiling data from lakes. After a short term working on the provenance of sediments in the Hudson Bay Lowland, Dominique Paré left to begin a Ph.D. program on the same topic at Queen's University.

OF GENERAL INTEREST

ARCTIC COASTAL SURVEYS

A coastal geology survey of Jones Sound, N.W.T. was initiated in August 1983 as part of a larger marine Geology-Geophysics and Hydrographic survey of the seabed of Jones Sound (CSS Baffin Cruise 83-008). In just over two days, colour aerial video tape coverage was obtained along 1135 km of the Jones Sound coastline including, Cobourg and North Kent islands and Norfolk, Thomas Lee and Sverdrup inlets on northern Devon Island. Coastal fog prevented photography of the N. Devon coast between Sverdrup Inlet and Brae Bay. Audio commentary, which provides more detailed description of the physical shore zone and sediment characteristics, was simultaneously added to the tapes. Filming was taken from a Twin Otter aircraft (provided by Polar Continental Shelf Project) flying less than a kilometre offshore at an elevation of 150-180 m. The video tapes provide a variety of users both in government and industry with a first hand continuous view of this coastline. The tapes provide an invaluable reference tool for assisting in environmental emergencies such as oil

spills, coastal land use planning for marine terminals or aircraft landing and pipeline crossing sites, and a variety of scientific studies such as coastal geology mapping and monitoring of coastal changes and fluctuations in tidewater glacier positions. Our video coverage provides a logical extension to the video tapes obtained by industry along the shores of the classic North West Passage.

STRATIGRAPHIC CORRELATION MEETING AT AGC

The sixth international and fifth Canadian meeting of the International Geological Correlation Program, Project 148, Quantitative Stratigraphic Correlation, was held on October 11-14, 1983 at Dalhousie University, Halifax, and Bedford Institute of Oceanography, Dartmouth. The first Canadian meeting also took place at BIO. Over 100 delegates and/or interested professionals attended from India, the Netherlands, U.K., Canada and U.S.A. Over 30% of the attendants were from private industries.

The final IGCP-148 meeting is scheduled for Kharagpur, India, December 12-13, 1983.

G.L. Williams

LAKE ERIE COASTAL EROSION

Dr. C.F.M. Lewis of the Atlantic Geoscience Centre, Geological Survey of Canada, is advising the Departments of Justice and Public Works in the case of Alton et al. versus the Queen, in which a number of landowners on the shore of Lake Erie are claiming that the construction of harbours by the Department of Public Works has caused coastal erosion.

Dr. Lewis has just prepared an account of the historical development of the coastline of Lake Erie since the last retreat of the glaciers. A broad wave-cut, coastal-retreat terrace has been mapped and has been related to changing water levels in response to erosion of the lake outlet, changes in water supply from the upper Great Lakes, and differential isostatic recovery of the earth's crust since glacial loading.

The fine fraction of the sediment eroded from the coastline has been re-deposited in the offshore basins of the lake, and this historical accumulation can be used to estimate rates of erosion prior to the activities of the Department of Public Works.

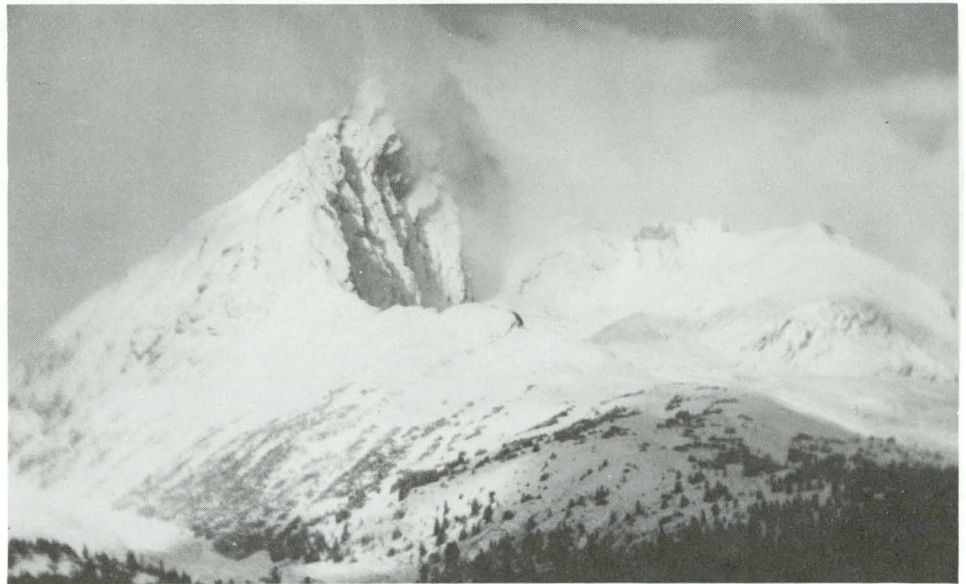
M.J. Keen

ARCHEAN GEOCHEMISTRY - EARLY CRUSTAL GENESIS WORKSHOP

In August 1983, an Archean Geochemistry-Early Crustal Genesis Workshop was held in Canada under the sponsorship of the GSC, the National Aeronautics and Space Administration (NASA), the Lunar and Planetary Institute (LPI), the International Geologic Correlation Program (IGCP), and the Ontario Geological Survey (OGS). Forty-six geoscientists from Canada, the U.S.A., Australia, West Germany, China, and Zimbabwe registered for one day of formal papers at GSC, Ottawa, and a six-day field trip in the Wawa-Timmins area of northern Ontario. The field trip was led by J.A. Percival (GSC), K.D. Card (GSC), R.P. Sage (OGS), L. Luhta (OGS), and L.S. Jensen (OGS). L. Ashwal (LPI) and K.D. Card were co-convenors. The main objective of the trip was to examine the characteristics of the Archean crust at various levels, as exposed in an upthrust section called the Kapuskasing Structural Zone. As a result of this trip, a number of participants plan to carry out research on various aspects of the geology, geochemistry, and geophysics of the region. This research will complement the results of Canada's upcoming Lithoprobe project on the Kapuskasing structure, the Kapuskasing Uplift Seismic Profile (KUSP).

K.D. Card

ISPG FIELD TRIP TO THE ATHABASCA GLACIER



A majestic peak rises near Bow Summit, the Rocky Mountains, Alberta.

ISPG staff never tire of the Rockies, and so around 7:30 am on Saturday, September 17th, a busload of staff members headed for the Columbia Icefields, Jasper National Park.

Glaciation was the topic of conversation that morning. Field trip leader Len Hills (University of Calgary) described the valley system that predated the most recent glacial event, which took place during the Wisconsinan, and left glacial till over much of the present-day foothills. The Bow Valley, we were told, is deeper now than it was in glacial times. From a look-out near Big Hill Springs, we could imagine the meltwaters flowing westward to empty into the Bow Valley west of Cochrane, and the inland sea that submerged present-day Calgary. Glacial Lake Calgary was dammed to the east by Laurentide ice. As the ice retreated, the lake drained periodically into the southeastern Bow River. Terraces resulted from the active downcutting of the water. Gravels, 10 000 years old, contain remains of **Bison antequis**, mountain cariboo, big horn sheep, and camel. Archeological evidence links ancestral Indian peoples to the Banff area at that time.

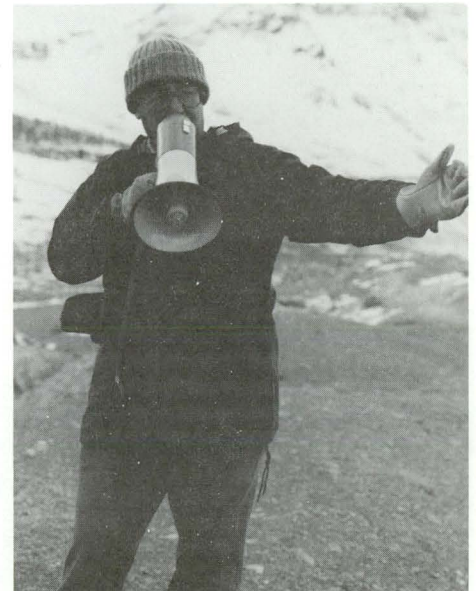
Terraces continued to be evident in the relief of the land, indicating the vast expanse of Glacial Lake Calgary thousands of years ago, as were drumlins, features used to determine direction of ice flow.

The increasing deformation of the rocks was quite evident as we drove into the mountains. Don Norris illustrated, by means of cross-sections which reconstructed pre- and post-deformational times, the shortening (on the order of 200 km) of the entire rock suite. A

sedimentary package around 10 km thick resulted from the thrusting and stacking of rock units in the Front Ranges.

Stop 3 provided us with a view of the Lac des Arcs Thrust, where middle Cambrian rocks overlie Lower Carboniferous beds.

Over the next few stops, Don Norris pointed out thrusting patterns and formations in the Mount Allen Syncline and Mount Rundle Fault regions. At Bow Summit, some 2088 m above sea level and 40 km north of Lake Louise, a spectacular vista of Peyto Lake stretched below us. A suspension of glacial silts (known as



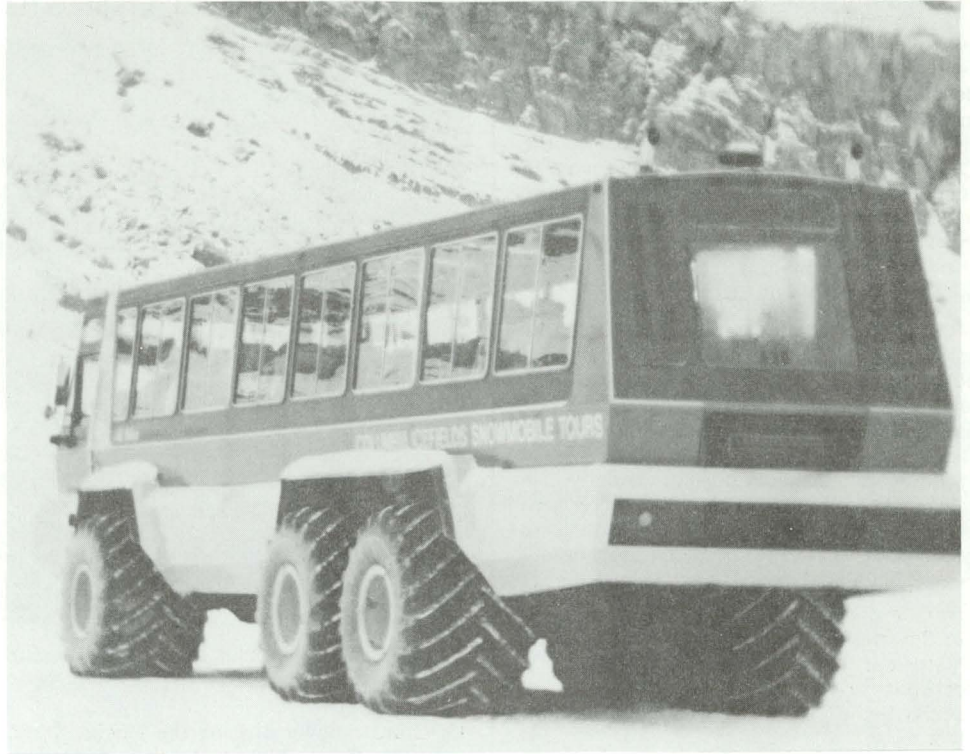
Len Hills, of the University of Calgary, describes the motion of Athabasca Glacier.

glacial flour because they are so fine) in the waters of Peyto Lake gave the lake a striking turquoise hue.

It was nightfall by the time the bus rolled up to the Saskatchewan River Crossing cabins where we would be lodged. Sweaters were built up in layers as the cool, pristine, night air slipped over the snow capped mountains and engulfed the chalets. A meal of beef, accompanied by wine, provoked hours of joke and story telling. A few of the brave, as is tradition, caroused until dawn. Some of the "night people" in the assembly joined Don Norris in an examination of the evening sky.

Early on Sunday morning the ISPG party assembled ready to venture onto the Athabasca Glacier. Warmly wrapped in sweaters and coats, we prepared for the worst. In one short day, we had left summer for the icy domain of a glacier; persistent sensations of winter invaded our memories.

The Columbia Icefields extend for 325 km² at an average elevation of 2896 m and are composed of eight large glaciers. It was at Mount Athabasca that a chance occurrence split the ISPG group into two parties. A tour snowmobile became available to those who wanted to experience the glacier. Over half of us opted to be driven onto its belly, a stretch of ice about 7 km long and over a kilometre wide. A second group was content to examine gravelly outwash deposits at its toe.



Some snowmobile!

Mounted over 1.7 m rubber tires and driven by a diesel engine, bus-sized snowmobiles are reminiscent of Star Wars technology. Rick Lichfield, an engineer, was our guide and pointed out the major

features of the glacier as we rolled over it. We were told not to expect crevasses in the central portion of the field because pressure from the rock walls tends to keep the ice compacted. Moving toward the rims of the glacier, however, crevasses 20 to 80 m deep were seen. Pressure ridges in the ice were pointed out and our attention focussed on the turquoise ice that filled the cirques of Mount Andromeda. Fresh meltwater action was later seen in the form of millholes, formed when rushing glacial waters plunge and swirl through fractures in the ice. To the south, 400 year-old lateral moraines fanned out.

Because of the purifying action of freeze-thaw cycles, the water 3 to 4.5 m below the surface of the ice is said to be a hundred times purer than double distilled water. A maximum of five hundred and seventy tons of silt on average pours daily into Lake Sunwapta, which receives the bulk of the meltwater. Each year, some 6-9 m of snow accumulates in the region. That snow is compacted over the winter season and becomes granular. Over time, a critical thickness is reached, at which point the ice begins to move down the valley. Movement of the glacier is faster in summer when it is lubricated from below by meltwaters.

It appears that more ice is being melted away each summer than is being supplied by glacial movement during the remainder of the year. Hence, the glacier is said to be dying. From June to September, clay, sand, pebbles and boulders are left behind



The Athabasca Glacier

as the glacier retreats. By September, it has receded by as much as 30 m. However, with the onset of winter it reworks some of the previously exposed debris, forming narrow ridges or moraines. As the meltwaters pour down the Icefield glaciers, they empty into the Columbia River System (on their way to the Pacific), the North Saskatchewan River (on their way to Hudson Bay), and into the Athabasca River (on their way to the Arctic), making this region the hydrological apex of Canada.

Well preserved ash layers in the surface soil indicate that the glaciers have not advanced significantly over much of the area since ash was deposited 2350 years ago (the Bridge River ash), 3500 years ago (the Saint Helen's ash), and 6000 years ago (when Mount Mazama blew its top). From the relative preservation of such ash markers, geologists have been able to determine that the present interglacial period began during a warming trend that started some 10 000 years ago, during the Holocene. It was from about 2500 years ago to about 150 years ago that a climatic perturbation took place. During this cooler period, the Neoglacial, the Athabasca advanced somewhat, forming terminal moraines beyond the glacier's present-day snout. Since that time a pattern of fluctuating retreats and advances has been typical.

We thank Don Norris, Terry Poulton, and Len Hills for contributing their time to making our field trip into the Athabasca as informative as it was enjoyable.

Lynn Machan-Gorham

PRECAMBRIAN GEOLOGY DIVISION

This autumn, the Precambrian Geology Division played host to two visitors, one from the U.S.A., the other from Africa.

Prof. M.E. "Pat" Bickford of the University of Kansas is spending a 4-month sabbatical at 588 Booth Street. Pat is a petrologist-geochronologist in whose laboratory a major program is underway dating rocks of the Wopmay Orogen.

Nick Baglow of the Geological Survey of Zimbabwe studied the petrography of drillcore from the Troodos ophiolite complex, obtained earlier this year during the internationally-sponsored Cyprus Project, with which Bob Baragar and Maurice Lambert are associated. Nick had also participated in fieldwork on Cyprus.

Nick returned to Zimbabwe in November to continue work for his Ph.D. on a greenstone belt. Pat should be back in academe by Christmas. The Division's best wishes go with them.



DISCOVERY OF A MAJOR URANIUM DEPOSIT IN SASKATCHEWAN

A discovery of significant uranium mineralization in Saskatchewan was announced early this year by S.E.R.U. Nucléaire (Canada) Limitée, a member of the COGEMA Group, an organization for exploration and mining of uranium controlled by the government of France.

The deposit is associated with the sub-Athabasca unconformity and occurs as a concealed body 350-400 m below the present surface at Cigar Lake at the southwestern tip of Waterbury Lake in Saskatchewan.

The company frequently exchanges geological information on the exploration of this deposit with the Geological Survey - Regional Mineral Resource Assessment Section. The picture, taken by the Vice-President of the company Dr. H.D. Knipping, shows examination of the high grade uranium core section by the S.E.R.U.'s project geologist Dr. K. Schimann (right) and Vlad Ruzicka of the Geological Survey at the locality immediately after the mineralization was intersected by drilling.

USGS-GSC JUAN DE FUCA RIDGE CRUISE

Jim Franklin, of the Economic Geology Division, has been getting his feet wet in new terrain these days. Jim led the

Canadian team on a five week joint USGS-GSC scientific cruise over the Juan de Fuca ridge (international waters) in August and September, where they continued investigation of the USGS-discovered seafloor polymetallic sulphide sites.

The first leg of the study, aboard the USGS research vessel **S.P. Lee**, saw some 25 000 pictures of the ridge axis seafloor snapped using the Wood's Hole-developed deep photography system "ANGUS", and a new USGS camera system.

On the second, and scientifically most exciting leg, the Canadian-developed BIO-DAL electric drill mounted on the research vessel **Paul Langevin III** was used in the discovery of an unusual seafloor volcanic structure. This structure (multiple thin basalt sheets, each supported by thin pillars and separated by one to two metres of seawater) has important implications in understanding the origin and distribution of polymetallic sulphide deposits on the seafloor. The success of this experiment was in large part due to the excellent co-operation and efforts of George Fowler and his BIO staff and Patrick Ryall of Dalhousie who were responsible for the drilling. Although it had been hoped that the drill could capture some core from the sulphide zones, the photographic work revealed the zones to be mounds of only a few metres in diameter and thus impossible to drill.

JOSEPH EDGAR ANDRE (ANDY) LAROCHELLE
1925-1983

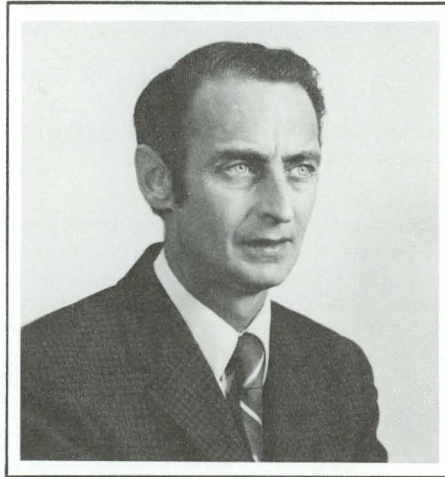
André Larochelle died in hospital in Ottawa, on June 8, 1983, after a long and determined fight against cancer.

André Larochelle was born in Black Lake, Eastern Townships, Quebec, on January 20, 1925. He had a distinguished academic career commencing with a BA degree cum laude from Laval in 1946. He worked as a junior assistant on geological mapping for the Quebec Department of Mines in the summers of 1945 and 1946; in the summer of '47 he worked as a miner at Sigma Mines, Quebec, and in 1948 as a surveying assistant at Allard Lake, Quebec. In 1949 and 1950 he was a senior geological mapping assistant in Labrador and around Thetford Mines. He obtained a Bachelor of Applied Science degree (cum laude) in mining engineering from Laval in 1950 but at this point in his career he decided his real interest was in geophysics. In the summers of 1951 and 1952 he worked on gravity surveys for the Dominion Observatory. In 1952 he obtained an M.Sc. from St. Louis University with "A gravity survey in the vicinity of St. Louis" as his thesis topic.

He joined the staff of GSC, in October 1952, initially working as an advisor on seismology under Dr. Caley in the Fuels Division. The following year he requested a transfer to the Geophysics Division in order to pursue a growing interest in magnetism and he became involved in the quantitative interpretation of aeromagnetic maps. In 1954 he was granted educational leave from the GSC in order to undertake postgraduate work at McGill where he was accepted by the Department of Physics as their first Ph.D. candidate in paleomagnetism. He returned to full time work at the GSC in 1956, and his Ph.D. was awarded 3 years later following completion of his thesis on "The paleomagnetism of the Yamaska and Brome mountains, Quebec".

During his thesis work he recognized the statistical nature of paleomagnetic data and concluded that paleomagnetism required the fast and accurate collection of orientated samples, as well as a laboratory properly equipped for the rapid throughput of large numbers of these samples. His first priority was to design and construct an astatic magnetometer with sufficient sensitivity to measure weakly polarized sedimentary rocks. His talents in mechanical engineering were skillfully applied and in the course of the next five years he produced what was probably one of the most sensitive and efficient astatic magnetometers in existence at the time. Against 'expert' advice he installed special compensating

coils that made it possible to operate in an ordinary building rather than in the isolated location which was recommended by the conventional wisdom of the time. Spinning and thermal demagnetizers followed and by the early 60s the GSC laboratory was largely automated, including computer processing of the experimental results. Attention was then turned to the speed and efficiency with which samples could be collected in the field. With the co-operation of the late Jerry Meilleur he developed a portable diamond drill and special orienting compass which made it possible to greatly accelerate sample collection. With his co-workers he succeeded in establishing paleomagnetic measurements on a scientifically secure base through the development of new instrumentation which was subsequently copied and used in many other laboratories.



Once the methods were well established there followed, especially between 1962 and 1969, a prolific period of publication. André Larochelle set meticulous standards for himself and expected them from others. Many of the paleomagnetic results he produced were enthusiastically used by other workers in the construction of polar wandering curves. He himself was always rather cautious in their application.

He was a co-author with Dr. L.W. Morley of the now well known 1964 Royal Society of Canada paper on paleomagnetism which included a statement of Morley's hypothesis on the cause of oceanic magnetic striping. André Larochelle disclaimed any role in the formulation of what has recently become known as the Vine-Mathews-Morley hypothesis, but his careful investigations of the causes of reversed

polarity, such as he had observed in the Monteregian Hills, formed part of the Morley background within which the Morley hypothesis was conceived.

Having developed state-of-the-art instrumentation and demonstrated its capacity to produce large quantities of data, André was not content to run a paleomagnetic service laboratory, and he was philosophically reluctant to participate in the mix of observation, speculative extrapolation and inference that is usually required to provide geological interpretations of geophysical data. He was much happier with mathematics, physics and engineering, where cause and effect can be linked with certainty. As the significance of paleomagnetism became more obvious to geoscientists, and more geologists sought to become directly involved, André seemed to feel it was no longer his prime interest.

In 1969 the branch was requested to provide CIDA with geophysical advice for the purpose of launching major new exploration programs in Francophone Africa. Dr. Larochelle enthusiastically accepted the invitation to participate. In the course of the next 10 years he made many visits to Cameroon, Ivory Coast, Mali, Niger and Upper Volta, as well as to Algeria, Ethiopia, Pakistan, and Brazil. At the beginning of 1972 the Paleomagnetic Section was transferred to the Regional and Economic Geology Division and for two years, when not travelling internationally, Dr. Larochelle was head of the Contract Surveys Section in RGG.

He spent 12 months, in 1974-75, on secondment to the Engineering Division of CIDA. His cynicism about bureaucratic processes in general was greatly reinforced by this experience, and he described his return to the GSC as a breath of fresh air. He was tempted to return to full time scientific activities but decided against it and in the fall of 1975 he became Assistant Director of RGG Division. He suffered several years of increasing ill-health before his retirement in the Spring of 1983.

André Larochelle will be remembered as a rigorous, precise scientist, a man who combined impeccable logic and very firm opinions. His assessment of ideas and people and current events could be very shrewd and penetrating. He was a very stimulating person to know.

He leaves a wife, Gisele, two sons and two daughters.

AGD with contributions
from PHH, LWM, and EJS.

JOAN QUANTZ ROSCOE

Joan's sudden death on 14 October as the result of a tragic accident near her home was a great shock to her many friends. She joined the Geological Survey's Water Supply and Borings Section in 1946 logging well cuttings and core, notably those from the Redwater and Leduc-Woodbend fields, "retiring" in 1952 to marry Stuart (Economics Geology Division). An active member of the Geological Wives Association, Joan prepared a light-hearted historical account of the group's activities to celebrate its 20th anniversary in 1980. Sympathy is extended to Stu and their son Peter.

ECONOMIC GEOLOGY DIVISION

We welcome Professor Roger Webber of the Department of Geological Sciences, McGill University, Montreal, who arrived at the beginning of October to spend part of his sabbatical leave in the Economic Geology Division. He will participate in research in the geochemistry of gold associated with iron formations in volcanic belts of the Precambrian Shield.

Congratulations to Frits Agterberg of the Mathematical Applications in Geology Section (formerly Geomathematics Section) of the Economic Geology Division on the award given to his joint paper with L.D. Nel. "Algorithms for the ranking of stratigraphic events" was selected by the International Association of Mathematical Geology as the best paper in volume 8 of "Computers and Geosciences" for 1982.

COMPUTER INFORMATION

If you already have an office computer or if you are thinking of acquiring one and need some help, the Library has a number of journal titles in the field of Information and Computer Technology.

Byte, Canadian Datasystems, Datamation, Infoworld, and Nibble, to name a few, are available for consultation in the reserve collection.

The Library also has online access to the International Software Database, the Microcomputer Index and, shortly, to the Computer Database. By searching these files we can help you find an article on a particular subject or a software package to solve a specific problem.

A complete list of available titles can be obtained at the Information Desk.

Judith Wilks,
Automated Information
Retrieval Librarian

FOURTH ANNUAL ISPG GOLF TOURNAMENT

Wayne Bamber, last year's winner of the Low Net Trophy, returned in fine form the sunny afternoon of September 20th to the Valley Ridge Golf Club in northwest Calgary and walked away with the Low Gross Championship (Wild Leitz Trophy), after the fourth annual ISPG golf tournament. He attributed much of his success to a heightened adrenalin flow which resulted, early in the game, from the excitement of having a fellow golfer's shot hit a tree and ricochet near his head.

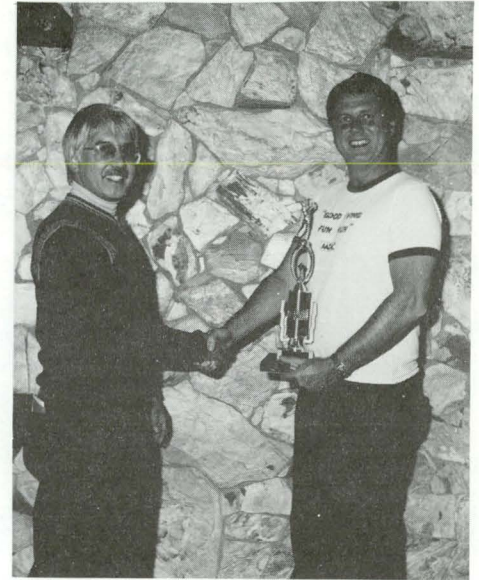
There was a lot of wood hit throughout the day (trees, that is) and Dennis Peatman became a moving target as he made his way around the course (former champions tend to attract the wrath of stray balls). John Thomson (alias Rodney Dangerfield) was also a candidate in that area, finding his ball near tree trunks and keeping fellow golfers alert.

After all of the balls had been sunk (many remain in the Bow River), the crew proceeded to the lounge where the following prizes were handed out. The prize for the lowest number of putts went to Buck Serafini (sports bag winner) and the award for the highest number of putts was handed to Denise Then (a 26-oz. bottle of perfume). The low hidden score (No. 8, par 5) went to Bill Vermette (an award of golf balls) and the closest to the pin award was claimed by Jack Unkauf (a sports bag). All the other competitors received minor prizes (beer mugs, coffee mugs, golf balls, etc.).

All the golfers enjoyed a delicious steak dinner in the club dining room. Wayne Bamber's score of 95 made him the Low Gross Champion and Willy Williams won the Low Net Champion (the ISPG Trophy) with 73 (using the Callaway Handicap System). There was also an

INTERNATIONAL PERMAFROST ASSOCIATION

Five years of backroom work amongst leaders of the permafrost research community in Canada reached a successful climax with the founding of an International Permafrost Association at the Fourth International Conference on Permafrost held in Fairbanks, Alaska in July 1983; and the appointment of Dr. J. Ross Mackay as the first Secretary General of the new Association. The story really began at the Second International Conference in Yakutsk, U.S.S.R. in 1973, when the possibility of such an association being formed was first raised. At the Third International Conference (Edmonton, 1978), Canada was requested by the other "Big Powers" of permafrost - U.S.A., U.S.S.R. and China - to investigate the possibility of forming an International Permafrost Association. Other countries are expected to join the new Association.



Bill Vermette presents the Low Net Champion trophy to Willie Williams.

elimination draw with everyone's name thrown into a hat, and when it was down to two people, Bob Davidson let out a yell when his name was not called and, smiling broadly, prepared to take home a new golf bag (maybe next year you'll win something to put in it, Bob). Dick Procter, the runner-up, was pleased with his golf bag stand.

All participants thank Bill Vermette for his time and effort spent in organizing and making the fourth annual golf tourney such a successful event.

We hope to see everyone out again next year in prime form.

Denise Then

The Canadian efforts were led by Dr. Lorne Gold and the late Dr. Roger Brown, of the Division of Building Research, National Research Council. Others involved in the task included Dr. Ross Mackay (University of British Columbia), Dr. Hugh French (University of Ottawa), Dr. John Fyles (GSC), Dr. Fred Roots (DOE), members of the Permafrost Subcommittee, scientists and engineers from EMR, DOE and NRC, and others outside the government. During their five years of work, this group developed a firm proposal for setting up the Association, and produced a draft of a constitution and by-laws.

At the Fairbanks conference, Canada invited the official delegations of the "Big Four" to a meeting at which the proposals were presented. With some minor changes, the proposals were accepted and the founding executive officers appointed. The first President of the Association is Academician P.I. Melnikov, Director of

the Permafrost Research Institute, U.S.S.R. Academy of Sciences, at Yakutsk. The first Vice-President is Dr. Troy Péwé, Professor of Geology, Arizona State University, at Tempe, Arizona. Dr. Kaare Flaate, of the Royal Norwegian Council for Scientific and Industrial Research was appointed Second Vice-President, as Norway will be hosting the Fifth International Conference on Permafrost in 1988.

As noted earlier, Dr. Ross Mackay was appointed Secretary General. In support of Canada's nomination of Dr. Mackay for this post, the National Research Council has generously agreed to fund the operations of the secretariat, at the University of British Columbia, for the first five years. This will enable the new Executive to get on with the tasks of forming a council, refining and approving the draft constitution, developing a structure for member nations to pay fees for the future existence of the Association, creating a newsletter, or whatever it decides to do. At present the only responsibility of the Association is to ensure that the next International Conference takes place. Other responsibilities will be undertaken as the Association develops.

In Canada, the new task is to form a Canadian National Committee for Permafrost, under the auspices of the National Research Council. This committee will be Canada's National Adhering Body to the International Association. Work on this task has already begun.

J.A. Heginbottom
Terrain Sciences Division

1983 GEOLOGICAL WIVES' ASSOCIATION AWARD

Elaine Johnston, daughter of Alfred and Nancy Johnston of Nepean, was awarded the Annual Award of the Geological Wives' Association.

The award is based on academic standing, extracurricular and community activities, interests, general aims and accomplishments.

Elaine, an Honours Student, graduated from Woodsworth High School and is a recipient of an Ontario Scholarship. She will further her education at the University of Waterloo and plans to major in Mathematics.

GEMNOLOGICAL ASSOCIATION

Two students at Carleton University successfully completed a Gemnology course given in the Department of Geology by Ann Sabina of the GSC. The course normally takes two years, but the students successfully completed it in one year, and now have fellowship diplomas from the Gemnological Association of Great Britain (F.G.A.)

CANADIAN DELEGATION VISITS MINERAL DEPOSITS IN CHINA

Two members of Economic Geology Division, Dave Sinclair and Ken Dawson, were part of a five-man delegation visiting China October 02-28. Other members of the group were Petr Cerny (University of Manitoba), Dave Trueman (Consultant, formerly Chief Geologist for Tantalum Mining Corporation of Canada Limited) and Raymond Raby (SOQUEN).

On arriving in China, the delegation spent four days in Beijing (formerly Peking) visiting institutions, giving lectures and sightseeing (all of which are apparently de rigueur for visiting scientists in China). There was also an unexpected discussion of a tentative Memorandum of Agreement to cover future geoscientific exchange between Canada and China.

The group then spent 3 to 4 days in each of four separate areas of southeast China examining mineral deposits. At Dexing (Jiangxi Province), the group saw an open-pit operation on a Jurassic porphyry copper-molybdenum deposit similar to porphyry deposits in North America. The deposit is large (about 1.5 billion tonnes of 0.5% Cu) but the scale of operation (at 10 000 tonnes per day) is very low by North American standards.

The tungsten deposit at Xihuashan (Jiangxi Province) consists of more than 600 wolframite-bearing quartz veins related to a Jurassic granite complex. Veins are mined individually and, although low grade (0.2 to 0.3% WO₃), the ore is coarse grained and is easily upgraded by hand sorting. The mine operates at 3000

tonnes per day and produces 2500 tonnes of WO₃ annually. Bismuth, molybdenum, tin and copper are produced as byproducts.

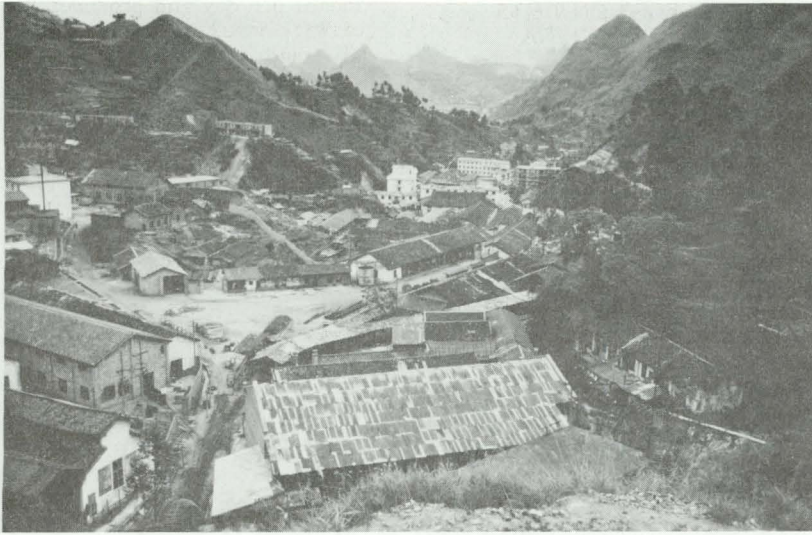
At Hengshan (Guangdong Province), tantalum-and niobium-bearing pegmatites occur in Sinian metasedimentary rocks and appear to be related to biotite granite and granite porphyry of mid-Cretaceous age. Although very low grade by Canadian standards (they average 0.04% Ta₂O₅ and 0.01% Nb₂O₅ or less), they are a high priority for the Chinese, who are exploring and developing them extensively. Some small scale mining is carried out by a number of local peasant groups.

The last deposits visited, the tin deposits at Dachang (Guangxi Province), were the most impressive. These deposits consist of cassiterite-sulphide veins and replacement zones in Devonian limestone intruded by Cretaceous granite. Veins are mainly narrow (1 to 10 cm wide) and form irregular to tabular, stratabound zones, the largest of which contains about 50 million tonnes averaging 0.7% Sn.

Some large veins (up to 1 m wide) are also present. A recently discovered replacement deposit contains at least 50 million tonnes with a grade of 1.6 to 1.7% Sn, plus 20% Pb + Zn. Although similar deposits are unknown in Canada, these are among the largest tin deposits in the world and clearly represent very attractive exploration targets. Current production at Dachang is on the order of 1000 tonnes per day although development presently underway should increase this significantly. In addition to tin, there is



The Canadian delegation with their Chinese hosts at the Lamuo zinc-copper mine, Dachang, Guangxi Province. The Canadians, from left to right, are Petr Cerny, Ken Dawson, Dave Trueman, Raymond Raby and Dave Sinclair.



Chang Po tin mine at Dachang, Guangxi Province.



Typical road hazard in China.

also production of lead, zinc, copper, antimony, silver, indium, cadmium and gallium.

Travel in China was by plane, bus, train and, locally, by boat. Travelling by bus was the most time-consuming although, at times, the most exciting. The general consensus was that the Chinese would make superb rally drivers. In addition to vehicular traffic, Chinese drivers must contend with a variety of randomly wandering domestic livestock including chickens, ducks, pigs and water buffalo, as well as people, both on bicycles and walking as many as three abreast and generally oblivious to cars, buses and trucks. (Incidentally, Chinese vehicles appear to be built with the horn where the brake should be). Although congestion and road surface conditions limited travel to 30 to 50 kilometres per hour for the most part, we occasionally reached breathtaking speeds of up to 100 kilometres per hour!

As other groups have experienced, we found the hospitality overwhelming, despite a few inconveniences caused by the massive Chinese bureaucracy. In addition to the rounds of sightseeing and movie-going, there were numerous banquets, each with ten functionaries going through ten courses and ten cups of mao-tai (a fiery liquor that we suspect could be substituted for rock fuel). The food in general was copious, superb, and highly varied, including at one point a fish that was cooked but still moving (no kidding!). All aspects of the trip considered, we thoroughly endorse good Canadian - Chinese relationships and encourage continued geoscientific exchange.

Dave Sinclair

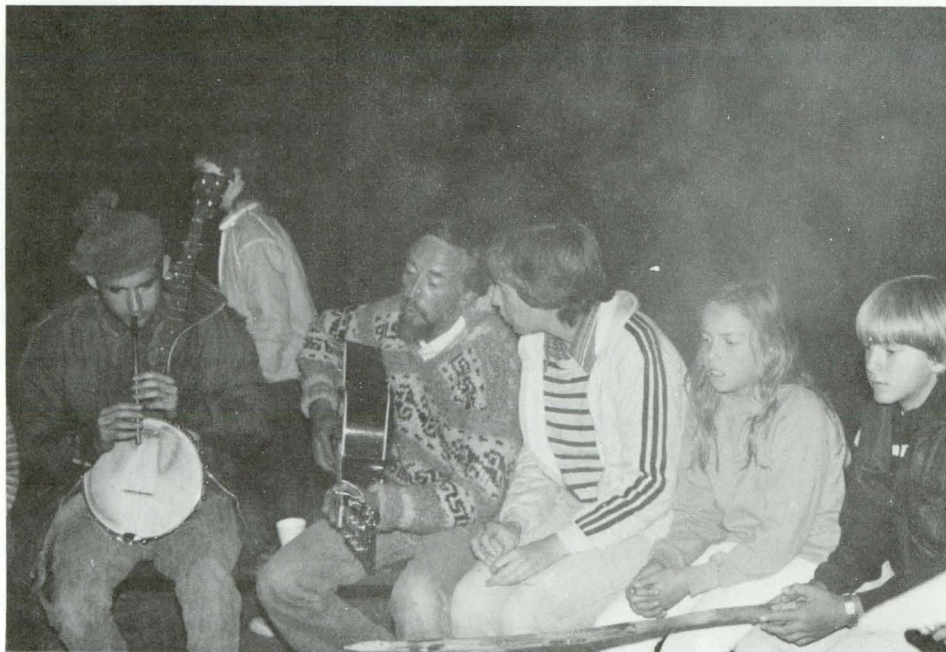
LOGAN DAY IN TURNER VALLEY

The Bow Crow Forest near Turner Valley was filled again with ISPG, university and 'downtown' geologists and their families celebrating Logan Day from the afternoon of Friday the 16th to the evening of Sunday the 18th of September. About 90 people came out to toast William Bradshaw Gallup, an industry geologist who worked on the development of the Turner Valley oil field in the mid-1950s. Stories of Gallup filled the minds and hearts of young and old alike as families settled in to a weekend of camping and feasting in the Sandy McNabb recreation area where the geological fraternity informally gathers each fall. It was a relaxing weekend and the fall air was fresh and clear. Aspen leaves had turned to gold and there was a stillness that can only be experienced when you are far from a major centre like Calgary.



Relaxing near the spit.

Logan Day celebrants share a song.



Socializing in the dinner line.

As usual, the group gathered around a large boulder where the toast to this year's honoured geological great was made by Jim Kirker of Canada N.W. Energy Limited. As members of his company passed out some cheer, Jim described the life and times of Gallup.

A graduate of the University of Saskatoon (1938), Gallup joined Imperial Oil just two years after the discovery of the oil leg on the west flank of the valley and worked the field for 11 years, supervising the drilling of 300 wells. In 1949, Imperial sold its interests in the field to the Seagram group and Gallup became the

Chief Geologist for the Royalite Company. The company drilled wells from Redwater, Alberta, to Hartney in Manitoba under the leadership of this dynamic geologist. When Seagram turned the company into a refining and marketing concern, some of the steam was taken out of the exploration effort and Gallup, as well as a number of the geologists who worked under him, lost interest in the company and left. Gallup became a consultant and projects took him to the Bighorn Basin of Wyoming, the Beaufort Sea, and from Manitoba to the islands of coastal British Columbia.

Active in the Canadian Society of Petroleum Geologists, Gallup became its President in 1954 and organized several field trips. In fact, he has been long remembered as one of the best geological guides to the foothills and Rockies areas of Alberta and B.C.

It was not long after the story of Gallup was told that the group drifted over to the barbecue pit to admire the culinary expertise of organizers Mike Cecile and Andrew Okulitch. To their efforts were added the help of several carvers and salad fixers and spirits rose as the food



Carvers Mike Perkins (Home Oil), Brian Ricketts (ISPG) and Clint Tippett (Shell) prepare to meet a voracious mob.

and drink were served up. The pig was "a pointe" -- a delicious combination of sight, smell and taste to all those who lined up around the picnic tables, paper plates firmly grasped in their hands.

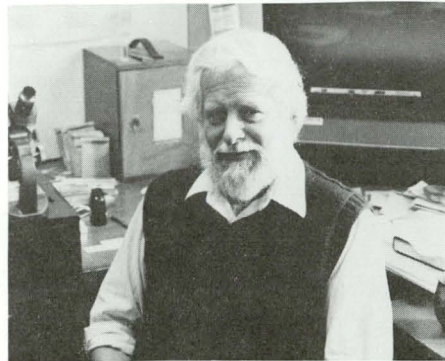
Logan Day, like fine wine, get better with age it seems, and has become a cherished ritual to Calgary geologists. Anyone who is in the area and who would like to come out and meet the group should get in touch with Mike Cecile sometime in late August of next year. Bring your camping gear and be prepared to share in the fun.

Lynn Machan-Gorham

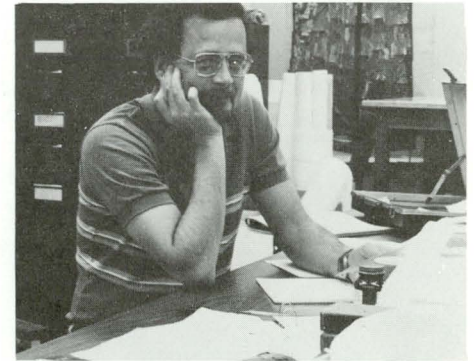
**PACIFIC GEOSCIENCE CENTRE,
PATRICIA BAY**

The recent history of the Geological Survey of Canada at the Pacific Geoscience Centre is best summarized in the following table:

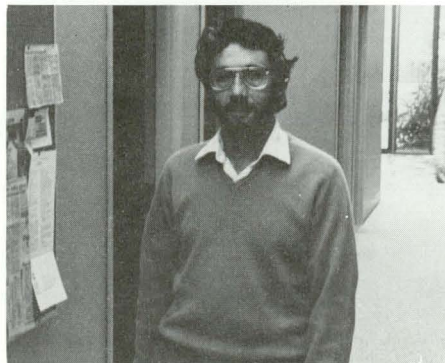
<u>Year</u>	<u>Arrived</u>	<u>Departed</u>
1977	C. Yorath B. Bornhold	
1978	B. Cameron S. Cameron R. Currie I. Frydecky D. Tiffin L. Sarracino	
1979	J. Luternauer D. Seemann	D. Tiffin
1980	P. McLaren M. Johns	S. Cameron
1981		L. Sarracino D. Seemann
1982	T. Forbes B. Hill G. Jewsbury T. Hamilton K. Conway	



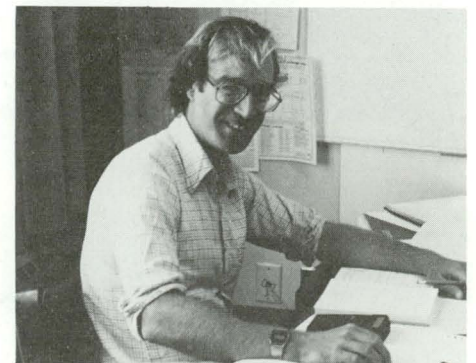
Bruce Cameron



John Luternauer



Chris Yorath



Patrick McLaren

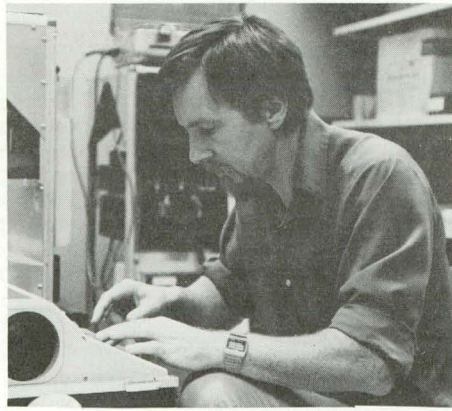
1977-78 was the major period of transfer of the Marine Geology Section from Vancouver to Patricia Bay. Since that time, four positions have been vacated and refilled. Don Tiffin resigned to sail around the world. Susie Cameron and Lesley Sarracino resigned to be full-time mothers. Dave Seemann still resides at PGC but decided that Earth Physics' grass was greener.

Chris Yorath took over as the local Ayatollah when Tiffin left for the South Pacific. He now settles our scraps - internal and external - and in his few free moments pursues research on continental margin tectonics. Mark Hamilton joined the bedrock geology group from the Alberta Research Council. Mark's past areas of interest have included petroleum geophysics,

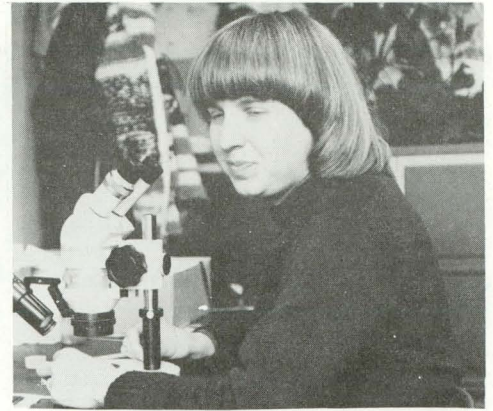
experimental geochemistry and bagpipe blowing. His current endeavours are in marine geophysics and volcanology. Geographically his fieldwork takes him from the Strait of Georgia, to the Queen Charlotte Islands, and offshore. Gail Jewsbury replaced Dave Seemann, primarily as an ocean-going technician, and is our one-woman field sampling equipment group. She spends most of her



Brian Bornhold



Ralph Currie



Marji Johns



Gail Jewsbury

time neck-deep in compressor parts and chasing scientists away from her pet coring equipment.

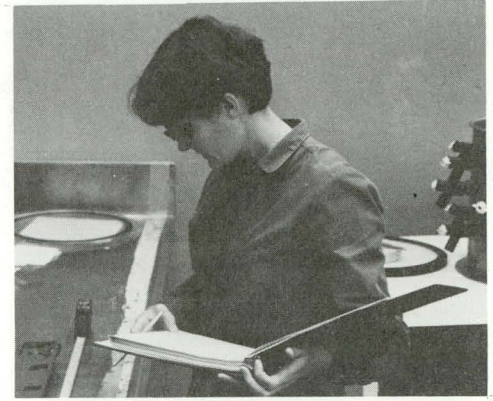
Marji Johns, in an epic saga of human freedom, managed to flee from ISPG to join us as our micropaleontology technician. After a suitable period of defumigation and debriefing, she has been aiding Bruce Cameron in a variety of studies. Included in these are Jurassic biostratigraphy of the Queen Charlotte Islands, micro-organisms associated with spreading ridges and the raising of pigs and goats at Sooke.

The electronic wizardry on which we all depend is in the able hands of Ivan Frydecky, a large itinerant Slovak from Bratislava, and Bill Hill, an escapee from the Canadian Coast Guard. Without the indispensable efforts of these two, nothing works including seismic gear, side-scan sonars, paleomagnetic equipment, coffee machines, vacuum cleaners, toasters, hair dryers.....

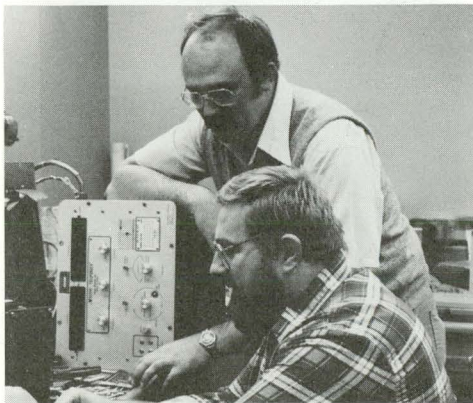
An 'interesting' feature of PGC is the number of one man groups. The one man magnetics group is Ralph Curie and the one man computer science group is also Ralph Curie. When he's not debugging equipment he performs things magnetic and on top of all that, he is our one man navigation group and spends much of his time telling us all where we have been.

Like many marine research installations we have an abundance of mud people. John Luternauer, who came to us from somewhere in the constellation Orion, studies the sediments of deltas such as the Fraser, Skeena, Cowichan, Nanaimo etc.

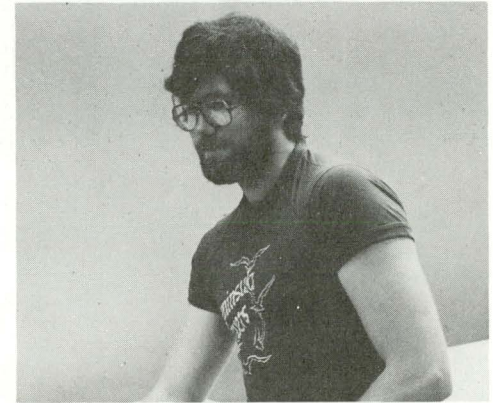
Patrick McLaren, reprieved from a sentence to AGC, chases sand grains along our coastline and tries to prove the ridiculous proposition that the source/deposit of a sediment has something to say about the grain size distribution and vice versa. Brian Bornhold, having returned to us from a year's sabbatical in the vineyards of southern France where he studied modern glauconite from the west coast of Canada, continues his muddy interests in our fiords and on the



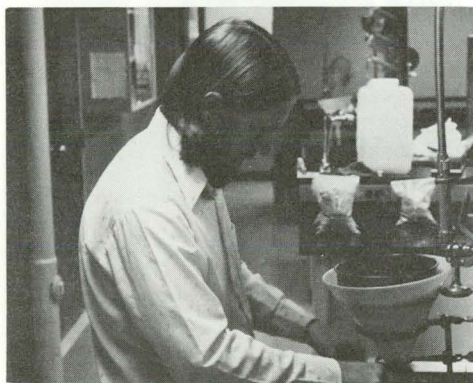
Trudie Forbes



Bill Hill (back) and Juan Frydecky



Kim Conway



John Truscott



Tark Hamilton

continental shelf. Each of these people are ruled by Trudie Forbes, the diminutive and benevolent dictator of the sedimentology laboratory.

What is the Pacific Geoscience Centre? Apart from its physical appearance as part of the campus of the Institute of Ocean Sciences, it comprises people from both the Survey and the Earth Physics Branch. To characterize the management of this arrangement is like trying to describe a heterosexual common law relationship between two people whose mothers are jealous of each other. Despite the problems of the arrangement we, in concert with our geophysical colleagues, manage to do some exciting work. Ralph Currie (GSC) and Earl Davis (EPB), in concert with American scientists from NOAA and the University of Hawaii, conducted extensive swath echo sounding (SEABEAM) and side-scan sonar (SEAMARK II) surveys of the Juan de Fuca Ridge system this past summer. In spectacular detail these surveys have revealed the complex volcanic structure of the system and will be used to identify potential targets for hydrothermal sulphide studies (black smokers) via submersible and other means.

KEGS/GSC BOREHOLE GEOPHYSICS SYMPOSIUM

The long planned event for the Borehole Geophysics Section of RGG Division was the International Symposium on Borehole Geophysics, held in Toronto, August 29-31, 1983. The three day conference, co-sponsored by the GSC and KEGS, (the Canadian Exploration Geophysical Society) drew over 200 people from all parts of the world, to discuss mining and geotechnical applications of borehole geophysics. Delegates came from Australia, Austria, Finland, France, Holland, Ivory Coast, Norway, Saudi Arabia, Sweden, Switzerland, South Africa, the U.K., U.S.A., West Germany and Canada. The excellent facilities at the University of Toronto, as well as the good weather, contributed to the success of the symposium.

The technical program committee chaired by Pat Killeen came up with a slate of 37 papers and two informal workshops. Jonathan Mwenifumbo kept the speakers in line as a technical session chairman. Quentin Bristow chaired the first workshop on 'Instrumentation', and Alf Dyck chaired the second workshop which was devoted to 'Interpretation'.

Both workshops stimulated lively discussions, with very interesting informal information being supplied by the participants. The age-old question of 'how to design a borehole probe to prevent its getting stuck in a hole' competed for time with the question of 'how to best recover a probe once it was stuck!'

Five technical papers on the work of the Borehole Geophysics Section were presented; an indication of the active role the GSC is playing in R&D in this field.

Geophysical equipment from Canadian manufacturers was prominent among the display of borehole instrumentation in the exhibit hall adjacent to the auditorium. The state of the art could be seen there, including fibre optic cables and a microprocessor controlled winch which was programmable. All the borehole logger had to do was get it to the borehole!

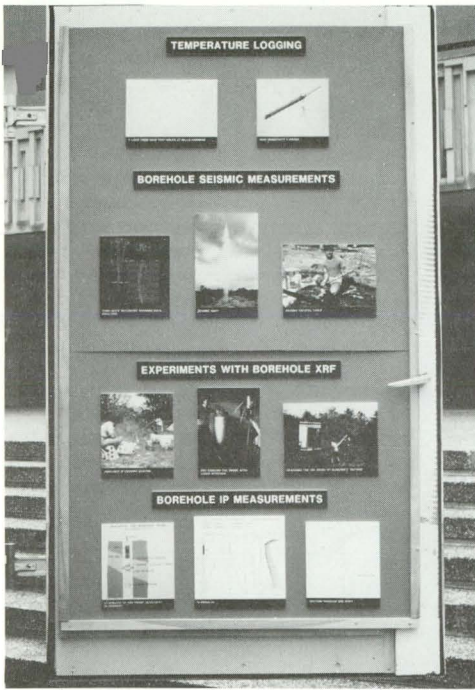
Outside in front of the auditorium, Bill Hyatt proved to be an able demonstrator of the R&D logging system used by the GSC. Using samples of chalcopyrite in an aquarium and uranium ore he illustrated the recording of I.P. (Induced Polarization) and gamma-rays for mineral exploration. To assist him in



The truck-mounted R & D logging system used by the Borehole Geophysics Section of RGG Division.

The computerized instrumentation developed by the Instrumentation R & D Section of RGG is shown inside the logging truck.





One of the 2 display boards prepared by the Cartographic Section of GID, which explains the activities of the Borehole Geophysics Section.

this effort an attractive display board explaining the activities of the Section was prepared by the drafting unit of the GSC, and mounted inside the back doors of the truck.

The organizing committee made up of KEGS members included Roger Caven (Chairman), Frank Bottos (Urtec Ltd.), Nigel Edwards (U. of T.), John Needham (O.M.E.S.E.) and Chris Madsen (Spectronics). The meticulous preparation by all concerned, and especially Frank Bottos, who filled in when the others were away, paid off in a smoothly run event, from the welcoming reception to the banquet held at the Ontario Science Centre.

Thanks to J. Tuzo Wilson's interest in geophysics, the Science Centre was held open after hours for the 200 delegates who were able to wander through the

hands-on exhibits and marvel at the technology on display. Many a "lunar lander" crashed at the Science Centre in the hands of inexperienced space-loggers that evening in the hour before the banquet.

An expert on conferences, Kathy Jones was borrowed from CANMET to help with the logistics of preparation of the symposium. Her knowledge and previous experience proved to be invaluable and we are certainly fortunate to have had her help.

Finally, to pre-inspect the manuscripts for publication, supplied by the speakers, and to document the affair on film, Mike Kiel from GID was on hand. The proceedings of the symposium will be published by the GSC. Response to the symposium has been very favourable and already people are asking when the next one will be held.

**CHANGE IN ORGANIZATION –
GEOLOGICAL SURVEY OF CANADA**

Effective April 1, 1984, the Mineralogy Section and the Analytical Chemistry Section of Central Laboratories and Technical Services Division will be transferred to the Economic Geology Division; and the Technical Services Section of CLTS will be transferred to the Resource Geophysics and Geochemistry Division.

Dr. J.A. Maxwell, Director of the Central Laboratories and Technical Services Division, will be transferred to the Director General's office to carry out a special assignment.

These changes are intended to make the management structure of the Geological Survey of Canada more efficient and effective by reducing the number of divisions, and by further implementing the successful Branch policy of integrating technical support and analytical service and research units with the Division that are their principal clients.

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

Material for the next issue of **Geogram** should be sent via your Division Office to GID

Les articles pour la prochaine parution de **Geogram** devront être dirigés au secrétariat de votre division et de là acheminés à la Division de l'information géologique.

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