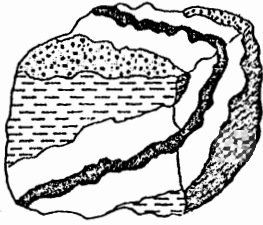


# THE OMINOUS



Newsletter of the Mineral Deposits Division

Geological Association of Canada

No. 8

March 1980

## Calgary 81: Two big MDD symposia announced

Your Mineral Deposits Division has sponsored two full-day symposia that promise to be of outstanding interest to economic geologists attending the GAC/MAC/CGU Annual Meeting at the University of Calgary, May 11-13, 1981.

On May 12, a symposium "New Exploration Guides for Kuroko-type Massive Sulphide Deposits" organized by Steve Scott and Hiroshi Ohmoto will present the results of a three-year investigation of the Hokuroko district, Japan. Members of the cooperative U.S.-Canada-Japan research team will present twelve papers that emphasize new exploration guides as well as background information on the type locality of volcanogenic massive sulphide deposits in island arcs. The program is:

May 12: Morning Session, 0830 - 1200, Student Union Ballroom.

Hiroshi Ohmoto

Overview of the U.S.-Japan-Canada Cooperative Research Project on the Genesis of Volcanogenic Massive Sulfide Deposits.

L. M. Cathles,  
F.O. Dudas and  
T. Lenagh

Exploration significance of a failed rift hypothesis for the genesis of Kuroko-type massive sulfide deposits.

Toshio Takahashi  
and Takeo Sato

Volcano-stratigraphic habitat and current exploration guides for Kuroko-type deposits.

Albert L. Guber,  
Hiroshi Ohmoto  
and Jiro Date

The Hokuroko model as an exploration guide for Kuroko-type deposits.

Jiro Date, Yoshihiro  
Watanabe and Yuji  
Saeki

Alteration as a new guide to Kuroko deposits.

Geoffrey R. Green  
and Hiroshi Oh-  
moto

The application of oxygen isotopic analyses to the exploration for volcanogenic massive sulfide deposits.

Afternoon Session, 1330 - 1700, Student Union building

S. I. Kalogero-  
poulos and S.D.  
Scott

Tuffaceous exhalites: their genesis and exploration significance.

Bruce R. Doe,  
U. Fehn, C. W.  
Farrell and  
K. Sato

Prospecting implications of radiogenic daughter element concentrations and isotopic compositions gained from the Kuroko ore project study.

L.M. Cathles

The use of hydrothermal circulation models in exploration for hydrothermal massive sulfide deposits.

I.H. Campbell,  
M.P. Gorton, S.D.  
Scott, J.M. Fran-  
klin and P.C.  
Thurston

Rare earth elements as a guide to massive sulfide exploration.

Tetsuro Urabe,  
Steven D. Scott  
and Keiko Hattori

A comparison of Kuroko and Canadian Archean massive sulfide deposits.

George W. Mannard

A critical appraisal of the applicability of recently developed data and theories to the search for volcanogenic massive sulfide deposits.

The next day, May 13, will feature the symposium "Metallogeny and Tectonics of the North American Cordillera" organized by Ken Dawson and Jim Monger of the GSC Vancouver office. The recent and rapidly-evolving tectonic concepts of the Cordillera provide a framework for the formulation of new regional metallogenic models. Twelve papers will be presented that will comprehensively cover the Cordillera from Alaska to Mexico inclusive. Many stimulating and provocative concepts will be presented in the following program:

May 13: Morning Session; 0900-1200; Student Union Ballroom

Zvi Ben-Avraham  
and Amos Nur

Oceanic plateaus and allochthonous terranes

D.L. Jones, H.C.  
Berg and W.J.  
Nokleberg

Significance of tectono-stratigraphic terranes to metallogenesis in Alaska

W.J. Nokleberg,  
R.E. Zenner, I.M.  
Lange and R.B. Tripp

Metallogeny of accreted Andean-type arc terranes, Mount Hayes Quadrangle, eastern Alaska Range, Alaska

H.C. Berg

Metallogenesis in accreted terranes in South-eastern Alaska

D.J. Tempelman-Kluit

Tectonics and mineral deposits of southern Yukon

J.W. H. Monger

Evolution of the Canadian Cordillera

1200 - 100: GAC Mineral Deposits Division Luncheon

Afternoon Session: Ballroom, Student Union Building.

1:15-2:00 Mineral Deposits Division Annual Meeting

A. Panteleyev

Metallogeny of British Columbia: overview and update

J.R. Griffiths  
and C.I. Godwin

Metallogeny and tectonics of porphyry Cu-Mo deposits in British Columbia

V.F. Hollister  
and E.W. Tooker

Metallogeny and tectonics of the northwestern United States

J.P. Albers

Distribution of metal provinces in major tectonostratigraphic terranes of the western United States

P.E. Damon and  
J.M. Guilbert

Zonation of mineral deposits related to Mesozoic-Cenozoic subduction in southwestern United States and Mexico

M.F. Campa and  
P.J. Coney

Tectonostratigraphic terranes and related metallogeny of Mexico

As indicated in the program above, the Second Annual MDD Business Meeting will be held at 1:15 p.m. in the Student Union Ballroom immediately following the MDD-sponsored luncheon. The short meeting will feature reports from the Chairman, Secretary, Treasurer and incoming chairman. The meeting will then be opened to comments from the floor and members are encouraged to comment on any aspects of MDD activities at that time.

1981 Executive Committee Elections: Call for Nominations

The Chairman of the Executive Nominating Committee, Dick Potter, would welcome suggestions for candidates from the membership. The slate includes the positions of Chairman, Vice Chairman, Secretary, Treasurer, Program and Publications, plus three directors for 1981 - 1984. The committee will announce the slate in mid March, and balloting will take place one month later.

Please send proposed nominees to: R.R. Potter, New Brunswick Department of Mineral Resources, P.O. Box 6000, Fredericton, N.B. E3B 5H1 (506) 453-2206

MDD Committee on Research in Mineral Deposits

This is a second article examining the status of Canadian research in mineral deposits. The first appeared in the October, 1980 issue of "The Gangue" and offered a preliminary review of the current status of mineral deposits research. In spite of a call for response to the article, virtually none was received. Other than my own colleagues at the GSC, only the following responses were received: One letter and one telephone call from the mineral industry and oral responses from two members of a provincial geological survey whom I happened to be visiting soon after the article appeared. No response or reaction was received from any member of the more than twenty Canadian university geology departments. Not one. Needless to say, due to the non-response, the planned-for discussion in this article cannot be presented. I can, therefore, only present a few more facts and opinions on the subject before I run out of material and the subject dies in this or the next issue of "The Gangue". To those few who did respond, thank you for your interest and the time you took in responding.

Article 2: Mineral deposits research in government and university

In the discussion that follows, we will examine, to the extent possible, the quantity and type of mineral deposits research carried out by government (provincial and federal) and universities. Only limited data are available for examination but what there are may be of interest to MDD members.

Distribution

Of 1273 research projects listed in the latest Canadian Geoscience Council listing (GSC paper 79-5), approximately 90 (about 7%) were judged, from the titles and synopses provided, to centre on mineral-deposits research. The distribution between government and university projects is approximately 42% and 58%. Thus, in terms of number of voluntarily-reported projects, Canadian universities are engaged in just under 40% more mineral deposits research projects than both levels of government.

Funding

I am not aware of any public documents listing annual funding of individual government research projects so the distribution and total of government, internal, mineral deposits research cannot be examined.

University research is funded almost entirely by government and industry. The amount and distribution of the latter support is not reported so only government-supported mineral deposits research can be examined.

The bulk of government-supported university funding has traditionally been supplied by the National Research Council (specifically the Natural Sciences and Engineering Research Council) In 1978, total operating grants awarded in Earth Sciences research amounted to \$5.9 million, of which about \$511,000 (or 8.6%) was directed to mineral deposits research. The proportion of NRC grants to mineral deposits research has been about the same for the three representative years selected for examination, i.e. 1979, 1978, 1975. The average mineral deposits NRC grant has risen from about \$7000 in 1975 to about \$12,000 in 1979.

Another source of funding is the Research Agreements from the Federal Department of Energy, Mines and Resources. In 1978, these amounted to about \$598,000 of which \$62,300 (10%) was awarded to mineral deposits research. Awards averaged \$7000 each.

Some provincial governments have grant programs under which universities may apply for research funding. For example, the Ontario Geological Survey, in 1979/80 accepted 27 grant proposals totalling \$478,567. About half of these were aimed at mineral deposits research. The OGS grants averaged about \$17,600, considerably higher than the NRC average of \$12,000 for the same year.

As conscientious taxpayers, MDD readers may be interested to know where mineral deposits, government-supported research funding is distributed among Canadian universities. For the three years (79/80, 77/78, and 74/75) selected for review, NRC grants to mineral deposits research totalled about \$1,000,000. This million dollars was awarded as follows:

University	% of Total	Cumulative %
Toronto	27.1	27.1
Alberta	10.3	37.4
Queen's	7.2	44.6
UBC	6.0	50.6
Memorial	5.9	58.5
UNB	5.4	61.9
Western Ontario	5.2	67.1
Saskatchewan	4.6	71.7
Manitoba	4.6	76.3
McGill	4.4	80.7
Carleton	3.7	84.4
Waterloo	3.4	87.8
Ecole Polytechnique	3.2	91.0
Calgary	2.7	93.7
Laurentian	1.8	95.5
Lakehead	1.4	96.9
Quebec (Chicoutimi campus)	1.1	98.0
Ottawa	0.9	98.9
McMaster	0.4	99.3
Dalhousie	0.4	99.7
	<u>99.7</u>	

This compilation serves to focus on the well-known pre-eminence of the University of Toronto in Canadian mineral deposits research. The figures also show that 50% of the funding went to only four universities, that just over 75% of it went to nine universities, and that eight universities collectively received less than 10% of NRC funding.

EMR 1978 Research Agreement funds for mineral deposits research (\$62,300) were distributed as follows:

University	% of total
Toronto	45
UBC	16
McMaster	15
Waterloo	9.6
McGill	9.6
Carleton	4.6
	<u>99.8</u>

The OGS Grants report does not include details of individual grant funding so the total awarded to mineral deposits research is not available. The total awards, however, in all fields of geology were distributed as follows for 1979/80:

University	% of total
Toronto	31.5
Western Ontario	16.8
Carleton	9.4
Windsor	8.8
Queen's	8.7
Laurentian	8.3
Waterloo	7.1
Ottawa	5.5
McMaster	3.8

Types of Research

The word "research", like "greywacke" or "metallogenesis" is not readily defined and, consequently, means different things to different people. Research in mineral deposits, or any other field, embodies a wide range of activities. An entire spectrum exists from simple compilation of existing knowledge ("library research") to the development of new ideas and discoveries at the frontiers of science.

In an attempt to avoid ambiguity and confusion, current Canadian mineral deposits research is divided into three types as defined below. Following this, an attempt is made to categorize current government and university research projects into these three types.

#### Type I Research

"Thematic" or "fundamental" in-depth research on specific problems of ore genesis. Examples might include study of mineralizing processes (e.g. solution chemistry), the effects of a mineralizing process (e.g. detailed and exhaustive alteration studies), development of new technology (e.g. direct dating of ores and minerals), development of new techniques (e.g. laser microprobe analysis of fluid inclusions). In general, Type I research is best described as "problem-oriented" rather than "deposit-oriented".

#### Type II Research

Basic, short-term documentation type studies of single deposits or a small group of deposits using existing, standard research techniques (mapping, core logging, microscopic/microprobe, chemical analysis). Research tends to be "deposit-oriented" rather than "problem-oriented" with the result that products of this research are more in the nature of case histories rather than solutions to specific problems. A typical project might be described as the "Geology of the Moosehead deposit" or "Metallogeny of the Blunder Bay area".

#### Type III Research

Commodity studies on a national or provincial scale (e.g. lead-zinc deposits of Canada; nickel deposits of Manitoba) or metallogeny of large areas (e.g. Appalachians, Superior Province). A large number of deposits are briefly examined, the common and obvious parameters are recognized, and a general deposit-type or metallogenic model emerges. Research is largely one of compilation and synthesis using, for the most part, other people's (i.e. existing) data.

With these descriptions in mind, titles of approximately 250 research projects pertaining to mineral deposits were scanned and assigned to one or other of the three research-types. Three sample years (1973/74, 1977/78, 1978/79) were selected to represent both present research topics and those under study about 5 years ago. Results are presented below:

<u>Research Type</u>	<u>University</u>	<u>Government</u>
1	13% 23%	- 2%
II	38% 65%	10% 22%
III	7% 12%	32% 76%
Totals	58% 100%	42% 100%
	(1) (2)	(1) (1)

#### Footnote

(1) Percentage of respective research type represented in all projects listed.

(2) Percentage of respective research type of projects within, respectively, university or government.

From the two columns of figures, some interesting factors emerge: 1. universities account for about half (58%) of the mineral deposits research projects listed; 2. within government three quarters (76%) of the research is of Type III and virtually none is of type I; 3. within universities, about two-thirds (65%) of the research is type II with most of the balance being Type I; 4. of all research topics listed, only 13% could be regarded as of the "fundamental" Type I.

Furthermore, titles and abstracts of 300 university theses completed in the interval 1973-1979 (published in several issues of the C.I.M. Bulletin) were similarly assigned to the three types of research. This revealed that 8% fell in Type I, 88% in Type II, and 4% in Type III. Categorized by thesis topic, rather than by research type, using the same categories as in the C.I.M. bulletin, the distribution is as follows:

Magmatic deposits	9.2%
Skarns	2.4
Porphyry deposits	16
Veins	14
Volcanogenic	32.4
Sediment-hosted deposits	17
Uranium	6.8
Regional studies	1.7
Total	99.5%

MDD readers may judge for themselves whether this distribution by topic reflects the relative economic importance of these deposits in Canada, current "fads", accessibility, or other factors.

Both the reasons for the distributions shown and the quality of research being conducted within these projects would require discussion beyond the scope of this presentation. Suffice to say that, in terms of research type distribution in Canada, government is concentrating on Type III (compilation and synthesis) and universities (particularly theses) are opting largely for Type II (case histories). Very little Type I research is being conducted in Canada but what little there is, is being done by the universities.

This article, and the preceding one, was intended to focus the attention of MDD members on the topic of Canadian mineral deposits research. The quality, quantity, and direction of mineral deposits research in Canada affects all of us and we all should therefore periodically examine the status of this research and ask ourselves whether we are satisfied with the results of our examination.

The facts and figures supplied in this article were meant to serve as a nucleus for your deliberations. As expressed in the first article, I believe the MDD has within it the capacity to influence the nature and direction of Canadian mineral deposits research. The next article will examine some of the ways that MDD might achieve this. I have some ideas of my own and, if none other is received from MDD members, then they will be the only ones expressed. If you have any interest in this topic at all, I ask you to please convey them either to the editor to "The Gangue" or to myself.

D. F. Sangster  
Chairman  
MDD Mineral Deposits  
Research Committee

Geological Survey of Canada  
601 Booth Street  
Ottawa, Ontario K1A 0E8

#### Publications: A Comprehensive Account of Canadian Ore Deposits by 1988?

Planning is in progress, largely within the Geological Survey of Canada at present, for a multi-volume series on the geology and mineral resources of Canada that is tentatively scheduled for publication 1986 to 1988. This series will supersede the 5th edition of "Geology and Economic Minerals of Canada", issued by the Geological Survey of Canada in 1970. J.O. Wheeler will be overall co-ordinator and editor for the series and R.I. Thorpe will co-ordinate contributions on mineral deposits. Individual volumes of the series will stand on their own, but will also form part of a centennial series by the Geological Society of America.

The great expansion in knowledge and literature on the geology and mineral deposits of Canada in the past few decades means that the job will not be easy, and that substantial contributions from outside the Geological Survey of Canada must be sought. We will need help!

A skeletal plan has evolved as to how best to marshal and integrate information on the mineral deposits of the country into five volumes, one for each of the major geological regions. Mineral deposits co-ordinators will be chosen to work in conjunction with regional geology co-ordinators on this job. One of their responsibilities will be to solicit descriptions of deposits and mining camps and summaries of regional metallogeny from the most knowledgeable people. The support of geologists and their employers in the mining industry, governments and universities will be essential.

In addition, a volume devoted exclusively to mineral deposits and resources is planned to present regional comparisons, summaries of general characteristics of deposits, metallogenic syntheses, and the best contemporary genetic models for Canadian deposit types. With your support this could be a benchmark volume.

In summary, the proposed series provides a great opportunity to advance significantly national as well as broad regional documentation of Canadian mineral deposits and resources. By working together, Canadian economic geologists can use this opportunity to jointly produce an outstanding account of Canadian ore deposits.

A talk on this subject will be presented at the GAC/MAC/CGU annual meeting in Calgary in May, and public discussion will be encouraged. However, your comments or offers to help will be welcomed at any time.

R.I. Thorpe

#### New Executive Position of Past Chairman

The Executive Committee agreed that a Past Chairman on the executive would offer continuity and support to the incoming chairman and new executive.

Accordingly, Secretary Roy Beavon mailed the following proposed amendment to the Constitution to the membership:

Article IV, 1 (a), currently reads as follows: 'The Executive Committee shall consist of six members - Chairman, Vice Chairman, Secretary, Treasurer, Program Chairman, and Publications Chairman.'

The proposed amendment reads as follows:

Article IV, 1 (a) 'The Executive Committee shall consist of seven members - Chairman, Vice Chairman, Secretary, Treasurer, Program Chairman, Publications Chairman, and Past Chairman.'

On December 3, 1980, Roy reported that out of 158 ballots returned, 152 were in favour of the proposed amendment, therefore, new Executive Committee position of Past Chairman has been approved.

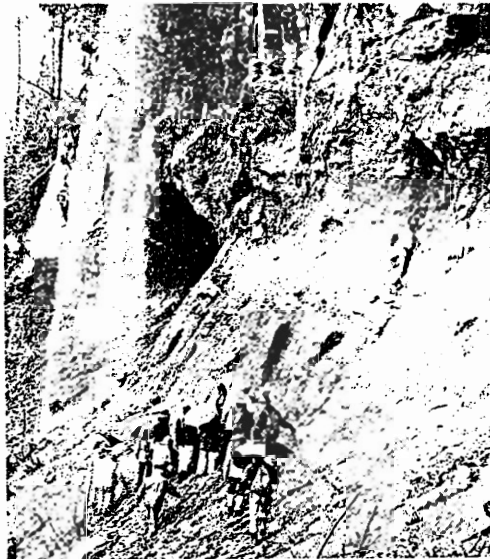
A multidisciplinary group of 35 enjoyed a scenic bus tour through the spectacular Coast Mountains to the B.C. Hydro geothermal site at Mt. Meager. The excuse for a communal dip in the hot springs was the November 1 joint MDD-GAC Cordilleran Section trip into the depths of the Coast Plutonic Complex 140 kilometres north of Vancouver.

The running account of geology enroute by tour leader Bill Mathews of U.B.C. compensated for poor visibility of the mountains due to inclement weather. An intermediate stop near Mt. Garibaldi allowed close examination of Quaternary columnar basalts, including an unusual esker-like subglacial flow.

Lunch at the Mt. Meager base camp was accompanied by a B.C. Hydro movie of the engineering aspects of the geothermal project, and a geological description of late Tertiary events by Peter Read of Geotex Consultants.

The geothermal area occupies the flanks of a Pliocene to Holocene felsic volcanic complex that developed in three stages, from 1.9 Ma to 2340 B.P., upon a late Mesozoic basement of quartz dioritic and metasedimentary rocks of the Coast Plutonic Complex. Probable heat sources for geothermal reservoirs in the district are miocene felsic plutons such as the 7.9 Ma Salal Creek pluton (and associated molybdenite deposit) 15 kilometres to the north, and feeder zones to the volcanic complex.

The tour group visited an excellent exposure of Bridge River tephra and flows in the Lillooet River valley. Thick, crudely stratified rhyodacite breccia and ash deposits represent the youngest volcanic event in the area. Charred tree stumps, shown above the group in the photo, date the explosive event at 2340±50 years B.P. Scaoriaceous rhyodacite flows overly the tephra.



On a brief visit to a drill site, tour participants viewed some core (unmineralized quartz diorite) and inspected the heavy drill rig with a choke valve below the collar designed to contain high-pressure fluid. Encouraging results from the 1980 program have led to a much-expanded drilling program in 1981 that includes a deep hole.

The final stop of the day, and for some the highlight of the trip, was the Meager Creek hot springs where 40°C waters warmed bodies chilled by the unseasonal wet weather. Rather than join the bathers, Secretary Roy Beavon chose to warm himself up in a different way- by holding an umbrella and serving as the ladies' changing room!

Ken Dawson

Announcements

'Precious Metals in the Northern Cordillera', an AEG/GAC Cordilleran Section Joint Symposium, will be held at the Hyatt Regency Hotel, Vancouver, B.C., April 13 - 15, 1981.

<u>Registration Fees</u>	<u>Before Mar. 15</u>	<u>After Mar. 15</u>
Member of AEG/GAC or speaker	\$70.00	\$85.00
Non-member	\$85.00	\$100.00
Student	\$30.00	\$30.00

Contact D. Brabec, Precious Metals Symposium c/o Cominco Ltd., #853-409 Granville St., Vancouver, B.C., CANADA V6C 1T2

April 13, morning. 0800 - 1200

- R.W. Boyle Gold, silver and platinum metal deposits in the Canadian Cordillera- their geological and geochemical setting.
- J.C. VanLoon Accurate determination of the noble metals- an overview
- E.L. Hoffman, E.J. Brooker and M.V. White The determination of gold by Neutron Activation Analysis
- J.C. Robbins, B. Radziuk and J.D. Kinrade Trace gold analysis with a newly-developed field-portable Atomic Absorption Spectrometer
- L.D. Turner and M. Ikramuddin Electrothermal Atomic Absorption determination of gold, silver and arsenic in stream waters and their relationship to gold-silver occurrences in the Republic Graben, Washington

April 13, afternoon. 1330 - 1700

- C.O. Ingamells Sampling theories- an overview
- J.F. Harris Analysis of gold in soils and stream sediments: A useful exploration technique?
- C.E. Pipke Principles of heavy-mineral orientation applied to precious-metal prospecting in the North American Cordillera
- J.J. Barakso, P. Tegart and F.M. Smith Stream sediment geochemistry of gold
- M.W. Garman and J.F. Gilfillan Pathfinders for precious metal deposits- a case history of geochemical exploration for gold in New South Wales, Australia
- C.J. Hodgson Application of exploration criteria for gold deposits in the Superior Province of the Canadian Shield to gold exploration in the Cordillera

April 14, morning. 800 - 1200

- J.C. Antweiler and W.L. Campbell Gold in exploration geochemistry
- H.V. Warren The significance of a discovery of gold crystals in overburden
- W.E. Baker A biogeochemical approach to gold prospecting in N.E. Tasmania, Australia
- A.J. Sinclair, E.M. Dawson, A.D. Drummond and N.C. Carter Interpretation of gold-silver content of selected porphyry Cu-Mo deposits of the Canadian Cordillera
- G.R. Peatfield Gold geochemistry in the search for porphyry Cu-Au deposits, Eddontenajon L. Area, northwestern B.C.
- R.S. Middleton, R.B. Durham, G. Harron, A. Phillip, and R.A. Markov Geophysical and geochemical techniques for gold exploration

April 14, afternoon. 130 - 320

- R.F. Brown and T. Grove Geology and alteration with emphasis on whole-rock geochemistry and auriferous mineralization at Poison Mountain, B.C.
- B.R. Berger, J.V. Tingley, L. Filipek and J. Neighbor Origin of pathfinder trace-element patterns associated with gold-silver mineralization in late Oligocene volcanic rocks, Round Mountain, Nevada
- A.S. Cuddy and S.E. Kesler Gold in the Granite and Belle Copper-porphry copper deposits, B.C.
- S. Gower and J. Carne The discovery of the Toodoggone Gold Camp

April 15, morning. 900 - 1200

Meetings Calendar

N. Champigny and A.J. Sinclair Cindla gold deposit, Queen Charlotte Islands, B.C. - a geochemical case history

C. Nauman Volcanogenic massive-sulphides with apparently elevated precious metal levels, east of Central Alaska Range, Alaska.

T. Schroeter Selected precious metal deposits of northern B.C.

J.A. Morin Element distribution in Yukon gold-silver deposits

L.J. Cabri Mineralogy and geology of platinum-group element deposits with reference to the Cordillera

B.N. Watson Geologic setting and characteristics of bulk-tonnage, low-grade silver deposits in the southern Cordillera

March 16 - 20

Gold and Silver Conference, Mackay School of Mines, Reno. Contact Kathy McDermott, Continuing Education/ Mining & Engineering, University of Nevada, Reno, 89557

March 19 - 20

Arizona Geological Society, "Relations of Tectonics to Ore Deposits in the Southern Cordillera", University of Arizona. Contact John Reinbold, Conferences and Short Courses, University of Arizona, Tucson 85721

March 23 - 29

Cordilleran Section, Geological Society of America, annual meeting and field trips, Hermosillo, Sonora Mexico. Contact Jaime Roldan, Apdo Postal 1039, Hermosillo, Sonora, Mexico. Tel (621) 3-17-20

April 13 - 15

Association of Exploration Geochemists Symposium, "Precious Metals in the Northern Cordillera", Hyatt Regency Hotel, Vancouver, B.C.. Contact Dr. D. Brabec, Cominco Ltd., #853-409 Granville St., Vancouver, B.C. Canada V6C 1T2

April 15, afternoon. 130 - 345

D.M. Hopkins, J.A. Domenico and D.L. Leach Multielement analysis of techniques for partial extractable and total metal determinations in stream-sediment reconnaissance for silver occurrences

May 3 - 6

83rd Annual General Meeting of CIM, Calgary, Alberta

May 11 - 13

D.L. Leach, H.E. Dawson, J.A. Domenico and D.M. Hopkins A regional geochemical reconnaissance for silver in stratabound and vein deposits in Proterozoic Y rocks of the Belt Supergroup, Idaho and Montana

Geological Association of Canada - Mineralogical Association of Canada - Canadian Geophysical Union, Annual Meeting, University of Calgary, Calgary, Alberta. Contact F.A. Campbell, Vice President (Academic), Univ. of Calgary, Calgary, Alberta.

May 13 - 14

J.P. Franzen and R.E. Van Tassel Grid rotary percussion drilling; A bedrock geochemical approach to silver vein exploration at United Keno Hill Mines Ltd.

Canadian Society of Exploration Geophysicists, Annual Meeting, Calgary Convention Centre, Calgary Contact C.S.E.G., Box 681, Stn. "G", Calgary, Alta. T3A 2G1

May 14 - 16

J.M. Kowalchuk, B.N. Church, J.J. Barakso and P.M.D. Bradshaw Primary dispersion of gold, silver and related elements at Equity Silver Mines near Houston, B.C.

M.A.C. Short Course, "Clays and the Resource Geology: Problems, Applications and Investigative Techniques", University of Calgary, Calgary. Contact F.J. Longstaffe, Dept. of Geology, University of Alta. Edmonton, Alta. T6G 2E3

Announcements: Seminar Program, University of Toronto

Thursday, March 19 4 p.m., Room 202, Mining Bldg.

Dr. Neil Irvine "Geology of the Skaergaard Intrusion"

Tuesday, March 24 4 p.m., Room 202, Mining Bldg.

Dr. Henry Wallace "Keweenaw geology of the Lake Superior basin"

May 31 - June 3

American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, Annual Meeting, San Francisco, California, U.S.A. Contact Kathy Watson, A.A.P.G., Box 979, Tulsa, Oklahoma 74101

Public Lectures, University of Ottawa

March 2

A. Majid Geochemistry and petrography of carbonate buildup of Kirkuk oil field, Iraq.

Sept. 8 - 13

CIM - SEG Uranium Symposium and field tips, Saskatoon. Contact G.D. Pollock, P.O. Box 5033, Saskatoon, Sask. S7K 4K3

March 16

R. McCorkell Etched particle-tracks in analytical chemistry and geochemistry

Nov. 2 - 5

Geological Society of America, Annual Meeting, Cincinnati, Ohio. Contact G.S.A., 3300 Penrose Place Boulder, Colorado 80301

March 23

A.J. Baer Proterozoic orogenes

1982

March 30

J. Lafleur Geology of the Round Lake Batholith area, Ontario

May 3 - 7

Council of Mining and Metallurgical Institutions, Twelfth Congress, Johannesburg, South Africa, 2000

GAC Cordilleran Section: Evening Program

March 5, 800 p.m. Student Night

May 12 - 14

Sue Campbell Sulphur contamination model for magmatic copper-nickel sulphide deposits

Ninth International Geochemical Exploration Symposium, Saskatoon, Saskatchewan. Contact V. J. Sopuck, P.O. Box 432, Sub P.O. #6, Saskatoon, Sask., S7N 0W0

Paul Matysek A preliminary evaluation of categorical field observations for regional stream sediment samples

May 16 - 19

Geological Association of Canada - Mineralogical Association of Canada, Annual Meeting, Winnipeg, Manitoba. Contact W. C. Brisbin, Dept. Of Earth Sciences, University of Manitoba, Winnipeg, Man. R3Z 2N2

Charles Henderson The paleontology of some Permian rocks from Ellesmere Island, N.W.T. focusing on 1) multifaceted approach to processing techniques; 2) conodonts; 3) algal borings

April 2, 800 p.m., Georgia Hotel

Dr. A. W. Bally, Shell Oil, Houston A comparison of some folded belts