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CURRENT RESEARCH IN THE GEOLOGICAL SCIENCES IN CANADA, MAY 1978-APRIL 1979

PROJETS DE RECHERCHE EN COURS D'EXÉCUTION AU CANADA - SCIENCES GÉOLOGIQUES. MAI 1978-AVRIL 1979

Compiled by/Préparé par
THOMAS E. BOLTON

1979

AREAL MAPPING, 1:50 000 OR LESS/CARTOGRAPHIE AERIENNE, 1:50 000 OU MOINS

ALBERTA/ALBERTA

1. GODFREY, J.D., Alberta Research Council (Geology Div.):
   Fort Chipewyan District map area, Alberta, 1970-79.

   Geology of the Fort Chipewyan District, Alberta. In press.

2. GODFREY, J.D., Alberta Research Council (Geology Div.):
   Alexander Lake, Wylie Lake map areas, Alberta, 1971-79.

3. GODFREY, J.D., Alberta Research Council (Geology Div.):
   Ryan Lake, Fletcher Lake map areas, Alberta, 1972-79.

   Map compilation complete, report preparation in progress.

4. GODFREY, J.D., Alberta Research Council (Geology Div.):
   Bocquene, Turtle Lakes map areas, Alberta, 1973-79.

   Map compilation complete, report in preparation.

5. GODFREY, J.D., LANGENBERG, C.W., Alberta Research Council (Geology Div.):
   South Fitzgerald, Myers Lake, Daly Lake map areas, Alberta, 1973-79.

   Map compilation and supporting laboratory studies underway.

6. GODFREY, J.D., LANGENBERG, C.W., Alberta Research Council (Geology Div.):
   North Fitzgerald, Tulip Lake, Mercredi Lake map areas, Alberta, 1974-80.

7. OLLERENSHAW, N.C., Geol. Surv. Can.:
   Geology of the southern Alberta Foothills, Highwood River to Athabasca River, 1970-

BRITISH COLUMBIA/COLOMBIE-BRITANNIQUE

8. BARTHOLOMEW, P.R., Univ. British Columbia (Geological Sciences):
   Geology and metamorphism of Yale Creek Valley, British Columbia, 1977-79; M.Sc. thesis.

   K-Ar and Rb-Sr age dating completed, microprobe analyses completed, metamorphic conditions calculated, thesis write-up in progress.

9. EASTWOOD, G.E.P., British Columbia Ministry of Mines & Petroleum Resources (Geological):
   Quinsam coal area, Vancouver Island, British Columbia, 1977-78.

   An outlier of the basal Comox Formation of the Upper Cretaceous series extends from Campbell Lake southeast across the Iran River. It consists predominently of sandstone and greywacke, which overlies a basal conglomerate and contains widely-spaced seams of shale and coal. Three coal seams are of economic thickness near Middle Quinsam Lake, but are laterally restricted. The lowest seam crosses the Iran River near the northeast contact of the outlier, but pinches out a short distance to the south. This contact has been assumed to be a

fault, but definite evidence was not found, and an outcrop of the basal conglomerate at the outlet of Lukwa Lake indicates a normal on-lapping contact.

10. EVANS, S.H., MATHEWS, W.H., BARNES, W.C., ROUSE, G.E., University of British Columbia (Geological Sciences):
Geology of the Tulameen Coal Basin, British Columbia, 1977-79; M.Sc.thesis (Evans).

11. EWING, T.E., ARMSTRONG, R.L., MATHEWS, W.H., MCTAGGART, K.C., University of British Columbia (Geological Sciences):
Geology and tectonic setting of the Kamloops Group (Eocene), southern British Columbia, 1977-80; Ph.D. thesis (Ewing).

Eocene volcanic and sedimentary rocks occur in fault-bounded basins along the Intermontaine Belt of the Canadian Cordillera. Despite their great thickness and abundance, internal stratigraphy and igneous/sedimentary petrology of the sequence is virtually unknown. This study will provide a well-studied section at Kamloops, British Columbia, from which a regional survey of Eocene stratigraphy can be made. Major and trace element geochemistry will be used to define crystallization paths and magma origins of the Kamloops Group volcanics. A regional synthesis of Eocene and related events is being undertaken, which will clarify the history of this transitional period in the evolution of the Canadian Cordillera.

Mapping has been completed for an area of 200 km^2 at a scale of 1:30,000. Kamloops Group stratigraphy has been recast in its type area, and will be described in detail. Systematic chemical and isotopic sampling will be carried out next summer. A preliminary geochronologic catalog of Paleogene tectonic elements has been assembled, leading to the recognition of fine structure in the early Tertiary tectonic transition.

12. GILCHRIST, R.D., DUFF, P.McL.D., KARST, R., British Columbia Ministry of Mines & Petroleum Resources (Geological):
Peace River coal field (Wolverine River to Haslen Creek) mapping and correlation project, 1977-79.

1977 - Wolverine River to Bullmoose Creek mapped;
1978 - Sukunka River to Hasler Creek mapped;
1979 - Bullmoose Creek to Sukunka River to be mapped.

13. KLEPACKI, D.K., ROSS, J.V., GREENWOOD, H.J., University of British Columbia (Geological Sciences):
Geology and structural evolution of an area near Maeford Lake, Cariboo Mountains, British Columbia, 1979-80, M.Sc. thesis (Klepacki).

Establishment of stratigraphy and structural evolution along a cross section involving the Kaza, Cariboo and Slide Mountain groups. General metamorphic history of the thesis area, and nature of isograds in the area.

AREAL MAPPING, 1:50 000 OR LESS/CARTOGRAPHIC AERIENNE, 1:50 000 OU MOINS

14. McMILLAN, W.J., CARTER, N.C., British Columbia Ministry of Mines & Petroleum Resources (Geological):
Mapping of the Late Triassic Nicola belt and related mineral deposits (NTS 92I), British Columbia, 1977-80.

The project continues work begun by Preto in the Nicola Group of Late Triassic volcanic, sedimentary and associated intrusive rocks. Detailed mapping (1:15840) is accompanied by examination of all mineral deposits in the map-area. The aim is to resolve the age, stratigraphic relationships and the tectonic heritage of the Nicola Group. The control and distribution of mineral showings relative to the host rocks will be examined carefully.

15. MULLER, J.E., Geol. Surv. Can.:
Geology of Victoria map-area, Vancouver Island, British Columbia, 1973-.

16. PANTELEYEV, A., CARTER, N.C., British Columbia Ministry of Mines & Petroleum Resources (Geological):
Geology and mineral deposits of Cassiar map-area, British Columbia, 1978-80.

A 50,000 mapping project was initiated in order to delinate and describe the various intrusive phases that make up this portion of the Cassiar Batholith. The project will serve as a basis for further studies on the nature of the Cassiar Batholith and related mineral deposits.

17. RICHARDS, T.A., Geol. Surv. Can.:
Hazelton map-area, British Columbia, 1972-.

18. TAYLOR, G.C., Geol. Surv. Can.:
Operation Liard, British Columbia, 1973-.

See:
Stratigraphy of Ware (East half) map area, Northeastern British Columbia; Geol. Surv. Can., Paper 79-A, p.227-231, 1979.

19. TAYLOR, G.C., Geol. Surv. Can.:
Operation Smoky, British Columbia, Alberta, 1968-.

20. TIPPER, H.W., Geol. Surv. Can.:
Taseko Lakes map-area, British Columbia, 1961-.

21. TIPPER, H.W., Geol. Surv. Can.:
Smithers map-area, British Columbia, 1969-77.

MANITOBA/MANITOBA

22. BAILES, A.H., Manitoba Geol. Serv. Br.:
Geology of the File Lake area, Manitoba, 1970-79.

AREAL MAPPING, 1:50 000 OR LESS/CARTOGRAPHIE AERIENNE, 1:50 000 OU MOINS

23. BAILES, A.H., Manitoba Geol. Serv. Br.:
Geology of the Saw Lake area, Manitoba, 1976-79.

24. CORKERY, M.T., WEBER, W., Manitoba Geol. Surv. Br.:
The Lower Nelson River project, Manitoba, 1976-79.

25. HERD, R.K., Geol. Surv. Can.:
Geology of the Island Lake map-area (53P), Manitoba and Ontario, 1974-.

26. MACQUARRIE, R.R., STAUFFER, M.R., University of Saskatchewan (Geological Sciences
Dating of igneous events near Flin Flon, Manitoba, 1974-79; Ph.D. thesis (MacQuarrie).

All igneous events in the Flin Flon area occurred during Aphebian time and were related to the Hudsonion Orogeny. The age of the Amisk volcanics is about 1810 Ma, based on U/Pb dating of zircons. The age of these rocks has been in dispute for some time but is resolved with the present work.

27. SCOATES, R.F.J., MACEK, J.J., Manitoba Geol. Serv. Br.:
Churchill - Superior boundary zone in Manitoba, 1977-84.

The Churchill-Superior boundary in Manitoba is defined as the Proterozoic-Archean contact between Aphebian metagreywacke-and metashale-derived paragneisses of the Churchill Province and Archean migmatitic gneisses of the Superior Province. The rocks of the boundary zone have been involved in an event which has reoriented structures and caused granulite facies Archean gneisses to be retrogressed to amphibolite facies. The event that has overprinted the rocks of the boundary zone post-dates the main Hudsonion orogeny in this area.

Other parts of the Churchill Superior boundary in Manitoba appear to have escaped the affects of this overprinting event. The rocks of the Fox River Belt of northeastern Manitoba occupy the Churchill-Superior boundary. These sedimentary, volcanic and intrusive rocks are relatively underformed and much of the belt has suffered subgreenschist facies metamorphism.

Continuing investigations are building up a data file concerning the nature of the edge of the Archean, Superior Province craton, including the significance of the supracrustal rocks and the metamorphic-tectonic events that have affected this boundary. Comparison of the edge of the Archean Superior Province craton with Phanerozoic continental margins will allow for a critical evaluation of whether the plate tectonic theory or some modification of that theory can be applied to the Churchill-Superior boundary of Manitoba.

28. SCOATES, R.F.J., MACEK, J.J., Manitoba Geol. Serv. Br.:
Thompson nickel belt project, Manitoba, 1977-84.

The Thompson nickel belt project forms an integral part of a study of the Churchill-Superior boundary in Manitoba. The geology is complex largely due to a late stage Hudsonian (?) event which overprinted the rocks of the boundary zone. The project is directing attention to the nature of the supracrustal rocks of the boundary zone and the nature and significance of the overprinting event.

29. ZWANZIG, H.V. SYME, E.C., GILBERT, H.P., Manitoba Geol. Serv. Br.:
Lynn Lake project, Manitoba, 1976-81.

The Lynn Lake greenstone belt contains a lower Proterozoic succession of volcanic and sedimentary rocks which is exposed in a series of isoclinal folds and fault-slivers, separated by granitic plutons. Subaqueous basaltic shield volcanoes, a younger, calc-alkaline, mafic and felsic succession, and a large heterogeneous stratovolcano have been interpreted to exist in the lower part of the succession (Wasekwan Group). They were deforemed and intruded by mafic and felsic plutons during an early phase of the Hudsonian orogeny.

NEW BRUNSWICK/NOUVEAU-BRUNSWICK

30. FYFFE, L.R., ST. PETER, C., VENUGOPAL, D.V., IRRINKI, R.R., CROUSE, G.W., New Brunswick Dep. Nat. Res. (Mineral Res. Br.):
Bedrock mapping, west-central New Brunswick.

See:
Geology of head of Dungarvon and Renous Rivers, map-area L-13, 21 J/15; New Brunswick Dep. Nat. Res., map report 78-2, 1978.
Geology of Benton-Kirkland Upper Eel River Bend, map area G-22, 21 G/13; New Brunswick Dep. Nat. Res., map report 78-3, 1978.
Geology of head of Wapske River, map-area J-13, 21 J/14; New Brunswick Dep Nat. Res., map report 78-1, 1978.

31. SKINNER, R., Geol. Serv. Can.:
Plaster Rock (east half) map-area, New Brunswick, 1970-.

32. SKINNER, R., Geol. Serv. Can.:
Juniper (east half) map-area, New Brunswick, 1971-.

NEWFOUNDLAND/LABRADOR/TERRE-NEUVE/LABRADOR

33. BAILEY, D.G., Newfoundland Dep. Mines & Energy (Mineral Develop. Div.):
The geology and uranium deposits of the Aillik Group, Labrador, 1977-80.

Investigation of chemistry of uranium deposits of the Aillik Group; relationships between stratigraphy and uranium deposits; development of models of genesis of volcanogenic stratiform uranium deposits associated with rhyolitic ash-flow and ash-fall tuffs.

34. BLACKWOOD, R.F., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Gander Rivers, Newfoundland, 1978-81.

The first map sheet of the Gander Rivers project has been completed. It has outlined four major tectonostratigraphic divisions: Gander Group, Gander River ultrabasic belt, Davidsville Group, and Botwood Group. Several mineral showings occur in the ultrabasic belt. During the 1979 field season the southwestward extension of the main units mentioned above will be mapped.

AREAL MAPPING, 1:50 000 OR LESS/CARTOGRAPHIE AERIENNE, 1:50 000 OU MOINS

35. CHORLTON, L.B., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
La Poile map-area, Newfoundland, 1977-81.

36. CHORLTON, L.B., PAPEZIK, V.S., STRONG, D.F., WILLIAMS, H., CALON, T., Memorial Univ. (Geology):
The geological history of the La Poile Cing Cerf map-area, southwestern Newfoundland, 1973-79.

37. COLMAN-SADD, S.P., SMYTH, W.R., ELIAS, P. STRONG, D.F., Newfoundland Dep. Mines Energy (Mineral Develop. Div), Memorial Univ. (Geology):
Canada-Newfoundland regional mineral potential evaluation:
Project 1:17-Regional study of the Bay d'Espoir area, 1977-78;
M.Sc. thesis (Elias).

Gaultois map sheet (1M/12) and Twillick Brook (2D/4) 1:50,000 maps completed; maps and reports to be published during 1979. St. Alban's (1M/13) map and report (76-4) published 1976. Mapping to start on Burnt Hill (2D/5) area in 1979 and expected to be finished in 1980.

Rock geochemical sampling completed for plutonic intrusions in Gaultois (1M/12), St. Alban's (1M/13), and most of Twillick Brook (2D/4) areas. Sampling in remainder of Twillick Brook and in Burnt Hill (2D/5) areas to be done in 1979.

See:
Twillick Brook, Newfoundland (20-4, West half);
Newfoundland Dep. Mines Energy, Map 7871, 1978.

38. HERD, R.K., Geol. Surv. Can.:
Geology of Red Indian Lake, west half, Newfoundland, 1977-82.

See:
Geology of Puddle Pond area, southwestern Newfoundland;
Geol. Surv. Can., Paper 79-1A, p305-310, 1979.

39. HIBBARD, J.P., BURSNALL, J.I., TUACH, J., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Burlington project, 1977-82.

See:
Geology East of the Baie Verte lineament; Newfoundland Dep. Mines Energy Rept. 78-1, 1978.

Areal mapping at the scale of 1:50,000 has now been completed for the northern part of the Baie Verte Peninsula. The area is composed of two broad tectonostratigraphic domains; a polydeformed polymetamorphosed largely metasedimentary sequence, the Fleur de Lys Supergroup, that possibly overlies Grenville Basement lies to the west of a dominantly mafic volcanic sequence that overlies an opiolitic basement the Baie Verte Supergroup. A major high angle fault zone separates the two terranes. It is proposed to map the southward extension of the Fleur de Lys Supergroup, during the 1979 season.

AREAL MAPPING, 1:50 000 OR LESS/CARTOGRAPHIE AERIENNE, 1:50 000 OU MOINS

40. HILL, J.D. Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Davis Inlet-Mistastin Lake corridor mapping project, Labrador, 1977-81.

Mapping was begun in 1977 in the eastern part of the area and will continue westward through 1981. At the end of the project, a final map and report will be produced. The project is supported by several laboratory studies including whole rock chemical analyses, microprobe mineral analyses, modal analyses, a rare earth study and a Rb/Sr radiometric age dating program.

41. HYDE, R.S., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Geology of the Deer Lake basin (Carboniferous), western Newfoundland, 1977-81.

Continuation of 1:50,000 mapping is planned for the 1979 field season. In addition to regional mapping, the project emphasizes stratigraphy, sedimentary facies and depositional environments. Results to date include a preliminary subdivision of the Anguille Group, recognition of uranium mineralization in the Deer Lake basin, and the finding of previously unreported pre-Carboniferous rocks within the basin as upfaulted slices.

42. KEAN, B.G., JAYASINGHE, N., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Geological mapping in south-central Newfoundland (Victoria Lake project), 1975-81.

The Badger sheet (12A/16) will be mapped during the 1979 field season; supported by petrographic, geochemical and geochronological studies.

43. O'DRISCOLL, C.F., MUGGRIDGE, W.W., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Geology of Harbour Buffett and Merasheen map-areas, Newfoundland, 1978-79.

44. PAJARI, G.E., PICKERILL, R.K., CURRIE, K.L., Univ. New Brunswick (Geology), Geol. Surv. Can.:
The geology of the Carmanville area, Newfoundland, 1977-80.

See:
Carmanville map area, Newfoundland; the northeastern end of the Appalachians-a reply; Geol. Surv. Can., Paper 78-1C, p. 129-132, 1978.

Tectono-stratigraphic problems in the Carmanville area, northeastern Newfoundland; Geol. Surv. Can., Paper 79-1A, p. 71-76, 1979.

Geological mapping has revealed that the eastern margin of the Proto-atlantic consists of oceanic crust obducted onto a continental rise prism. The obduction event occurred in early Ordovician time but did not totally disrupt sedimentation which continued through to the Silurian. During and/or after the Caradoc, large scale slides (olistostromes) disrupted the stratigraphy and resulted in the Carmanville Melange. The melange contains olistoliths of all the lithologies in the area older than Caradoc in age.

45. RIVERS, T., BAILEY, D.G., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Southern Labrador Trough, 1977-81.

See:
Geological mapping of the Wabush-Labrador City area, southwestern Labrador; Newfoundland Dep. Mines Energy, Rept 78-1, 1978.

Mapping and economic evaluation of supercrustal rocks in southwestern Labrador: during the past two years a large proportion of the iron formation and associated rocks of the Gagnon Group have been mapped and their structural and metamorphic history have been modeled. It is anticipated that extension of the map-area to the southeast further into the Grenville Province will result in recognition of a boundary between the Gagnon Group and reworked basement of Archean age.

Structural relationships in the region of producing iron mines have been described, and a number of small sulphide showings in the Grenville Front region have been related to local thrust faults.

46. RYAN, A.B., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Regional geological mapping and mineral potential evaluation studies in the Central Mineral Belt of Labrador, 1974-78.

See:
Geology of the Otter-Nipiskish-Stipec lakes area, Labrador; Newfoundland Dep. Mines Energy, Rept. 78-1, 1978.

The present project was completed in 1978, and the data collected over the past 4 field seasons will be compiled into a final comprehensive memoir during 1979. This final report will be accompanied by 2-1:100,000 colored maps each covering 4-1:50,000 sheets showing the geology and mineral occurrences of the project area.

47. SMYTH, W.R., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Regional study of the Gander Zone, southern Newfoundland, 1978-81.

See:
Reconnaissance of the Burgeo map sheet (11P, West half); Newfoundland Dep. Mines Energy, Rept. 78-1, 1978.

To define the extent and nature of the volcano-sedimentary belts of the south coast region between La Poile Bay and Baie d'Espoir; to establish the plutonic history of the region and assess the mineral potential.

48. THOMAS, A., Newfoundland Dep. Mines Energy (Mineral Develop. Div.):
Geology of Red Wine Lake-Letitia Lake areas 13K4, 13L1, 13L2, 13E15 (east half), central Labrador, 1978-80.

Expect to continue mapping in Letitia Lake, Red Wine Lake area with emphasis on mineral potential of same, delineation of border of Grenville Province, in map-area, and undertake some geochronological work on the gneisses south of Letitia Lake, the Letitia Lake Group, and on some of the plutonic rocks along the Grenville Province-Churchill Provine Boundary.

Red Wine Alkaline Complex is also located in the map-area and emphasis here will be to put the complex into a regional, geological setting. Possibility after 1980 of extending 1:50,000 scale mapping south into the Wilson Lake-Winokapau Lake Area with emphasis on geology, mineral potential and relationships of gneiss units in the area, and definition of their relationship to the gneisses south of Letitia Lake.

NORTHWEST TERRITORIES/TERRITOIRES DU NORD-OUEST

49. BAU, A.F.S., DIAND(Yellowknife):
Mapping of Yellowknife greenstone Belt, District of Mackenzie, Northwest Territories, Scale 1" = 700', 1975-.

50. BAU, A.F.S., DIAND(Yellowknife):
Mapping of 86H/9, 10 and 11, Mackenzie District, Northwest Territories, Scale 1" = ½ mile, 1978-.

See:
Preliminary maps - geology of 86H/9, 10 and 11, District of MacKenzie, Northwest Territories; Dep. Indian Affairs Norther Develop. 1979.

These preliminary maps show the Archean geology and outcrop pattern of the area 86H/9, 10 and 11 at a scale of 1:31,680. The 2000-square-kilometre area is located southeast of Takijuq Lake 350km North-Northeast of Yellowknife, and 240 km east of Great Bear Lake.

51. CHRISTIE, R.L., Geol. Surv. Can.:
Operation Grant Land - northeastern Ellesmere Island and Northwestern Greenland, 1963-.

52. COOK, D.G., Geol. Surv. Can.:
Operation Norman, District of MacKenzie, 1967-.

53. EADE, K.E., Geol. Surv. Can.:
Geology of the Tulemalu Lake map-area, District of Keewatin, 1975-.

54. HENDERSON, J.B., Geol. Surv. Can.:
Yellowknife and Hearne Lake map-areas, District of Mackenzie, 1970-.

55. HENDERSON, J.B., Geol. Surv. Can.:
Keskarrah Bay map-area, District of Macenzie, 1976-.

56. HEYWOOD, W.W., Geol. Surv. Can.:
Geology of Amer Lake map-area, District of Keewatin, 1976-.

See:
Stratigraphy and structure of the northern Amer group (Aphebian), Churchill structural province, District of Keewatin; Geol Surv. Can., Paper 78-1B, p7-11, 1978.

The structural history of the Amer mylonite zone, Churchill structural province, District of Keewatin; Geol Surv. Can., Paper 78-1C, p.79-88, 1978.

57. HODGSON, D.A., Geol. Surv. Can.:
Surficial geology, geomorphology and terrain inventory of the Ringnes and adjacent islands, 1976-.

58. HOFFMAN, P.F., Geol. Surv. Can.:
Geology of the Athapuscow Aulacogen, east arm of Great Slave Lake, District of Mackenzie, 1976-79.

59. KERR, J.W., Geol. Surv. Can.:
Southwestern Ellesmere-western Devon Islands (Operation Grinnell), District of Franklin, 1967-.

60. KERR, J.W., Geol. Surv. Can.:
Boothia Peninsula and Somerset Island(Operation Boothia), District of Frnklin, 1974-.

61. THOMAS, R.D., Geol. Surv. Can.:
Surficial geology, terrain inventory, north-central Keewatin, 1976-.

ONTARIO/ONTARIO

62. AMUKUN, S.E., SAWITSKY, E., MAHARAJ, M., MACKASEY, W.O., Ontario Geol. Surv.:
Geology of Howard Falls area, north-western Ontario, 1978-79.

Detailed mapping of area of study completed has indicated extension of Marshall Lake area lithologic units to the east, but unlike the type-area, the rocks do not contain economic deposits of base metals and precious metals. Extensive sand deposits may have affected exploration methods.

63. BLACKBURN, C.E., Ontario Geol. Surv.:
Synoptic geology, Manitou Lakes, Kenora District, Ontario, 1976-79.

64. BLACKBURN, C.E., Ontario Geol. Surv.:
Detailed geology, Kawashegamuk Lake area, Kenora District, Ontario, 1979-81.

65. CARTER, M.W., PYKE, D.R., Ontario Geol. Surv.:
Shining Tree area, Ontario, 1976-79.

The Shining Tree area is underlain by Early and Middle Precambrian rocks which are overlain by a mantle of Pleistocene and Recent deposits. The Early Precambrian rocks comprise a suite of interlayered subaqueous mafic to felsic subalkalic and mafic to intermediate alkalic metavolcanic rocks, clastic, siliceous and ferruginous metasediments and ultramafic rocks intruded by gabbroic, and intermediate to felsic granitic rocks. All these rocks are cut by three sets of diabase dikes which may range from Early to Late Precambrian age and trend north-westerly, northeasterly and east-west. The Middle Precambrian rocks belong to the Quirke Lake and Cobalt groups of the Huronian, and Nipissing Diabase.

The metavolcanic-metasedimentary rocks are folded about a sinuous doubly-plunging synclinorial axis which is convex to the northeast. These rocks comprise a distorted composite volcano and the name, Natal composite volcano is proposed. The lower volcanic rocks are tholeiitic flows, the upper rocks are calcalkalic and alkalic. Distortion of the volcanic edifice was due to granitic batholith intrusion, and the synclinorial structure to accompanying subsidence.

66. CARTER, M.W., PYKE, D.R., Ontario Geol. Surv.:
Asquith and Miramichi Townships areal mapping, Ontario, 1976-78(completed).

66A. DRESSLER, B., MILNE, V.G., Ontario Geol. Surv.:
Geology of the Lake Wanapitei area, Ontario, 1977-79.
Field work completed; laboratory work in progress.

67. JOHNS, G.W., PYKE, D.R., MILNE, V.G., Ontario Geol. Surv.:
Geology of the Burntbush-Detour Lake area, Ontario, 1978-79

See:
Ontario Geol. Surv., Misc. Paper 82, 1978.

The aim of the project was to map 4030 sq. km of ground north of Lake Abitibian on a scale of 1:50,000. Of special interest were the extent and distribution of previously mapped felsic metavolcanic rocks. Also of import was the geologic setting of the Amoco Canada Petroleum Company Limited's gold deposit situated 15 km. north of Detour Lake.

68. MOORE, J.M., CHAPPELL, J.F., KARBOSKI, F., PSUTKA, J.F., BROWN, R.L., MORTON, R.L., Carleton Univ. (Geology):
Stratigraphy and structure of the Grenville Supergroup in eastern Ontario, 1974-; M.Sc(Karboski), Ph.D.(Chappell).

Re-mapping of the Clarendon Lake area(NTS 31C/14, northeast$\frac{1}{4}$)(Moore and Morton), The Kaladar metasediments (31C/11, NE$\frac{1}{4}$) (Psutka), and the hinge zone of the Clare River "syncline" (31C/11, SE$\frac{1}{4}$ mainly) (Chappell) is complete. Recognized distribution of the Flinton Group has been extended to the Kaladar metasediments and to the core of the Clare River structure. The Kaladar metasediments comprise pelite, marble, calc-silicate, and polymictic metaconglomerate lying unconformably on rocks of the Addington and Northbrook plutons, and their volcanic-sedimentary envelopes. The Clare River structure is a megascopic, refolded first-phase isocline tectonically-emplaced on granitoid rocks. Pre-Flinton rocks there include calc-alkali metavolcanics, quartzo-feldspathic and carbonate metasediments. The Flinton Group comprises pelite, calcareous pelite and psammite comparable to marine facies encountered well tothe north in the Madoc and Myer Cave - Fernleigh areas. South of Norcan Lake (NTS 31F/4NW) Karboski has mapped complex megascopic refolded folds involving marble, calc-silicate and pink granitoid rocks, metamorphosed to upper amphibolite facies. Three major fold generations are evident. The granitoids are sheet-like; an attempt is being made to deduce whether they are intrusive, volcanic or sedimentary.

69. MUIR, T.L., PYKE, D.R., Ontario Geol. Surv.
Geology of the Hemlo area, District of Thunder Bay, Ontario, 1978-79.

General detailed geological mapping ($\frac{1}{4}$ mile to inch) of Hemlo area bounded by latitudes 48°33'N and 48°45'N, and longitudes 85°52'30'W and 86°0730"W. Area underlain by four large identifiable granitic bodies, one possibly representing basement, with subsequently deformed and metamorphosed 'greenstone' belts between them for the most part. Grade of metamorphism is medium. Deformation locally severe. Large proportion of 'greenstone' rocks consists of distal deposits of volcanic material (probably unlithified) with some flows. Majority of rocks of intermediate to felsic composition in northern belt; mafic in southern belt.

70. Pirie, J., Ontario Geol. Surv.:
Geology of Ranger, Willians, Byshe, Heyson Townships, District of Kenora, Ontario, 1978-80.

Mapping of Byshe, Ranger and Willians Townships was completed during 1978.

71. ROBERTSON, J.A., Ontario Geol. Surv.:
Geology of the Cutler area, District of Algoma, Ontario, 1964-.

72. THURSTON, P.C., Ontario Geol. Surv.:
Physical volcanology of Archean felsic volcanism at Lang Lake, northwestern Ontario, 1979-80.

QUEBEC/QUÉBEC

73. HOGARTH, D.D., Univ. Ottawa (Geology):
Geology of the Quinnville area, Quebec, 1976-81.

Detailed (1:10,000) mapping of the Quinnville area, Québec, with emphasis on iron-alkalic (hematite-acmite) metasomatic rocks.

74. VEILLETTE, J.J., Geol. Surv. Can.:
Geologie du Quaternaire, region de l'Outaouais superieur, Québec, 1977-.

SASKATCHEWAN/SASKATCHEWAN

75. DAVISON, W.L., Geol. Surv. Can.:
Milliken Lake - Goldfields mining area, Saskatchewan, 1975-.

76. MACDONALD, R., MACQUARRIE, R.R., Saskatchewan Geol. Surv.:
Geological re-investigation mapping, Jan Lake area (part of NTS 63M), Saskatchewan, 1978.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept 78-10, p.16-24, 1978.

The area includes part of the Tabbernor fault belt and extensions of the volcanic rocks previously mapped in the Limestone Lake and Hanson Lake areas. The principal object is to attempt lithostratigraphic correlation through detailed mapping in order to distinguish Aphebian volcanic and associated supracrustal rocks of the Snow Lake-Flin Flon belt from possible late Archean (Kenoran) supracrustals. Detailed mapping 1:33,000 is expected to be extended to the east in furture years.

YUKON TERRITORY/TERRITOIRE DU YUKON

77. BLUSSON, S.L., Geol. Surv. Can.:
Operation Stewart, Yukon-District of Mackenzie, 1968-.

78. CAMPBELL, R.B., Geol. Surv. Can.,
Operation Mount St. Elias, Yukon-British Columbia, 1973-.

See:
Operation Saint Elias, British Columbia; Geol. Surv. Can., Paper 79-1A, p. 17-20, 1979.

79. KLASSEN, R.W., Geol. Surv. Can.:
Surficial geology and terrain evaluation, southern Yukon, 1977-.

See:
Thermokarst terrain near Whitehorse, Yukon Territory: Geol. Surv. Can., Paper 79-1A, p. 385-388, 1979.

80. NORRIS, D.K.,

Operation Porcupine, Yukon-District of Mackenzie, 1961-.

AREAL MAPPING, GREATER THAN 1:50 000/CARTOGRAPHIE AERIENNE, >50 000

ALBERTA/ALBERTA

81. MORAN, S.R., Alberta Research Council (Geology Div):
Geology of the Calgary urban area and environs, Alberta, 1974-79.

Field mapping has been completed. Open file maps of surface geology at 1:50K (some of area at 1:25K) to be available early spring 1979. Test drilling completed with textural and mineralogical analyses of samples underway. Stratigraphic synthesis is still in rudimentary stages. However at least 2 subdivisions of each of the uppermost and the lowermost tills previously recognized in the area appear present.

BRITISH COLUMBIA/COLUMBIE-BRITANNIQUE

82. CHRISTOPER, P.A., CARTER, N.C., British Columbia Min. Mines Pet. Res. (Geological):
Evaluation of uranium deposits - East Okanagan uranium area, British Columbia, 1976-.

See:
East Okanagan uranium area (Kelowna to Beaverdell) south-central British Columbia (82E/10, 11, 14, 15):
British Columbia Min. Mines Pet.Res., Prel. Map No. 29, 1978.

A program of regional mapping and property examination in the East Okanagan area was carried out during the summers of 1976, 1977 and 1978 to help define the geological setting of known basal-type uranium deposits and to provide an improved base for lithogeochemical studies. This study will be expanded and continued.

83. GABRIELSE, H., Geol. Surv. Can.:
Operation Finlay, British Columbia, 1970-.

84. GABRIELSE, H., Geol. Surv. Can.:
Operation Dease, British Columbia, 1977-.

85. MULLER, J.E., Geol. Surv. Can.:
Geology of northern Vancouver Island, British Columbia, 1968-.

86. RODDICK, J.A., Geol Surv. Can.:
Coast mountains project, British Columbia, 1963-.

87. WOODSWORTH, G.J., Geol. Surv. Can.:
Kemano Project, British Columbia, 1977-.

See:
Geology of the Whitesail Lake map area, British Columbia; Geol. Surv. Can., Paper 79-1A, p25-29, 1979.

NEWFOUNDLAND/LABRADOR/TERRE-NEUVE/LABRADOR

88. ERMANOVICS, I., Geol. Surv. Can.:
Archean rocks of the Nain Province in Hopedale (13N), Snegamook Lake (13K), and Makkovik (13 0) maps-over, Labrador, 1978-.

NORTHWEST TERRITORIES/TERRITOIRES DU NORD-OUEST

89. CAMPBELL, F.H.A., Geol. Surv. Can.:
Geology of the Bathurst Inlet area, District of Mackenzie, 1974-.

See:
The northeastern margin of the Aphebian Kilohigok Basin, Melville Sound, Victoria Island, District of Franklin; Geol Surv. Can., Paper 79-1A, p. 91-94, 1979.

90. FRISCH, T., Geol. Surv. Can.:
Reconnaissance mapping of the Precambrian geology of southeastern Ellesmere and eastern Devon Islands, District of Franklin, 1976-.

See:
Reconnaissance studies of the Precambrian crystalline basement on Devon Island, District of Franklin; Geol. Surv. Can., Paper 79-1A, p113, 114, 1979.

91. FRITH, R.A., Geol. Surv. Can.:
Geology of Indin Lake map-area, District of Mackenzie, 1972-.

92. FRITH, R.A., Geol. Surv. Can.:
Geology of the Hackett River-Back River area, District of MacKenzie, 1975-.

See:
Stratigraphy of the Yellowknife Supergroup in the Mara-Back River area, District of Mackenzie; Geol. Surv. Can., Paper 78-1C, p. 89 -98, 1978.

93. HENDERSON, J.B., Geol Surv. Can.:
Healey Lake map-area, District of Mackenzie, 1978-.

See:
Geol. Surv. Can., Paper 79-1A, p.400, 1979.

94. HEYWOOD, W.W., Geol Surv. Can.:
Operation northern Melville Peninsula, District of Franklin, 1970-.

95. HOFFMAN, P.F., Geol. Surv. Can.:
Sloan River map-area, District of Mackenzie, 1973-.

96. JACKSON, G.D., Geol. Surv. Can.:
Operation Bylot, District of Franklin, 1967-.

97. JACKSON, G.D., Geol Surv. Can.:
Operation Penny Highlands, District of Franklin, 1969-.

98. LeCHEMINANT, A.N., Geol. Surv. Can.:
MacQuoid Lake ($W\frac{1}{2}$) and Thirty Mile Lake ($E\frac{1}{2}$), Map-areas, District of Keewatin, 1975-.

99. LeCHEMINANT, A.N., Geol. Surv. Can.:
Geology of Thirty Mile Lake 65 P ($W\frac{1}{2}$) and Tebesjuak Lake 65 O ($W\frac{1}{2}$) map-area, District of Keewatin, 1978-.

100. McGLYNN, J.C. Geol. Surv. Can.:
Calder River map-area, District of MacKenzie, 1973-.

101. MORGAN, W.C., Geol Surv. Can.:
Geology of the Foxe Fold belt, Baffin Island, District of Franklin, 1974-.

102. THORSTEINSSON, R., Geol. Surv. Can.:
Cornwallis and adjacent smaller islands, District of Franklin, 1965-.

ONTARIO/ONTARIO

103. CARD, K.D., Geol. Surv. Can.:
Regional geological synthesis, central Superior Province, Ontario and Quebec, 1977-.

104. ROBERTSON, J.A., GIBLIN, P.E., LEAHY, E.J., Ontario Geol. Surv.:
Sault Ste. Marie - Elliot Lake, 4-mile compilation map, Ontario, 1974-78.

105. THEMISTOCLEOUS, S.G., Ontario Geol. Surv.:
Geology of the Khartum area, Ontario, 1978-79.

Detailed mapping 1:15840 of the Khartum area has delineated a number of felsic, alkalic and mafic intrusives. Most of the rocks in the area are of Late Precambrian age but diabase dikes and late granite pegmatites of younger age are also present. Clastic siliceous a carbonate rocks are the major components of the metasediments. Mineral assemblages in the Precambrian rocks are indicative of upper almandine-amphibolite facies metamorphic conditions. Trends within the map area are northeast to north dips to the east and southeast. Examination of the Spain mine molybdenite deposit and surrounding lithologies suggest the ore bearing horizons to be possible continuous at stratigraphically similar positions to the northeast. Radioactivity in the area is mainly associated with late granite pegmatities.

106. WOLFF, J.M., Ontario Geol. Surv.:
Geology of the Long Lake area, Ontario, 1978-79.

Detailed 1:15840 mapping of the Long Lake area has delineated a number of intrusive bodies through supracrustal assemblages of varying metamorphic grades. The boundary between the Hastings Basin and Frontenac Axis segments of the central metasedimentary belt has revealed a continuous shear zone with well developed protomylonites, mylonites and mylonite gneisses. Examination of the Long Lake zinc deposit and surrounding carbonate lithologies suggest the ore-bearing horizons to be possibly continuous at stratigraphically similar positions elsewhere.

QUEBEC/QUÉBEC

107. BOURNE, J.H., Geol. Surv. Can.:
Operation Olomane, Quebec, 1976-.

108. TAYLOR, F.C., Geol. Surv. Can.:
Operation Nuvilik, Quebec, 1972-.

SASKATCHEWAN/SASKATCHEWAN

109. FORSYTHE, L.H., Saskatchewan Geol. Surv.:
Compilation geology, Lac La Ronge area and part of the Wapawekka area (NTS 73P, 731), Saskatchewan, 1978-79.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p10-12, 1978.

The area includes a major part of the La Ronge belt. Wathaman Batholithic Complex and Glennie Lake domain with part of the Wollaston domain and Needle Falls Shear Zone in the northwest. A 1:250,000 office compilation with field checking during the 1978 summer and a target for completion during 1979.

110. GILBOY, C.F., Saskatchewan Geol. Surv.:
Reconnaissance geology, Stony Rapids area (part of NTS 74P), Saskatchewan, 1978-81.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p35-42, 1978.

The eara covers the northeastern margin of the Athabasca Formation outcrop but the mapping is directed mainly to the older Precambrian. These include volcanic rocks northwest of the Black Lake Shear Zone and Mudjatik domain-style felsic gneisses with mixed supracrustal rocks lying to the southeast.

111. JOHNSTON, W.G., Saskatchewan Geol. Surv.:
Compilation bedrock geology, Reindeer Lake South (NTS 64D), Saskatchewan, 1978-79.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p4-9, 1978.

The area includes a major part of the La Ronge-Reindeer belt and parts of the Wathaman batholithic complex, the Tabbernor fault belt and the Kisseynew domain. A 1:250,000 office compilation with field checking during the 1978 summer and a target for completion during 1979.

112. PATERSON, D.F., KENDALL, A.C., CHRISTOPHER, J.E., Saskatchewan Geol. Surv.:
The sedimentary geology of the La Loche area, Saskatchewan (NTS sheet 74C), 1975-78.

113. RAY, G.E., Saskatchewan Geol. Surv.:
Reconnaissance geology, Wollaston Lake West area (part of NTS 64L), Saskatchewan, 1978-81.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p25-74, 1978.

The area covers the eastern margin of the Athabasca Formation outcrop but the mapping is directed mainly to the older Precambrian rocks. These include a large chunk of the Wollaston domain around Wollaston Lake and the presumed late Archean basement to the northwest.

114. SCHREINER, B.T.S., Saskatchewan Res. Council (Geology Div.), Saskatchewan Geol. Surv.:
Reconnaissance Quaternary geology, northwestern part of the Shield, Saskatchewan, 1978-80.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p 45, 46, 1978.

The 1978 mapping covered the northwestern part of the Shield north of latitude 58°N (NTS area 47J, 47K, 47N, 740 and parts of 741 and 74P).

115 SCOTT, B.P., Saskatchewan Geol. Surv.:
Geological mapping, Laird Lake West area (NTS 63M-14W), Saskatchewan, 1977-79 (completed).

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 78-10, p.13-15, 1978.

The area lies in a complex migmatized part of the Tabbernor subdomain immediately southwest of Reindeer Lake.

116. STAUFFER, M.R., COLEMAN, L.C., LANGFORD, F.F., MOSSMAN, D., FUMERTON, S., ASHTON, K., Univ. Saskatchewan (Geological Sciences).:
Geology of the Reindeer Lake region, northern Saskatchewan, 1975-79; Ph.D. thesis(Fumerton), M.Sc. thesis (Ashton).

Rocks in this region have been divided into 24 units, including metasedimentary and metavolcanic rocks, a variety of granitic to gabbroic bodies (some may be partially remobilized), and mylonites. Most rocks have been involved in several phases of folding and faulting and the general level of metamorphism is within the middle amphibolite facies.

117. BLOESCH, J., BURNS, N.M., RATHKE, D., MUNAWAR, M., Fisheries-Environment Canada (CCIW):
Nearshore and offshore sedimentation of particulate matter and phytoplankton in eastern Lake Erie, 1978-79.

To characterize the chemical and biological differences of sedimentation in the inshore and offshore zones of the Lake Erie eastern basin; to calculate the sinking rates of live and dead particulate material; and to compare chemically the sedimenting material with the lake bottom sediments.

118. BOYD, E.A., HARAS, W.S., Fisheries-Environment Canada (CCIW):
A survey of vegetation at the shoreline of the Great Lakes, 1978-79.

In conjunction with the Canada/Ontario Shore Erosion Monitoring Programme, a survey of indigenous vegetation at ground erosion measurement stations was undertaken. Major species were identified and percent groundcover estimated. Correlation of vegetation with slope as well as bluff height was calculated and frequency of species noted.

119. BOYD, G.L., Fisheries-Environment Canada (CCIW):
Siltation problem at the Maitland River mouth, Goderich, Ontario, 1975-78.

This study was undertaken at the request of the Maitland Conservation Authority, in response to the concern about siltation at the mouth of the Maitland River at Goderich. The major focus of this concern was the sand bar development at the river mouth which inhibits boating access to the river, and therefore access to the public ramp, as well as possible upstream marina development. It was found that high spring discharge flushes the material away from the river mouth while, during low river flow, waves and littoral drift re-form the bar. This cycle predated harbour modifications and was considered the prevailing factor in the development of the bar.

120. CROCKET, J.H., KABIR, A., McMaster Univ. (Geology):
Geochemical pathway studies of arsenic, selenium, and palladium in fresh water systems by neutron activation analysis, 1975-80.

The determination of some heavy metals including arsenic, selenium, palladium, iridium and gold in bottom sediment of lakes between Sudbury and Temagami is carried out by neutron activation analysis. The principal objective is to establish the main geochemical pathways by which these metals enter fresh water systems. From work on lake sediment cores completed to date it is established that core depth vs. metal concentration profiles are often characterized by much higher metal contents in the top 4 to 6 cm of core than at greater depths. A probable explanation of these metal profiles is that they arise from airborne input of heavy metal-rich particulate material. To sustantiate this suggestion we are carrying out analyses of different size fractions of sediment on a 2 cm vertical interval. We expect that the correlation of metal concentration with size fraction should be very sensitive to distance from source if an airborne input is in fact a principal pathway. It is also thought likely that the size fraction with which a metal is associated will have an important bearing on how labile the metal is in sediments and on how readily it may be transferred to or dissolved in lake waters.

121. DELORME, L.D., Fisheries-Environment Canada (CCIW):
Distribution of benthic shelled invertebrates in Lakes Erie and Ontario, 1978-.

A report on the distribution of Ostracodes in Lakes Erie and Ontario, and on the realationships between biota and the lake environment.

122. DELORME, L.D., ESTERBY, S., Fisheries-Environment Canada (CCIW):
Paleolimnology of a selected lake from Saskatchewan, 1977-.

To define and quantify the nature of past environmental conditions and processes which have affected the aquatic environment of Echo Lake near Fort Qu'Appelle, Saskatchewan. The study will provide a quantitative interpretation of physical, chemical and biological response of a lacustrine system to natural and man-induced changes during the past 200 years.

123. EGGINTON, P.A., Geol. Surv. Can.:
Periglacial processes and slope movement, central District of Keewatin, 1977-.

See:
Rates of movement associated with mud boils, central District of Keewatin; Geol. Surv. Can., Paper 78-1B, p203-206, 1978.

To determine the rates of slope mass movement, the processes involved in mudboil development and their rate of development, and relate slope movement and mudboil development and morphology within the proposed Polar Gas pipeline route.

124. ESTERBY, S., DELORME, L.D., Fisheries-Environment Canada (CCIW):
Auteocology of shelled invertebrates, 1978-.

See:
The estimates of sample size required in chemical limnology and autecology of shelled invertebrates; Can. Dep. Fisheries-Environment. Sci. Ser. No. 85, 1979.

To evaluate statistically the autecological data base of shelled invertebrates and to develop a quantitative interpretive model for predicting the impact of man's intervention in nature.

125. GLOOSCHENKO, W.A., CAPOBIANCO, J.A., HARPER, N., NRIAGU, J.O., Fisheries-Environment Canada (CCIW):
Aquatic geochemistry of wetlands, 1977-79.

See:
Metal content of Sphagnum mosses from two northern Canadian bog ecosystems; Water, Air and Soil Pollution, vol. 10, p.215-220, 1978.

Peat, sediment, water and live plant materials will be sampled from peatland environments (bogs, fens, marshes and rivers) in the Hudson Bay lowlands, adjacent subarctic regions and Great Lakes shoreline. The nutrients, trace metals and potentially toxic chemical substances will be determined to develop an understanding of wetland chemistry and an understanding of both natural and anthropogenic chemical distributions with emphasis upon long range transport.

126. GLOOSCHENKO, W.A., HARPER, N., CAPOBIANCO, J.A., Fisheries-Environment Canada (CCIW):
Hudson/James Bay coastal ecology, 1976-79.

See:
Above-ground biomass of vascular plants in a subarctic James Bay salt marsh; Can. Field Nat., vol.92, p.30-37, 1978.

To develop an understanding of interactions between sedimentology, sediment geochemistry, soil chemistry, and vegetation of the western James Bay coast. The coming field year will emphasize the northern portion of the west coast of James Bay.

127. GORDON, J.B., SPRINGER, J.S., Ontario Geol. Surv.:
U-Th deposit maps edited for targetting of radiactive emanation, 1978.

Deposit maps for U-Th have been edited and cross-referenced to radiometric data, to assist estimation of radioactive hazard.

128. HARAS, W.S., BOYD, G.L., COAKLEY, J.P., Fisheries-Environment Canada (CCIW):
Headland landfill studies, 1975-81.

Headland offshore landfill operations are increasing in number, especially on Lake Ontario. Two sites, one at Bluffer's Park, Scarborough and the other at 50 Mile Point, Grimsby are being monitored to evaluate the response and impacts on adjacent shorelines.

129. HARAS, W.S., STRELCHUCK, D.L., Fisheries-Environment Canada (CCIW):
Great Lakes coastal zone studies, 1975-78.

See:
Canada/Ontario Great Lakes flood and erosion prone area mapping-Guide and atlas; Fisheries-Environment Canada, 1978.

One of the recommendations of the Canada/Ontario Great Lakes Shores Damage Survey was the delineation of erosion and flooding hazard lands. Long-term recession rates and definition of bluff profiles and stratigraphy enables the establishment of erosion setback guidelines for coastal zone management. Along with this, contour elevations, wind set-up, and wave uprush calculations enable delineation of hazard flood-prone areas.

130. JACKSON, L.E., Jr., Geol. Surv. Can.:
Environmental assessment of coal resource development, Canadian Cordillera, 1977-.

131. KAMENKA, L.A., RUTTER, N.W., Univ. Alberta (Geology):
Rates of weathering of spoil piles from open pit mines in the Rocky Mountains of Alberta from field observation and a laboratory experimental systems, 1979; M.Sc. thesis (Kamenka).

132. MANNING, P.C., WILLIAMS, J.D.H., LEAN, D.R.S., Fisheries-Environment Canada (CCIW):
Mossbauer spectral studies of Fe compounds in lake sediments, 1978.

To investigate, using Mossbauer spectroscopic methods, the role of iron ions, and indirectly of aluminum ions, in the sediment fixation of phosphate nutrient ions in Canadian lakes, and to determine the conditions under which phosphate is released to the overlying waters.

133. McMILLAN, R.K., Fisheries-Environment Canada (CCIW):
Acoustic images of underwater structures, 1977-79.

Detailed field surveys for the area in western Lake Ontario have been completed. Data is being digitized, enhanced and slant range corrected to form a 'digital mosaic'. Results of a novel imaging system, a 'flying spot' acoustic beam, are undergoing analysis to determine the feasibility of this type of imaging of targets in deep, and/or turbid waters.

134. MORIN, F., Geol. Surv. Can.:
Environmental geology, Hamilton urban area, Ontario, 1973-.

135. MUDROCH, A., Fisheries-Enviornment Canada (CCIW):
Great Lakes regional wetlands, 1976-.

See:
Study of selected metals in marshes on Lake St. Clair, Ontario; Archiv für Hydrobiologie, Vol. 84, pt. 1, p. 87-108, 1978.

To investigate the beneficial and/or detrimental effects of Great Lakes marshes, on the water quality of the lakes, by evaluating the release and/or retention of nutrients and toxic metals by different types of marshes.

136. MUDROCH, A., SANDILANDS, R.G., BOOTH, W.G., CAPOBIANCO, J.A., Fisheries-Environment Canada (CCIW):
Effect of dredging on the aquatic environmental system, 1978-80.

To 1) study the effect of toxic substances, originating from dredge spoil disposal, on the aquatic system; 2) review existing criteria and develop additional criteria for characterizing polluted dredge spoil; and 3) review existing dredging practices, programs, laws and regulations.

137. MUDROCH, A., SANDILANDS, R.G., CAPOBIANCO, J.,A., Fisheries-Environment Canada, (CCIW):
Heavy metals in sediments, 1977-79.

Study completed of heavy metals in lake sediments in old gold mining areas. The study sites were on the Moira River in Ontario and near Waverley in Nova Scotia. The results showed elevated levels of Hq and As associated with previous mining activities.

138. NRIAGU, J.O., COKER, R.D., Fisheries-Environment Canada (CCIW):
Stable isotope studies of sulphur pollution in the Great Lakes Basin, including the Sudbury area, Ontario, 1973-.

See:
Isotopic composition of sulphur in precipitation around Sudbury, Ontario; Nature, no. 274, p. 883, 1978.

Isotope composition of sulphur in precipitation within the Great Lakes Basin; Tellus, Vol. 30, p. 365-375, 1978.

An on-going project to determine the isotopic composition of sulphur from various sources and to evaluate the subsequent isotopic changes during the cycling of sulphur in the Great Lakes basin. The project should provide important information on the source, dispersion pathways and ultimate sink of the pollutant sulphur.

In the preceding year, the isotopic composition of the inorganic sulphur pools in Lake Ontario sediment was used to quantify the emission of sulphur from the lake sediment. Previous year's data on the isotopic composition of sulphur in air, stack plumes, precipitation and lake waters (around Sudbury) will be the basis of a major report to assess the applicability of isotope ratio variations to sulphur pollution studies.

139. NRIAGU, J.O., COKER, R.D., Fisheries-Environment Canada (CCIW):
Chemical gradients at the mud-water interface, 1977-.

To evaluate the variations in chemical characteristics of the lake waters at the mud-water interface and to provide important clues on the capacity of sediments to release deleterious nutrients, and on diagenetic processes within the sediment pile. The data is critical to models of nutrient regeneration from sediments.

140. NRIAGU, J.O., WONG, H.K.T., WILLIAMS, J.D.H., Fisheries-Environment Canada (CCIW):
Geochemical studies using lead-210, 1977-.

To determine the residence time for heavy metals and the modern sedimentation rates in Canadian freshwater environments. Lead-210 provides a unique index for determining: 1) the source and behaviour of lead and other heavy metals in natural waters; 2) dating past pollution episodes as recorded in the sediment column; and 3) calculating geochemical and sediment budgets.

141. ONGLEY, E.D., BYNOE, M., PERCIVAL, J., SIMON, A., Queen's Univ. (Geography):
Sediment-related nutrient and contaminant transfer in two southeastern Ontario creeks, 1977-80; MSc. thesis (Bynoe, Percival, Simon).

142. PODOLAK, W.E., Geol. Surv. Can.:
Stratigraphy and composition of surficial materials, proposed Polargas pipeline route, Melville Island to Longlac, 1978-.

143. RUKAVINA, N.A., DUNCAN, G.A , Fisheries-Environment Canada (CCIW):
Time-lapse photographic studies of nearshore erosion and sediment transport, 1977-.

To analyze and report on results of time-lapse studies of nearshore sediment transport of Van Wagner's Beach, Hamilton, Ontario and to begin time-lapse studies of nearshore erosion at Stoney Creek, Ontario.

144. RUKAVINA, N.A., LaHAIE, G.G., Fisheries-Environment Canada (CCIW):
Lake Erie nearshore sediment, western basin, 1978-79.

To analyze data and publish results of nearshore sediments studies in the western basin of Lake Erie.

145. RUKAVINA, N.A., OWENS, E.H., Fisheries-Environment Canada (CCIW):
Classification of Great Lakes' shoreline for oil-spill contingency planning, 1978-79.

See:
Air-photo reconnaissance, Great Lakes' shoreline; Hydraulics Res. Div. Tech. Note 78-12, 1978.

146. RUKAVINA, N.A., ST. JACQUES, D.A., LaHAIE, G.G., Fisheries-Environment Canada (CCIW):

Nearshore profile modification by storms and seasonal water level variations, 1977-.

To measure nearshore profile changes at Van Wagner's Beach (western end of Lake Ontario) and relate to storm activities and seasonal water level variations. Profiles are monitored by conventional echo sounding traverses and by a newly developed fixed transducer system capable of 1 cm resolution.

147. RUKAVINA, N.A., ST. JACQUES, D.A., LaHAIE, G.G., Fisheries-Environment Canada (CCIW):
Nearshore sediment survey, southern Georgian Bay, 1978-.

To complete and report on a field survey of the sediments and bathymetry of the nearshore zone of southern Georgian Bay.

148. SOLES, J.A., CANMET (EMR):
Identification and characterization of mineral phases in the working environment and in human tissue, 1975-.

Accurate and precise identification of particulate mineral materials in samples of residues of ashed human tissues have been carried out to assist Health and Welfare Canada in the assessment of environmental hazards.

149. STRACHAN, W.M.J., Fisheries-Environment Canada (CCIW):
Sediment fractionation of PCBs, 1977-79.

. To determine the fractionation behavior of PCB in organic-rich and organic-poor sediments from Lake Ontario, to indicate the rates of release of the isomers from the sediment to the overlying waters.

150. STRACHAN, W.M.J., WHITTLE, M. McMILLAN, R.K., HUNEAULT, H., Fisheries-Environment Canada (CCIW):
Toxic substances in selected Lake Superior locations, 1978-79.

To collect and process water, suspended matter and sediment samples from each of Thundery Bay, Peninsular Harbour - Pic River, and Michipicoten Bay, for environmental contaminants.

151. STRELCHUCK, D.L., HARAS, W.S., SHAW, J.R., BROWN, D.W., Fisheries-Environment Canada (CCIW):
Shore management study, 1977-79.

The joint Canada/Ontario shoreland management study attempts to develop methodologies for evaluating shoreland management alternatives and to present viable alternatives for the study site. The area selected was the Lake Erie shoreland of Gosfield South and Colchester South Townships in Essex County. The components of the project include mapping at a scale of 1:2,000, a geotechnical soils investigation, an offshore bathymetry survey, an evaluation of present and possible future structural and other protection methods, a shore damage evaluation, and a planning and environmental analysis.

152. THOMAS, R.L., HARAS, W.S., Fisheries-Environment Canada (CCIW):
Contribution of sediments and associated elements from erosion of Canadian shoreline, 1977-78.

An input into the IJC PLUARG activities, the Shore Properties Studies Section and the Great Lakes Biolimnology Laboratory responded to Task D, Activity 1. The task was to assess the contribution of sediment and associated elements to the Great Lakes from erosion of the Canadian shoreline. To accomplish this, long- and short-term bluff sediment inputs were calculated and analysis of texture, major and trace elements, provided data to establish the long- and short-term sediment loadings attributable to the shoreline bluffs.

153. VAN LOON, J.C., HUTCHINSON, T.C., STOKES, P.M., Univ. Toronto (Geology, Biology):
A study of metal contamination and acidification of lakes due to mining and smelting, 1972-; M.Sc. thesis (Hutchinson), Ph.D. thesis (Stokes).

154. VAN LOON, J.C., IP, J., KAHN, N., RADZIUK, B., THOMASSEN, Y., Univ. Toronto, (Geology):
Metal speciation studies using atomic absorption; M.Sc. thesis (Kahn).

155. VAN LOON, J.C., THOMASSEN, Y., RADZIUK, B. BUTLER, L.R.P., KAHN , N., IP, J., Univ. Toronto (Geology):
Metal speciation studies using atomic fluorescence spectroscopy; M.Sc. thesis (IP).

This study involves the development of equipment and procedures for the study of the forms of metals in geological, environmental and biological/clinical samples. The atomic fluorescence detector in the system is metal specific and can be used for the multielement (simultaneous on separate channels) determination of inorganic chemical compounds. Particular emphasis is being placed on the study of the methylation of metals in lake sediments (with Dr. Y.K. Chau, Canada Center for Inland Water) and the study of metal-amino acids in patients with high serum metal levels.

156. WILLIAMS, J.D.H., MANNING, P.G., NRIAGU, J.O., THOMAS, R.L., SHEARER, H., WONG, H.K.T., Fisheries-Environment Canada (CCIW):
Speciation of phosphorus, iron and heavy metals in lake sediments and suspended solids in water, 1978.

See:
Trophic status related to sediment chemistry of Canadian Prairie lakes; J. Environ. Quality, vol. 7,p.99-106, 1978.

To establish forms,sources and mobility of phosphorus, iron and heavy metals in a wide range of geological materials interacting with aqueous systems.

157. ZEMAN, A.J., Fisheries-Environment Canada (CCIW):
Monitoring of piezometers and slope indicator castings at the Port Burwell study site, central Lake Erie, 1975-.

To monitor pore pressure and slope indicator readings during the progressive failure of a previously instrumental slope to determine the mode of failure, the amount of progressive displacement, seasonal variation of pore pressure and any build-up of pore pressure before bluff failure.

158. ZEMAN, A.J., Fisheries-Environment Canada (CCIW):
Three-dimensional analysis of bluff recession surveys, Port Burwell and Scarborough, Ontario, 1977-.

To determine spatial and temporal variability along short stretches of shoreline, using existing data from two localities. The analyses will investigate, to what extent change in form can be related to the processes of bluff recession, and the effect of the protection on bluffs slope development.

159. ZEMAN, A.J., Fisheries-Environment Canada (CCIW):
Shoreland management study - Canada/Ontario Shore Damage Task Force, 1977-79.

Geotechnical exploration was undertaken along the shoreline of Colchester South and Gosfield South Townships, western Lake Erie geotechnical conditions were determined by borehole sampling and instrumentation, nearshore jetting, ground-truth mapping, and subsequent laboratory testing of borehole samples. The results were compiled into various geotechnical strip maps at the scale of 1:50,000. The study will provide a technical input into the Canada/Ontario shoreland Management Study in connection with the development of site-specific designs and costs for shore protection alternatives.

ANALYTICAL METHODS AND ANALYSIS/METHODES ANALYTIQUES ET ANALYSES

160. ABBEY, S., Geol. Surv. Can.:
Analysis of international reference samples, 1969-.

See:
Geol. Surv. Can., Paper 78-1B, p202, 1978.

161. ABBEY, S., Geol. Surv. Can.:
Development of methods for the analysis of geological materials, 1969-.

See:
Development of analytical methods; Geol. Surv. Can., Paper 78-1B, p.202, 1978.

162. FAYE, G.H., SUTARNO, R. BOWMAN, W.S., CANMET(EMR):
Canadian certified reference materials project (CCRMP), 1970-.

See:
Certified and provisional reference materials available from The Canada Centre for Mineral and Energy Technology; CANMET Rep. 78-3, 1978.

Revison of recommended values for reference ores MP-1 and KC-1; CANMET Rep 78-2, 1978.

In calendar year 1979, it is planned to complete interlaboratory programs for the certification of three base-metal concentrates and a high-grade uranium ore. New programs will be initiated for the certification of: a low-grade uranium ore; a nickel-copper ore; a zinc-lead-copper-tin ore; and a suite of seven zinc-aluminum alloys.

163. KINRADE, J.O., VAN LOON, J.C., Univ. Toronto (Geology):
Determination of inorganic ions in water for exploration geochemical purposes, 1974-80; Ph.D. thesis (Kinrade).

164. RUCKLIDGE, J.C., GORTON, M.P., RYLAARSDAM, J.C., Univ. Toronto (Geology):
Automatic instrumental analysis of rocks and minerals, 1975-80.

The system for automatic bulk and micro-analysis of rocks and minerals has produced X-ray fluorescence and electron microprobe data throughout 1978. Refinements for the system have been made, and many programs to aid in the interpretation and presentation of data have been written.

A digitising tablet has been integrated with the rest of the equipment. This is able to rapidly record co-ordinates of points selected on a map or diagram, and make them available for subsequent data processing.

Current efforts are directed towards introducing microprocessor control to make the X-ray fluorescence spectrometer and stand-alone but system-compatible unit which will greatly improve the utility of the whole operation. The introduction of a new data reduction program for energy dispersive X-ray spectra will allow data all (as opposed to selected) elements to be processed quantitatively.

165. SCHIMANN, K., SMITH, D.G.W., Univ. Alberta (Geology):
Quantitative energy dispersive electron microprobe determination of whole rock compositions using an optical fusion furnace, 1974-78 (completed); Ph.D. thesis (Schimann).

The technique previously reported has been tested on a series of basaltic lavas from Ascension Island, Mid Atlantic Ridge and excellent agreement obtained with results for the same rocks analysed by the X-ray fluorescence flux-fusion technique.

166. SMITH, D.G.W., CAVELL, P.A., Univ. Alberta (Geology):
Quantitative analysis of clays and clay minerals by means of energy dispersive electron microprobe technique, 1977-80.

See:
An energy dispersive technique for the quantitative analysis of clay minerals by the elctron microprobe; Proc. 13th Ann. Conf. Microbeam Anal. Soc. Ann Arbor, Michigan, p.45A-45F, 1978.

The techniques (previously reported) have now been further developed and successfully applied to a wide range of clays including illites, kandites, smectites and palygorskites. The typical analytical time per sample is about 10 mins. (including all data processing). A further reduction on the amount of material required to about 1mg appears possible and experiments along these lines will shortly be carried out.

167. SMITH, D.G.W., GOLD, C.M., Univ. Alberta (Geology):
The atomic number dependence of the X-ray continuum intensity at high atomic numbers, 1977-80.

An empirical expression has now been derived which allows accurate estimation of the X-ray continuum intensity at a given operating voltage and X-ray take-off angle (15kv & $52\frac{1}{2}^{o}$, respectively) for all atomic numbers up to 92(uranium). It is anticipated that new analytical equipment soon to be installed will permit the testing of the expression for a range of operating voltages up to 50 kv. Testing of the X-ray take-off angle dependence will require use of different instruments in other laboratories. The new empirical expression should permit the fully quantitative analysis by energy dispersive microprobe techniques of a greatly increased range of sample compositions.

168. TUREK, A., MITCHELL, K.D., QUIRT, D.H., Univ. Windsor (Geology):
Argon plasma trace element analyses, 1976-79; M.Sc. theses (Mitchell, Quirt).

An atomic absorption instrument has been converted for use on a DC argon plasma emission spectrograph. On ionic standards APE is generally superior to AAS in terms of sensitivity and detection limits. For major rock analyses the precision of analyses by APE is comparable to AAS, and superior in the determination of Ti, P, Si and Fe. However, for trace element analyses, unless the solutions are dilute and simple in composition, severe background problems exist due to matrix effect. Work on the correction of the matrix effects is in progress.

EXPLORATION,ORGANIC/APPLIQUEE, ORGANIQUE

169. HEROUX, Y. CHAGNON, A. BERTRAND, R., INRS-Pétrole, Univ. Québec:
Diagenèse-catagenèse des séquences traversées par le forage Karlsefni H-13, plate-forme du Labrador; étude comparative des indicateurs thermiques sur fractions argileuses et organiques, 1977-79.

Le but du présent ouvrage est d'apporter un exemple de corrélations entre les indicateurs thermiques tant organiques que minéraux et ce faisant, d'établir le niveau de maturation thermique atteint par les séquences tertiaires de la partie nord ud bassin de la plate-forme du Labrador. I¹ y est question de paramètres analytiques peu usités, ceux des gaz adsorbés, de mode d'évolution des pouvoirs réflecteurs en zone immature et de la relation entre nature et quantité des kérogènes en relation avec les paléoenvironnements.

170. HEROUX, Y., CHAGNON, A., BERTRAND, R., INRS-Pétrole, Univ. Québec:
Signification de la réflectance sur kérogène par comparaison diagenèse-catagenèse minérale et organique; application aux séries du Paléozoique inférieur des Bass-Terres du Saint-Laurent, Québec, 1978-79.

Mode d'évolution du pouvoir réflecteur (Ro) des organolites (kérogène-pyrobitume asphaltique) comme paramètre de diagenèse-catagenèse des séries du Paléozoique inférieur-moyen et évaluation de ces séries en tant que potentiel roche-mère à hydrocarbures.

171. JONASSON, I.R., Geol Surv. Can.:
Environmental geochemistry, 1974-.

See:
Low grade uranium mineralization in carbonate rocks from some salt domes in the Queen Elizabeth Islands, District of Franklin; Geol. Surv. Can., Paper 79-1A, p.61-70, 1979.

172. POWELL, T.G., Geol. Surv. Can.:
Hydrocarbon geochemistry of Artic Archipelago and Canadian East Coast offshore, 1976-.

173. PURCELL, L.P., Geol. Surv. Can.:
Organic geochemistry related to the petroleum potential, Atlantic coast of Canada, 1975-.

174. RASHID, M.A., Geol. Surv. Can.:
Hydrocarbon geochemical analysis of eastern offshore well samples - heavy hydrocarbons as source and maturity indicators, 1973-.

175. SAWATZKY, H., GEORGE, A.E., FURIMSKY, E.E.,MONTGOMERY, D.S., CANMET(EMR):
Geochemical information obtained during investigation of bitumen, heavy oils from western Canada and products derived from them. Investigtion of oils from frontier areas.

176. SNOWDON, L.R., Geol. Surv. Can.:
Development of extraction, identification and correlation systems for organic compounds from sedimentary rocks and crude oils, 1973-.

177. SNOWDON, L.R., Geol. Surv. Can.:
Hydrocarbon geochemistry of northern interior plains and Beaufort Sea, 1976-.

EXPLORATION,NON-ORGANIC/APPLIQUEE, NON-ORGANIQUE

178. BINGLEY, J.M., Nova Scotia Dep. Mines:
Geological-geochemical surveys-sub-projects 4.1; geochemical studies, 1978-79.

3000 stream silt samples were collected in Cape Breton and analysis will be completed in 1979. A map of the Port Hood area will include all of the data collected in 1977 and 1978. Analytic determinations for Cu, Pb, Zn, Cd, Fe, Mn, Mo, Mg, Ni, U, F, As, Aq, Ba, Sr will be published on 1:50,000 maps. 2300 Lake sediment samples were collected in southwestern Nova Scotia in 1978; analysis will begin in 1979. 1977 lake sediment geochemistry was presented as an open file release in August 1978.

179. BINGLEY, J.M., Nova Scotia Dep. Mines:
Geological-geochemical surveys sub-project 4-3: Cobequid Highlands-Antigonish Highlands geochemical survey.

Present project work entails the expansion of analytical coverage of stream silt samples collected from the Cobequid mountains of northern Nova Scotia in 1971-73.

Previous analyses was for copper, lead and zinc on all samples, manganese, silver, cadmium, nickel and mercury on selected samples. Present work will give complete analyses for manganese, iron, uranium, molybdenum and arsenic.

180. CAMERON, E.M., Geol. Surv. Can.:
National geochemical reconnaissance, 1975-.

See:
Investigation of base metal mineralizationin Proterozoic metasediments, Melville Peninsula, District of Franklin; Geol. Surv. Can., Paper 79-1A, p.187-196, 1979.

181. CANN, R.M., GODWIN, C.I., Univ. British Columbia (Geological Sciences):
Minor elements in magnetite from Iron Mask Batholith, British Columbia, 1976-79; M.Sc. thesis (Cann).

Magnetite has been separated and purified from all samples. Ninety-six samples were analysed for Cu, Co, Cr, Mg, Mn, Ni, Pb, Ti, Y, Zn by atomic absorption spectrometry. Polished sections of magnetite and thin sections of host rocks have been studies.

The data is presently being statistically analysed to determine characteristic trace and minor element populations for magnetite lodes and for magnetite in host rocks.

182. CARIGNAN, J., GELINAS, L., DARLING, R., Ecole Polytechnique (Génie Minéral)
Géochimie et géostatistique comme outil combiné pour l'exploration des gisements volcanogènes de sulfures massifs, 1975-79; thèse de doctorate (Carignan).

The volcanic host rocks of the No. 14 lens in the Millenbach mine have been sampled, analysed for major, minor, and trace elements and the results have been interpreted using geostatistical methods.

183. COKER, W.B., Geol. Surv. Can.:
Regional geochemistry, southern Canadian shield, 1976-.

See:
Detailed geochemical studies, southeastern Ontario; Geol. Surv. Can., Paper 79-1A, p.247-252, 1979.

184. DUNN, C.E., Saskatchewan Geol. Surv.:
Geochemistry of water-deposited sediments peripheral to the Athabasca Formation, 1975-79.

See:
Surface Geochemical Patterns Associated with Uranium In and Beneath the Athabasca Sandstone, Saskatchewan, Canada; Proc. Symp. Denver, April 1978, 1979.

Establish trace metal patterns in sediments of lakes and streams which are close to the margin of the Athabasca Formation, northern Saskatchewan; close consideration will be given to patterns associated with major uranium deposits.

185. DUNN, C.E., Saskatchewan Geol. Surv.:
Uranium in Phanerozoic sediments of north-central Saskatchewan, 1978.

Establish stratigraphic, lithological and regional distribution of uranium in Phanerozoic sediments of Saskatchewan which occur within a 100 km wide band immediately south of the Precambrian Shield.

186. DYCK, W., Geol. Surv. Can.:
Groundwater geochemistry applied to uranium exploration, 1972-.

See:
Evaluation of He and Rn geochemical uranium exploration techniques in the "Key" Lake area, Saskatchewan; Geol. Surv. Can., Paper 78-1B, p.39-44, 1978.

187. FOSCOLOS, A.E., Geol. Surv. Can.:
Clay and clay minerals investigation, 1968-.

188. GYONGYOSSY, Z.D., SPOONER, E.T.C., Univ. Toronto (Geology):
Lithium-A commodity report and an orientation exploration geochemical survey near Bernic Lake, Manitoba, 1977-80; M.Sc. thesis (Gyongyossy).

189. HATTORI, K.H., MUEHLENBACHS, K., Univ. Alberta (Geology):
Stable isotope study (oxygen, carbon, hydrogen, sulfur) on uraninite and uranium ore deposits, 1977-.

The oxygen isotopic compositions of uraninite and associated oxides and silicate minerals were analyzed from 7 vein-type ores in Canada, 1 pegmatite ore in U.S. and 1 syngenetic sedimentary ore in Africa.

The $\delta^{18}O$ values of uraninite in Canada are exceptionally low ($\sim -30^{o}/oo$ SMOW), that had never reported among natural minerals. Whereas their associated silicate and carbonate minerals are quite rich in 18O (e.g., quartz ; $+10 \sim +18^{o}/oo$). From isotopic and fluid inclusion data of the Kitts, the Stormy Lake deposit, Labrador and of the Eldorado, N.W.T., the participated ore-forming fluid were saline ($\sim$20wt. % NaCl equiv. conc.) and of $\delta^{18}O = \sim 0^{o}/oo$ SNOW at moderate temperatures ($\sim 150^{o}C$.)

Equilibrium oxygen isotopic fractionation factors between uranium oxides and water were theoretically evaluated. Taking these predicted equilibrium fractionation factors and $\delta^{18}O$ values of uraninite into account they might be caused by re-equilibration with present-day groundwaters. The $\delta^{13}C$ values of some carbonates were found to be variable, and some are very low ($\sim -15^{o}/oo$ PDB). These values might indicate the involvement of biogenic carbon in uranium ore formations, though these ores were formed in early Proterozoic.

All the associated silicate minerals in the anatexite-hosted disseminated uranium ores in N. Sask. have the similar $\delta^{18}O$ values of usual acidic igneous rocks. (qtz; $\sim 10^{o}/oo$, k-field $9\ ^{o}/oo$, biotite $4\ ^{o}/oo$). However, silicate minerals associated with pegmatitic uraninite are extraordinarily enriched in 18-O. It is still open question whether these peculiar $\delta^{18}O$ values is primary character of uranium-hosted igneous body.

190. JONASSON, I.R., Geol. Surv. Can.:
Trace elements in sulphides, 1974-.

See:
Zn: Cd ratios for sphalerites separated from some Canadian sulphide ore samples; Geol. Surv. Can., Paper 78-1B, p. 195-201, 1978.

191. KIMBERLEY, M.M., FARR , M., TANAKA , R.T., Univ. Toronto (Erindale-Earth Planetary Sci.):
Multi-element characterization of the Elliot Lake Group, Ontario, 1976-79; M.Sc. theses (Farr, Tanaka).

See:
Origin of Stratiform Uranium Deposits in Sandstone, Conglomerate, and Pyroclastic Rock; Uranium deposits, their mineralogy and origin, Mineral. Assoc. Can. Short-Course Handbook, no. 3, p339-381, 1978.

Variation in chemical composition of the Elliot Lake Group is being determined by neutron-activation analysis of a large number of samples. Some compositional and mineralogical peculiarities have been determined in the vicinity of uranium ore bodies and the regional extent of these peculiarities is being investigated.

192. LETT, R.E.W., FLETCHER, W.K., Univ. British Columbia (Geological Sciences):
The secondary dispersion of transition metals through a copper-rich bog in the Cascade Mountains, British Columbia, 1976-79; Ph.D. thesis (Lett).

193. MAURICE, Y.T., Geol. Surv. Can.:
Regional geochemistry, eastern and northern Canadian Shield, 1976-.

See:
A preliminary assessment of the uranium potential of southern Melville Peninsula, District of Franklin; Geol. Surv. Can., Paper 79-1A, p.281-287, 1979.

194. McCONNELL, J.W., DAVENPORT, P.H., Newfoundland Dep. Mines Energy, (Mineral Develop. Div.):
An evaluation of reconnaissance lake sediment surveys and studies of suitable follow-up methodologies, 1978-81.

To evaluate the effectiveness of lake sediment geochemistry as an exploration method in Labrador with emphasis placed on uranium. Geochemical and radiometric field studies are being undertaken in a number of areas to gather data on lake sediments, overburden, rock and mineralization, in the hope of gaining a better understanding of how mineralized bedrock is reflected in the secondary environment.

195. OSHIN, I.O., CROCKET, J.H., McMaster Univ. (Geology):
An evaluation of the economic potential of ophiolites for platinum group metals, 1977-79; Ph.D. thesis (Oshin).

Noble metals including platinum, palladium, iridium and gold are determined by neutron activation in samples of ophiolite suite rocks from Quebec. Sampling is mainly from the Thetford and Asbestos areas and includes representatives from various ultrabasic rocks, and detailed sampling across asbestos veins has been carried out.

The main objectives are to characterize the main units of an ophiolite suite with respect to noble metal abundances. Rock types involved are dunites, metamorphic harzburgites, gabbros and various cumulus rocks, pillowed spilitic basalts and oceanic sedimentary rocks. The data will be of most interest in comparing with modern ocean crust as now available in the deep sea drilling program and in evaluation of the genetic relationships between the mafic and ultramafic components of ophiolites.

A further aspect of interest is whether the ophiolites present a significant potential for platinum metal mineralization. Results obtained to date show that chromite is probably a very efficient concentrator of iridium.

196. PRABHU, M.K., WEBBER, G.R., McGill Univ. (Geological Sciences):
Geochemical and petrological studies at Montauban, Québec, 1976-79; Ph.D. thesis (Prabhu).

197. ROBERT, F., DARLING, R., GELINAS, L., Ecole Polytechnique (Génie Minéral):
The geochemistry of altered wallrocks surrounding the Manitou-Barvue volcanogenic ore deposits, Val D'Or, Québec, 1978-80; M.Sc. thesis (Robert).

The sampling and chemical analysis completed. Petrographic studies and data interpretation.

198. SCOTT, S.D., KALOGEROPOULOS, S., SHEGELSKI, R.J., SIRIUNAS, J., Univ. Toronto (Geology):
Geochemistry of ferruginous sediments associated with massive sulfide ores, 1977-81; M.Sc. thesis (Siriunas), Ph.D. thesis (Kalogeropoulos, Shegelski).

Ferruginous and cherty sediments, here termed "sulfide ironstones", are commonly found in the hanging wall and on strike from volcanogenic massive Cu-Zn-(Pb)-Ag sulfide deposits. We are examining the geology and mineralogy together with stable isotopic and trace element geochemistry of sulfide ironstones from three localities in Ontario and, for comparison, the Hokuroku district of Japan and Noranda, Québec (Kalogeropoulos) as a test of whether such rocks can be used to discriminate environments which may host massive sulfide deposits from those which are barren. Shegelski's results from Sturgeon Lake in northwestern Ontario have demonstrated that the sulfide and kerogen fractions of ironstones provide the most useful information but we have not found a simple geochemical correlation with productive or barren environments. Studies are in progress at Manitouwadge, Ontario (Siriunas) as a test of the effects of high grade metamorphism on sulfide ironstones and in the Archean at Cobalt, Ontario (Scott) as an example of sulfide ironstones in an area from which massive sulfide deposits are not presently known.

199. SINCLAIR, A.J., TRESSARI, O., Univ. British Columbia (Geological Sciences):
Vein geochemistry as an exploration tool, Keno Hill-Galena Hill area, Yukon Territory, 1978-79; M.Sc. thesis (Tessari).

Approximately 200 routine samples of vein material from selected traverse have been analyzed and examined for systematic distribution patterns that might have some use as a predictive tool in exploration. These data have been used to develop an idealized conceptual model of an ore shoot in both geochemical and mineralogical terms. This model appears to have predictive value for ore, although application of the model involves variable subjective decision.

200. SOPUCK, V.J., LEHTO, D.A.W., SMITH, J.W.J., Saskatchewan Research Council (Geology Div.):
Uranium dispersion studies in Lake sediments and till; Basal till sampling techniques in uranium and base metal exploration, 1977-81.

See:
Geochemical Investigations of the Duddridge Lake uranium prospect-Applications of a Basal till sampling technique;
Sask. Geol. Soc.Spec. Publ. No. 4, 1978.

Fractionation of lake sediments and partitioning of metals in the various components of lake sediments. Relative merits of using various till fractions in the exploration for uranium deposits under differing oxidation conditions.

201. SPITZ, G., DARLING, R., Ecole Polytechnique (Génie minéral):
Geochemistry of volcanic rocks surrounding the Louvem copper deposit, Val D'Or, Quebec, 1970-78 (completed); Ph.D. thesis(Spitz).

See:
Major and minor element lithogeochemical anomalies surrounding the Louvem copper depcsit, Val D'Or, Quebec;
Can. J. Earth Sci.,vol. 15, p.1161 - 1169, 1978.

202. STONELL, R., ANDERSON, G.M., CHOU, C.L., Univ. Toronto(Geology):
Trace element distributions in nepheline syenites, Bancroft, Ontario, 1979-; M.Sc. thesis(Stonell).

Abundances of rare earth elements have been determined in some nepheline syenite samples from the Bancroft area using neutron activation analytic techniques. Four samples of nepheline gneiss are enriched in light REE (La = 50X chondrites) and have flat heavy REE patterns (12X chondrites). These patterns are similar to Precambrian sedimentary rocks. The nepheline pegmatites are significantly lower in REE than nepheline gneiss and do not show Eu enrichment. Previous studies suggest that the composition of pegmatite has been changed by metasomatism. Rare earth abundances in individual minerals would be useful to test the effect of metasomatism on the original REE patterns. Concentrations in nepheline, albite and biotite are too low to be determined by NAA using Slowpoke irradiation. We plan to do radiochemical analysis on mineral separates. Trace elements in other nepheline syenites show systematic variation, presumably due to fractional crystallization.

203. WEBBER, G.R., McGill Univ.(Geological Sciences):
Investigations in applied geochemistry, 1975-.

THEORETICAL/PURE

203A. ANDERSON, G.M., Univ. Toronto (Geology):
Sulfide mineral solubilities, 1972-79.

See:
Episodes, vol. 1978, p15-19, 1978.

The solubilities of galena and sphalerite in NaCl brines saturated with H_2S and up to 95°C have been measured, and also calculated using thermodynamics data. The experimental data is used to test the validity of the calculations, which are then extended to place limits on possible conditions of formation of certain types of lead-zinc ore bodies.

204. ANDERSON, G.M. Univ. Toronto (Geology):
Effects of uncertainties in geochemical models, 1979-.

A Monte Carlo technique has been developed for easily ascertaining the effects of uncertainties in input parameters on the results of complex calculations. It has been applied to solubility and phase calculations.

205. CAMPBELL, I.H., NALDRETT, A.J., Univ. Toronto (Geology):
The influence of silicate; sulfide ratios on the geochemistry of magmatic sulfides, 1978.

The concentration of a given trace element in a liquid (A) decreases if a second phase (B) segregates from it and if the Nernst distribution coefficient is such that the element favours B over A. The magnitude of the decrease is a function of the mass ratio (R) of A to B and the magnitude of the partition coefficient. If the initial concentration of the element in A is X_A, its final concentration in the separating phase (X_B) may be calculated from the expression:

$$X_B = \frac{X_A\, D(R + 1)}{(R + D)}$$

where D is the Nernst distribution coefficient. It can be shown from this equation that R is not significant unless $R < 10D$. D for silicate minerals is usually less than 20 and R factors are rarely important. However for partitioning of trace elements between sulfide liquids and silicate melts D's may range from 40 to 2000 and consequently silicate sulfide ratios may have an important influence on element abundance and ratios in magmatic sulfides.

206. CERMIGNANI, C., ANDERSON, G.M., Univ. Toronto (Geology):
Experimental investigation of nephelinization reactions, 1979; Ph.D. thesis (Cermignani).

Phase relations and equilibrium constants have been determined for several reactions in the system Ab-An-Ne-Na_2CO_3-$CaCO_3$-H_2O at high pressures and temperatures. The results are applied to interpreting the petrogenesis of the nepheline gneisses in the Bancroft area. A model has been proposed whereby NaCl-bearing solutions react with marble, creating Na_2CO_3. The "nephelinizing" reaction is then: Anorthite (in plagioclase) + Na_2CO_3 = 2 Nepheline + $CaCO_3$.

207. CHOU, C.L., Univ. Toronto (Geology):
Trace element geochemistry of meteorites, 1975-.

Meteorites are important for studying the early history of the solar system because most of them are 4.6 Ga old. Trace element abundances have been determined in several groups of meteorites using neutron activation analysis. 1) Howardites have previously been shown to be enriched in siderophile elements (e.g. Ni, Au, and Ir) due to intense bombardment of chondritic projectiles on their parent body. New data

of major elements and lithophile trace elements in howardites and mesosiderites have been completed. It is interesting that mesosiderites Mincy, Lowicz and Veramin show an enrichment in light rare earth elements and have a REE pattern qualitatively similar to that in terrestrial basalts thought to have been formed by small degrees of partial melting. These mesosideritesmost likely formed by 2-4% partial melting of a source containing low abundances of the rare earths. 2) The Innisfree meteorite, a recent fall (Feb. 7, 1977) in Alberta, has been determined by NAA for 7 elements: 0.61% Na, 7.8 ug/g Sc, 0.40% Cr, 0.22% Mn, 20.1% Fe, 550 ug/g Co and 1.17% Ni. These data along with petrographic observation indicate that Innisfree is an LL5 chondrite. Further work is planned to determine the Ga and Ge contents in the metal portion.

208. CHOU, C.L., GOODWIN, A.M., Univ. Toronto (Geology):
Geochemistry of Archean gneissic terrain, greenstone belts and iron formation, 1975-.

Several areas in the western Superior Province have been selected for trace element studies. 1) The Lac Seul area comprises mostly the southern orthogneissic terrain and partly the northern metasedimentary domain of the English River Subprovince. Trace element data indicate that in the southern domain tonalitic gneisses formed by partial melting of garnet pyroxenite and amphibolites at matle depths. Granite is derived from volcanogenic sediments at deep crustal levels. and pegmatite crystallized from a water-rich fluid. In the northern domain the rocks have undergone various degrees of metamorphism and anatexis. These data, along with Rb/Sr systematics, indicate that new granitoid crustal material was accreted directly or indirectly from the mantle. 2) Sturgeon Lake volcanic rocks in the Wabigoon Volcanic Belt have been analyzed for trace elements. Tholeiites can be divided into four types based on REE and Hf contents and La/Sm ratios, which may have formed by various degrees of partial melting and from sources of different compositions. A low-K dacite is suggested to have derived from eclogite. 3) Abundances of iron, manganese, copper, zinc, gold and silver are determined in samples from a drill core in the Helen iron formation, Michipicoten, for better understanding of their distribution and mode of deposition.

209. CHOU, C.L. PEARCE, G.W., STRANGWAY, D.W., Univ. Toronto (Geology):
Trace element and metallic iron abundances in lunar samples, 1975-.

Lunar soils and breccias contain appreciable amounts of metallic iron (about 0.2 to 1.0 per cent), which can be derived from several sources: 1) lunar bed rock, 2) disseminated metallic particles from meteorite projectiles, and 3) reduction of the silicate iron by solar wind or subsolidus reaction in the regolith. Purpose is to search for the relation between the nickel and metallic iron contents, so that the meteoritic contribution can be quantified. At the Apollo-16 site nickel and metallic iron are positively correlated, indicating that meteoritic material is the dominant source in highlands regoliths. Apollo-17 data indicate that their abundances are related to selenographic locations at the Taurus-Littrow site, i.e. controlled by relative contributions of mare

and highlands materials. A glass-coated breccia sample (no. 70019) has trace element abundances similar to mare basalt, suggesting that the glass coat is probably derived from a local source. Our current effort is to study the variation of metallic iron and trace element abundances in size fractions of a deep-drill core from the Apollo-15 site (no. 15002,170).

210. GALE, N.H., SPOONER, E.T.C., Univ. Toronto (Geology), Univ. Oxford:
The Isotopic compositon of lead in metalliferous sediments ("umbers") and sulphide mineralization associated with Upper Cretaceous ophiolitic rocks in Cyprus, Syria and Oman, 1977-79.

Metal enriched iron-manganese hydroxyoxide sediments occur in pockets within and immediately above ophiolitic mafic pillow lavas in Cyprus, Syria, and Oman. In Cyprus this material is worked as a source of exceptionally high quality umber pigments. It is extremely fine-grained and remarkably free of impurities. It has been suggested that the deposit is an inorganic hydroxy-oxide precipitate which formed during interaction of discharged, reduced hydrothermal fluid with oxidised sea water. If this were the case, the metals were probably derived by leaching of underlying basaltic rocks. This hypothesis has been tested by determining the 208/204, 207/204, and 206/204 isotopic ratios of lead contained in eighteen umber samples. The values obtained define a field stretching from a range characteristic of deep sea basaltic rocks to a sea water range defined by previous analyses of the isotopic composition of lead in manganese nodules. A variable proportion of the contained lead has, therefore, been shown to be of basaltic origin. Umbers from Oman contain exclusively basaltic lead, umbers from Cyprus contain a variable mixture and umbers from Syria contain dominantly sea water/terrestrially derived lead.

A new project is now in progress to examine the isotopic composition of lead in the sulphide ore deposits of Cyprus. Determinations are also being carried out on the lead isotopic compositions of fresh gabbroic rocks in Cyprus.

211. GOODWIN, A.M., CHOU, C.L., CHEN, G.S.J., Univ. Toronto (Geology):
Trace element distributions in Archean iron formation.

212. GOODWIN, A.M., MONSTER, J., THODE, H.G., Univ. Toronto (Geology), Univ. McMaster (Chemistry):
Sulphur and carbon isotope abundances in Archean iron-formation.

213. KRAG, P., ANDERSON, G.M., Univ. Toronto (Geology):
Alkali diffusion in hydrous silicate melts, 1979-; M.Sc. thesis(Krag).

Silicate glasses of Ab80Or20 and Ab70Or30 containing 7.5 per cent water have been prepared at 750°C and 5000 bars pressure. These glasses are then placed together at the same P and T, then later sectioned and analyzed to determine how far K and Na have diffused. Measurement of the diffusion profile allows calculation of the diffusion coefficients.

214. THURSTON, P.C., Ontario Geol. Surv.:
Trace element geochemistry of alteration processes in Archean volcanic rocks - Cyprus type and massive sulphide orebodies, 1979-80.

1) A Cyprus type Cu bearing sulphide body in mafic flows will be examined. Major, minor and trace element geochemistry will be done to ascertain the existance of an alteration haloes, pipes, etc.

2) Major and trace element geochemistry of Zn -Ca massive sulphide bodies and associated felsic volcanic piles will be examined. Rare earth geochemistry of the mineralizing fluids and their effect on ores and the surrounding rocks will be examined. Locales to be examined - Confederation Lake, Lang Lake, northwestern Ontario.

GENERAL/GENERALITES

215. ARNDT, N.T., ZINDLER, A.H., Univ. Saskatchewan (Geological Sciences), M.I.T. (Earth and Planetary Science):
Trace element abundances in Proterozoic komatiites from the Cape Smith fold belt, northern Québec, 1978-79.

July, 1978, was spent in the Cape Smith Fold Belt mapping and sampling komatiitic and tholeiitic lava flows and sills with A.J. Hynes and D. Francis (McGill Univ.). Similarities between the field characteristics of the Proterozoic komatiites and their Archean counterparts were noted, with particular attention being focussed on previously unrecognised thick, layered ultramafic-mafic lava flows. Over 60 large samples, collected for trace element and isotopic analysis, have been crushed and will be analysed for trace elements at Australian National University and for Sr and Nd isotopes at M.I.T. The major element chemistry and the petrology of the rocks is being studied by Hynes and Francis at McGill.

216. BRAND, U., VEIZER, J., Univ. Ottawa (Geology):
Geochemistry of Paleozoic carbonates and their associated fossils, 1976-79; Ph.D. thesis(Brand).

Trace element and stable isotope studies of internal constituents of sedimentary carbonate rocks showed that diagenetic stages can be deciphered by such a multitechnique approach. The major control appears to be excercised by the degree of stability of internal constituents. These criteria are utilized for interpretation of the origin of lead and zinc containing carbonate breccias.

217. BRISTOW, Q., Geol. Surv. Can.:
Geochemical technology development, 1976-.

218. CAMPBELL, I.H., NALDRETT, A.J., ROEDER, P.L., Univ. Toronto (Geology), Queen's Univ. (Geological Sciences):
Nickel activity in silicate liquids, 1977-79.

The activity of nickel (^{a}NiO) in a number of silicate liquids has been determined by equilibrating the liquid with a Fe-Ni alloy at a known f_{O_2}. Two series of experiments were carried out: 1) Eighteen sili-

cate liquids of differing compositions were run at constant t and f_{O_2}. a_{NiO} varies from 7.8 in the komatiite to 30 in the dacite. The increase in a_{NiO} with the acidity of the liquid is believed to be due to the decreasing number of octahedral sites in the liquid. 2) Four of the liquids used in the first series of experiments were run at differing temperatures between 1200° and 1400°C. The results showed that, for melts of constant composition, γ NiO is inversely proportional to the reciprocal of the absolute temperature.

Work is continuing to systemmatically access the role of melt composition on a_{NiO}.

219. DUNN, J.T., SCARFE, C.M., Univ. Alberta (Geology):
An investigation of silicate melt structure as a function of composition, temperature and pressure, 1978-81; Ph.D. thesis(Dunn).

220. DYCK, W., Geol. Surv. Can.:
Material balance of uranium series in a natural environment, 1978-.

221. EDWARDS, G.R., HODDER, R.W., Univ. Western Ontario (Geology):
Evolution of an Archean felsic volcanic-plutonic complex, northwestern Ontario, 1978-81; Ph.D. thesis (Edwards).

A relatively complete Archean felsic volcanic-plutonic complex at Kokagi-Pipestone lakes has been mapped and affords an opportunity to study local magma genesis, sequential development, and metal distribution, and to comment on broad aspects of Archean crustal evolution. The first objective is to complete full documentation of field relationships in space and time for plutonic, volcanic and sedimentary rocks and mineralization between Kakagi and Pipestone lakes. The second objective is petrographic study and analysis of major, minor, trace and rare earth element abundances and possibly strontium isotope abundances for the igneous rocks to examine (a) consanguinity and evolutionary trends in these rocks and (b) source of the host basalt sequence, the batholith, its satellite stocks and associated volcanics. The third objective is to determine the source, means of transport and manner of deposition of copper and gold in this volcanic-plutonic-sedimentary complex. The general aim is to compare the Kakagi-Pipestone Lakes area to other Archean and possibly Phanerozoic sites as a basis for comment on Archean crustal development and mineralization in place and time.

222. FORESTER, R.W., Univ. Saskatchewan (Geological Sciences):
Stable isotope study of some uranium ore deposits in northern Saskatchewan, 1977-79.
$^{18}O/^{16}O$, D/M and $^{13}C/^{12}C$ analyses are being carried out on rocks and minerals associated with the Rabbit Lake uranium deposit, northern Saskatchewan. The stable isotope data should provide evidence bearing on the origin of the mineralizing fluids, and on the temperatures of deposition of the minerals. In conjunction with mineralogical and fluid inclusion geochemical research, the study will provide quantitative evidence for the physical and chemical parameters of the uranium-bearing solutions, and thus give us a better understanding of the geo-

logical processes responsible for generating these important ore deposits.

223. FRITZ, P., CHERRY, J.A., MOZETO, A., Univ. Waterloo (Earth Sciences):
^{14}C and carbon geochemistry in shallow groundwater systems, 1978-80;

Ph.D. thesis(Mozeto).

To obtain information on the geochemical evaluation of groundwater in aquifers within shallow sedimentary sequences overlying the Canadian shield.

224. FRITZ, P., MICHEL, F., Univ. Waterloo (Earth Sciences):
Hydrogeologic properties and age of permafrost in northern Canada, 1977-79; Ph.D. thesis (Michel).

Water from samples representing five cores, collected along the Mackenzie Valley Corridor, was analysed for its oxygen-18 and tritium contents. Sampling in these cores was done at one foot intervals near the surface and at five foot intervals at depth. The core from a sixth hole at Norman Wells was sectioned and analysed at 2 to 3 cm intervals. In all cases, tritium was found only at the surface and no measurable amounts were detected below about 3 meters. Similarly the ^{18}O contents decreased from about $\delta^{18}O = -23$ °/oo SMOW at the surface to about $\delta^{18}O = -31$ °/oo SMOW at depth. This change cannot be related to isotope fractionation effects and is interpreted as an age difference whereby the deep relic permafrost waters were recharged under colder climatic conditions. The tritium and ^{18}O data thus enable one to distinguish between contemporary and relic permafrost. The depth of the contemporary permafrost appears to be roughly related to the grain size of the soil whereby the active zone tends to be deeper in soils with higher clay contents.

225. GARRETT, R.G., Geol. Surv. Can.:
Geochemical data systems, 1975-.

See:
Sampling considerations for regional geochemical surveys; Geol. Surv. Can., Paper 79-1A, p.97-205, 1979.

226. GOODFELLOW, W.D., Geol. Surv. Can.:
Regional geochemistry, Yukon Territory, 1977-.

See:
Geochemistry of copper, lead and zinc mineralization in Proterozoic rocks near Gillespie Lake, Yukon; Geol. Surv. Can., Paper 79-1A, p. 333-348, 1979.

227. HARTREE, R., VEIZER, J., Univ. Ottawa (Geology):
Pb and Zn in sedimentary carbonate rocks, 1975-79; M.Sc. thesis(Hartree).

Concentrations of soluble lead and zinc in sedimentary carbonate rocks are in 10^{0} ppm in range. Zinc is strongly controlled by available lattice position (mineralogy) while lead is not. The observed secular variations are of a small magnitude.

228. HATTORI, K.H., MUEHLENBACHS, K., Univ. Alberta (Geology):
Oxygen isotopic study on Icelandic deep drilling cores, 1978-79.

Drilling core (∿3000m) obtained in the eastern part of Iceland is being studied as a part of the "Iceland Deep Drill Project", which is organized by University of Dalhousie. The goals are:

1) $\delta^{18}O$ variation of whole rocks with depth; these variations of $\delta^{18}O$ may suggest the cause of exceptionally low $\delta^{18}O$ magma in Iceland,
2) to obtain alteration temperature by $\delta^{18}O$ analyses separate minerals; and
3) to calibrate isotopic geothermometer of zeolite.

Zeolite is a common mineral in many low grade metamorphic rocks. However, there has not yet been published systematic analyses of $\delta^{18}O$ values of zeolites. Isotopic geothermometer containing zeolite should be useful to apply isotope method to alteration study.

229. HOUGHTON, R.L, Univ. Alberta (Geology):
Stable isotopic study of the basaltic melts of a heterogeneous mantle, 1978-79.

Preliminary analyses of the isotopic composition of fresh alkali basalts suggest they may be slightly enriched in ^{18}O with respect to seafloor tholeiites. Such a relationship could indicate that the mantle is heterogeneous in its oxygen isotopic composition as well as in heavier isotopes. To properly test this hypothesis, the oxygen isotopic compositions of both alkalic and tholeiitic basalts from the same oceanic island/seamount edifaces are being determined. Also, the observed ^{18}O variations are compared to other geochemical indicators of mantle heterogeneity, including K/Rb, Rb/Sr, and Li/Ar ratios, which may reflect the abundance and mineralogy of any hydrous phase present. Preliminary data for the likely hydrous minerals suggest they fractionate oxygen isotopes quite differently, and thus, correlation of the oxygen anomalies with these trace element ratios could define the nature and possible origin of such mantle heterogeneities. Samples from 17 different oceanic volcanic complexes are currently being investigated in this study.

230. HUTCHEON, I.E., GHENT, E.D., OLDERSHAW, A.E., Univ. Calgary (Geology):
Geochemistry of the diagenesis of clays and related minerals and mineraloids in the Kootenay Formation, southwestern Alberta, 1978-80.

The study of diagenesis of the coal-bearing sandstones of the Kootenay Formation was begun in two areas where reported coal-rank (vitrinite reflectance) was different. To date illite crystallinity data has been collected for comparison with vitrinite-reflectance.

SEM studies indicate the probability of a reaction between dolomite and kaolinite to form chlorite, ie:
5 dolomite + kaolinite + quartz + 2 water = 5 calcite + chlorite + 5 carbon dioxide.

Because theequilibrium implied by this reaction involves water and carbon dioxide it is necessary to obtain activity coefficients for the mixture. Water and CO_2 form a mixture of limited miscibility under diagenetic conditions and published data have been used with a solution model to extract the activity coefficients.

231. INNES, D.G., ROBERTSON, J.A., Ontario Geol. Surv.:
Ni-potential of an ultramafic komatiite suite, Swayze greenstone belt, Ontario, 1978-79.

A sequence of komatiitic lavas in the eastern part of the Swayze greenstone belt of Ontario, are similar to those described in the Abitibi greenstone belt. Chemical and field data suggest the presence of high-Fe and high-Mg tholeiitic basalts, basaltic komatiites and ultramafic komatiites. In the komatiitic sequence, all flows analyzed have low FeO*/(FeO*+MgO) ratios, low TiO_3 content and high MgO, NiO, and Cr_2O_3 content. Cumulus peridotite flows have low Cr values associated with relatively high Ni values. CaO/Al_2O_3 ratios are generally less than 1, however some samples have CaO/Al_2O_3 ratios ideal for komatiites according to Brooks and Hart (1974). Nickel deposits in the Abitibi Belt are commonly associated with peridotitic komatiites having at least 35% MgO. Some of the peridotites from the Swayze Belt contain as much as 40% MgO and are a potential host for nickel sulphide deposits.

232. KERRICH, R., FRYER, B.J., HUTCHINSON, R.W., Univ. Western Ontario (Geology):
Lode gold deposits, Timmins, Ontario, 1977-78 (completed).

233. KERRICH, R., FYFE, W.S., Univ. Western Ontario (Geology):
Yellowknife lode gold deposits, Northwest Territories, 1976-78.

See:
Vein geometry and hydrostatics during Yellowknife mineralisation; Can. J. Earth Sci., vol. 15, no. 10, p. 1653-1660, 1978.

Analysis of precious metals of ppb levels in rock by a combined wet chemical and flameless atomic absorption method; Atomic Absorption Newsletter, No. 17, p.4-6, 1978.

234. LEW, M.M., SONNENFELD, P., HUDEC, P.P., TUREK, A., Univ. Windsor (Geology):
Seasonal variations in the physical and chemical properties of Lago Pueblo Solar Pond, Los Roques Archipelago, Venezuela, 1975-78; M.Sc. thesis (Lew).

235. LONGSTAFFE, F.J., GOWER, C.F., Univ. Alberta (Geology):
Oxygen isotope geochemistry of Archean gneisses near Kenora, Ontario, 1978-.

To determine the origin of Archean gneisses located near Kenora, Ontario. It is of special interest to distinguish between igneous and sedimentary protoliths for these rocks. In addition, correlation is attempted between oxygen isotope geothermometry and temperatures derived from metamorphic reactions. Initial results indicate most gneisses to be of igneous parentage. Quartz-magnetite mineral pairs appear to provide a minimum temperature estimate of the culmination of metamorphism.

236. LONGSTAFFE, F.J., McNUTT, R.H., Univ. Alberta (Geology), McMaster Univ. (Geology):
Oxygen isotope geochemistry of Mesozoic granitoids and volcanic rocks from Chili, 1978-.

This project uses oxygen isotopes to determine the nature of source materials involved in the generation of the Mesozoic granitoids and volcanic rocks of Chili. Initial data indicates that crustal contamination has not been an important process during the formation of these rocks.

237. LONGSTAFF, F.J., McNUTT, R.H., SCHWARCZ, H.P., McMaster Univ. (Geology):
Oxygen isotope relations of Archean granitoids and granitoid gneisses, Western Superior Province, 1978; Ph.D. thesis (Longstaffe).

$\delta^{18}O$ values for Archean granitoids and granitoid gneisses from the Western Superior Province reflect both the genesis and subsequent evolution of these rocks. The $\delta^{18}O$ values (7.3-9.0°/oo) of many granitoid gneisses from the Rainy Lake Batholith, Wabigoon Subprovince, and the southern portion of the English River Subprovince indicate a protolith similar to Wabigoon plutonic granitoids (7.3-9.3°/oo). These Archean rocks have lower $\delta^{18}O$ values than most Phanerozoic granitoids. This suggests that the Archean rocks have not assimilated, nor exchanged with, large amounts of pre-existing ^{18}O-rich material, and are juvenile additions to the continental crust. Strongly fractionated REE patterns, with no Eu anomalies, and low initial Sr isotope ratios support this conclusion for the Rainy Lake samples. Variable and usually large quartz-microcline, large Δ quartz-biotite, and, for most gneisses, low $\delta^{18}O$ biotites ($< 3°/oo$) indicate that the analyzed Archean rocks are slightly out of oxygen isotope equilibrium. Quartz-magnetite temperatures provide minimum estimates of the thermal peak of metamorphism for the gneisses but low (400°C) quartz-biotite 'temperatures' reflect only the continued isotopic exchange and $\delta^{18}O$ depletion of biotite after other phases have ceased to isotopically re-equilibrate.

High $\delta^{18}O$ values (8.8-11.7°/oo) for paragneisses from the northern part of the English River Subprovince reflect their clastic sedimentary protolith. However, some highly migmatized portions of both the para- and orthogneisses have undergone high temperature, isochemical depletion of $\delta^{18}O$ and attained mantle-like isotopic compositons (6°/oo).

238. LONGSTAFFE, F.J., SMITH, T.E., MUEHLENBACHS, K., Univ. Alberta (Geology):
Origin of Devonian granitoids of southwestern Nova Scotia, 1978-79.

See:
Oxygen isotope evidence for the origin of Devonian granitoids from southwestern Nova Scotia; Abstr. Prog. Joint Ann. Meeting, GAC/MAC vol. 3, p. 446, 447, 1978.

Oxygen isotope studies over 100 samples have demonstrated that a geographic variation in $^{18}O/^{16}O$ exists in the granitoids of southwestern Nova Scotia. This variation ranges from 8°/oo in the southern portions of southwestern Nova Scotia to 12°/oo in the north. The high values indicate involvement of clastic sediments in the source materials.

The significance of the lower values to the south is under investigation; crustal versus sub-crustal protoliths cannot yet be distinguished with confidence. Host clastic metasedimentary rocks have been metamorphosed in an isotopically closed system and show no systematic variation in $\delta^{18}O$ is observed for the granitoids.

239. LUDDEN, J.N., Univ. Montreal (Géologie):
Geochemical studies of Archean and modern crustal floors.

Geochemical comparisons of Archean and ocean floor crustal sections leading to a better understanding of the volcanic processes in each region. Major fracture zones in the Atlantic and Indian oceans are used to evaluate oceanic crustal compositions. At present Archean crustal sequences have been restricted to the Abitibi region of Québec.

240. MAJID, A.M., VEIZER, J., Univ. Ottawa (Geology):
Geochemistry of the Tertiary carbonates of the Kirkuk oil field, Iraq, 1977-80; Ph.D. thesis (Majid).

To utilize trace element data for interpretation of facies, their diagenetic history and dolomitization.

241. McNUTT, R.H., CLARK, A., LONGSTAFFE, F.J., McMaster Univ. (Geology), Queen's Univ. (Geological Sciences), Univ. Alberta (Geology):
Sr, Pb and O isotopic study of Chilean plutonic and volcanic rocks of the Andean Cordillera, 1973-.

O isotope values suggest a deep crustal or mantle source for the magmas. The relatively high Pb^{207}/Pb^{204} value and Sr^{87}/Sr^{86} (the latter for the younger rock) can be the result of some crustal contamination of the rising magma but can equally well represent conditions prevailing at the source (i.e. the subducting slab, overlying mantle on basal crust).

242. MUEHLENBACHS, K., SCARFE, C.M., Univ. Alberta (Geology):
Isotopic and mineralogical study of the alteration and aging of the basaltic seafloor, 1978-81.

243. PERRAULT, G., LAPLANTE, R., McCANN, J., Ecole Polytechnique (Génie minéral):
Géochimie et minéralogie des carbonatites, 1954-80; thèse de maîtrise (Laplante, McCann).

Recherches minéralogiques et pétrologiques sur les carbonatites surtout québecoises (Oka, St-Honoré, Crevier, etc.).

244. REARDON, E.J., Univ. Waterloo (Earth Sciences):
Complexing and low pairing in natural waters, 1978-.

245. REARDON, E.J., Univ. Waterloo (Earth Sciences):
Calcite dissolution kinetics in the unsaturated zone, 1979-80.

246. REID, R.P., BARNES, W.C., Univ. British Columbia (Geological Science):
Inorganic particulate phosphates in lakes, 1976-79; M.Sc. theses.

Apatite is a common accessory mineral in the source rocks for the glacial debris supplying modern sediments to many Canadian Lakes. Chemical analyses of sediments in Kamloops Lake, British Columbia suggest that this apatite may comprise a significant portion of the total phosphorus load of the lake water, thereby invalidating the Vollenweider (1968, 1974) relationship between total phosphorus load and trophic state for Kamloops Lake. A method has been developed which uses scanning electron microscopy and energy dispersive X-ray spectrometry for direct identification of apatite. This method has been used to examine the apatite content of various size fractions in Kamloops Lake sediments. Apatite concentrations obtained by this direct examination correlate well with the apatite concentrations suggested by the indirect chemical analyses and indicate that, in addition to comprising as much as 70% of the total phosphorus load, apatite may comprise as much as 25% of the "dissolved" ($< 0.45\ \mu m$) inorganic phosphate load. This would lead to erroneous estimates of productivity even if dissolved rather than total phosphorus values were used in Vollenweider's model.

247. SCARFE, C.M., Univ. Alberta (Geology):
Geochemical and geophysical properties of rocks and magmas at elevated temperatures and pressures, 1976-.

248. SLAWSON, W.F., Univ. British Columbia (Geophysics and Astronomy):
Oxygen isotopes in hydrological studies, 1977-79.

The five lysimeters installed in 1977 have been on a weekly basis for over one year. Waters from these and the Univ. British Columbia rain gauge have been analyzed for oxygen-18. The data awaits compilation and interpretation. The progress continues.

249. SPOONER, E.T.C., MacDONALD, A.J., BRYNDZIA,T.L.,Univ. Toronto (Geology):
Fluid inclusions in minerals, 1978-88; M.Sc thesis (Bryndzia).

In 1978 a NSERC capital grant of $16,000 was awarded to E.T.C. Spooner and associates to set up microthermometric apparatus for examining fluid inclusions in minerals. The apparatus will consist of a Linkam Scientific Instruments TH600 heating/freezing cell mounted on a Leitz Orthoplan Microscope. A room called "the F.G. Smith Fluid Inclusion Laboratory" in honour of Dr. Smith for his well-known seminal research in this field is being prepared. The apparatus will be used particularly for the study of fluid inclusions in minerals from hydrothermal ore deposits. Immediate studies are already planned for the Boss Mountain molybdenum deposit, British Columbia, and the Uwamuki no. 4 Kuroko deposit in Japan. It is also intended that the apparatus be available for fluid inclusion research on many other types of material.

250. STEGER, H.F., FAYE, G.H., CANMET(EMR):
Thiosalt formation, 1976-79.

The formation of thiosalts by the oxidation of monomineralic samples of the more common sulphide minerals in aqueous slurry were studied with respect to 1) nature of the mineral, 2) temperature, 3) pH of the slurry, 4) particle size, and 5) oxygen flow rate or availability. An attempt was made to apply the results of this study to help the understanding of the thiosalt problem associated with sulphide ore processing.

251. STEGER, H.F., FAYE, G.H., DESJARDINS, L.E., CANMET(EMR):
Oxidation of sulphide ores and minerals, 1973-.

See:
Oxidation of sulphide minerals. III. Determination of sulphate and thiosulphate in oxidized sulphide minerals; Talanta, vol. 24,no. 11, p. 675, 1977.

Oxidation of sulphide minerals. IV. Pyrite, chalcopyrite and pyrrhotite; Chem. Geol., vol.23, p. 255, 1978.

An analytical method was developed to determine the ferrous and ferric iron in the water-soluble oxidation products of pyrrhotite, pyrite and chalcopyrite, their concentrates and ores. Samples of pyrrhotite have been oxidized at various temperatures and relative humidities for up to 7 days and the oxidation products have been analyzed for the various metal- and sulphur-bearing components to derive an understanding of the two oxidation pathways to yield FeO(OH) or $Fe_2(SO_4)_3$.

252. THORPE, R.I., Geol. Surv. Can.:
Lead isotopic studies on genesis of ore deposits, 1978-.

253. VEIZER, J., Univ. Ottawa (Geology):
Geochemistry of carbonate rocks, Somerset and Prince of Wales Islands, 1977-80.

See:
Paleosalinity and dolomitization of the Lower Paleozoic carbonate sequence; Can. J. Earth Sci., vol. 15, p. 1448-1461, 1978.

Simulation of limestone diagenesis - A model based on strontium depletion: discussion; ibid., p. 1683-1685, 1978.

Trace element (particularly Sr and Na) data proved suitable indicators of salinity and diagenetic history of carbonate facies. Furthermore, they suggest that the so-called late diagenetic dolostones are the products of two stage (metastable assemblage→ low-Mg calcite → dolomite) diagenetic replacement process.

254. VEIZER, J., Univ. Ottawa (Geology):
Evolution of sedimentation during geologic history, 1977-80.

See:
Secular variations in the chemical composition of carbonate rocks-I; Precambrian Res., vol. 6, p. 367-380, 1978.

Secular variations in the chemical composition of carbonate rocks-II; ibid., p.381-413, 1978.

Secular variations in the chemical composition of sediments: A review; Origin and distribution of elements, Pergamon Press, p.269 - 278, 1978.

Major, trace element and isotopic composition of sedimentary carbonate rocks, covering ~2.8 b.y. time span, shows that these variables vary with age. The variations are a reflection of both unidirectional evolutionary and post-depositional alteration phenomena. At this stage the major effort is directed to: (a) Computer simulation of these phenomena; (b) The role and linkage of sulphur and carbon cycles; and (c) Studies of Archean chemical sediments.

255. VEIZER, J., BROOKS, C.H., Univ. Ottawa (Geology), Univ. Montréal(Géologie): Marine geochemical cycle of strontium, 1978-81.

To measure strontium, 87 Sr/86 Sr (and metals) in the dissolved load of major North American rivers in order to calculate their fluxes per year. The knowledge of these parameters will enable to estimate the magnitude of fluxes between ocean floor and sea water.

256. ARMSTRONG, R.L., BROWN, R.L., SIMONY, P.S.,PARRISH, R.R.,MATHEWS, W.H., DUNCAN, I., Univ. British Columbia (Geological Sciences), Carleton Univ. (Geology), Univ. Calgary (Geology):
Geochronometry of Omineca belt core complexes and basement(?) slices, 1977-80; Ph.D. thesis (Duncan), M.Sc. thesis(Parrish).

Work is in progress on suites of rocks from the Valhalla, Thor Odin, and Frenchmans Cap domes, Trail Gneiss, and Trinity Hills to determine original ages, cooling and uplift histories, and times of metamorphism and ductile deformation.

257. ARMSTRONG, R.L., MISCH, P., BROWN, E.H., Univ. British Columbia, (Geological Sciences), Univ. Washington:
Geochronometry of Cascade Mountains, Washington, British Columbia, 1975-80; M.Sc. theses.

Permo-Triassic and Late Jurassic - Early Cretaceous periods of high-pressure metamorphism have been established. Analytical work on core gneisses of the cascades is near completion for a suite of samples. Those results will guide future work on this project.

258. ARMSTRONG, R.L, MONGER, J., WOODSWORTH, G.J., GABRIELSE, H., PRETO, V.A., McMILLAN, W.J., GREEN, N., OSATENKO, M., ERDMAN, L., Univ. British Columbia (Geological Sciences), Geol Surv. Can., Univ. Oklahoma (Stillwater), Cominco Ltd.:
Sr isotopic composition and ages of igneous rocks in eugeosynclinal British Columbia, 1974-85.

Papers are currently in preparation on studies in the 1) Nicola belt of southern British Columbia, 2) the Hogem batholith and 3) Jurassic volcanic suites in northern British Columbia. Work will continue to characterize all major tectonostratigraphic units and plutons in the Cordillera, largely west of the Rocky Mountain Trench.

259. ARMSTRONG, R.L, SOUTHER, J., MULLER, J.E., GREEN, N., WALTERS, B., READ, P., NICHOLLS, J., BEVIER, M.L., BERMAN, R., LAWRENCE, R., Univ. British Columbia (Geological Sciences), Geol. Surv. Can., Univ. Oklahoma (Stillwater), Univ. Regina (Geological Sciences), Univ. Calgary (Geology):

Papers are in preparation on K/Ar dating of Late Cenozoic volcanic rocks in southwestern British Columbia (Garibaldi and Alert Bay volcanic belts) and on Sr isotopic composition of Late Cenozoic volcanic rocks throughout British Columbia. K/Ar dating of young volcanic centers continues.

260. ARMSTRONG, R.L., WHITFORD, D.J., RYAN, B., RUSSELL, R.D., SLAWSON, W.F., GODWIN, C.I., SINCLAIR, A.J., SHORE, L.P., Univ. British Columbia (Geological Sciences):
U/Pb dating and Pb isotope studies of Cordilleran rocks and ores, 1976-; M.Sc thesis(Shore).

U/Pb dating of zircons commences during the 1978-79 winter dealing with selected problems in the Omineca Belt, Coast Plutonic complex, and Insular Belt of British Columbia.

261. BAADSGAARD, H., CHAPLIN, C., Univ. Alberta (Geology):
Geochronology and lead isotope variation in a zoned complex pegmatite, Norway, 1979-81; M.Sc thesis(Chaplin).

In particular, the distribution of lead isotopes between apatite and feldspar will be studied to aid in establishing initial igneous behaviour as contrasted with metamorphic effects on lead isotope homogenization. The Rb-Sr geochronology of the pegmatite will also be carried out.

262. BAADSGAARD, H., CUMMING, G.L., MORTON, R.L., HOEVE, J., Univ. Alberta (Geology), Saskatchewan Res. Council (Mineral Res. Div.):
The isotope geology and nature of deposition of the Saskatchewan Proterozoic uranium deposits, 1978-.

Enough data on five deposits has been accumulated to present a reasonable picture of the time and nature of the "first stage" pitchblende deposition. The five deposits appear to have co-eval first-stage deposition with only minor variation in discordant U-Pb patterns. "Second stage" mineralization is characterized by complex isotope patterns for U-Pb, but fairly simple Pb-Pb systematics - indicating remobilization and relocation of U during this stage. The "third stage" ores have not yet been investigated since they present special problems of sampling and identification.

263. BAADSGAARD, H., LAMBERT, R.St.J., BANKS, C., Univ. Alberta (Geology):
Geochronologic and tectonic study of a weakly metamorphosed Archean inlier in the central Hudsonian orogenic belt, 1974-79; M. Sc thesis (Banks).

264. BAADSGAARD, H., LERBEKMO, J.F., EVANS, M., Univ. Alberta (Geology, Physics):
Magnetic reversals and stratigraphic - time-scale correlation in the Upper Cretaceous, 1977-.

An excellent set of bentonite samples has been collected within one meter of the Cretaceous-Tertiary boundary in the Hill Creek area of Northern Montana. This bentonite horizon will be dated by K-Ar, Rb-Sr and V-Pb to calibrate the boundary. At the same time, palynological correlation will be made to establish the floral hiatus in the section containing the bentonite. This work will complement work completed on the boundary section in the Red Deer Valley of Alberta.

265. BAADSGAARD, H., LONGSTAFFE, F.J., MCGREGOR, V., BRIDGWATER, D., COLLERSON, K., Univ. Alberta (Geology), Greenland Geol. Surv.:
Isotope geology of the polymetamorphic early Archean rocks of Western Greenland and Labrador, 1970-

See:
Further V-Pb dates on zircons from the early Precambrian rocks of Godthaabsfjord Area, west Greenland; Earth and Planetary Sci. Letters, vol. 33, p. 261-267, 1978.

Mineral isotopic age relationships in the polymetamorphic Amitsoq Gneisses, Godthaab District, west Greenland; Geochim. et Cosmochim. Acta, vol. 40, p. 513-527, 1978.

A three week field excursion (summer 1978) enabled the principal researcher to acquire sufficient samples to investigate the following subprojects: 1) K-Ar, Rb-Sr and V-Th-Pb correlative isotope systematics of the Isua Gneisses; 2) age and geochemistry of the unaltered Ameralite dykes at Isna, W. Greenland (primitive basaltic material); 3) Pb isotope variations in the widespread pegmatite dykes of the Qôrqut granite; 4) U-Pb on zircons and Pb-Pb on matrix of ancient crustal boulders from the Isna supracrustals; and 5) detailed U-Pb and Rb-Sr isotope study on the minerals and whole rocks of the intermediate Nuk gneiss sequence in western Greenland samples from "type section".

266. BACHINSKI, S.W., FOLAND, K.A., Univ. New Brunswick (Geology):
K-Ar dating of shallow alkaline intrusions of New Brunswick (lamprophyres and gabbro), 1978-80.

Lamprophyres and an alkaline gabbro sill spatially associated with Lower Devonian volcanic rocks of the Dalhousie area, northern New Brunswick, have been assumed to be of Devonian age. K-Ar dating of these intrusions should establish if they are Devonian or are younger and perhaps associated with major espisodes of alkaline magmatism in northeastern North America.

267. BEAKHOUSE, G., McMaster Univ. (Geology):
Rb/Sr geochronology and geochemistry of plutonic and gneissic phases, Southern English River gneiss belt, Northwestern Ontario, 1977-80.

Over 200 samples have been collected from plutonic and gneissic phases in the Southern English River gneiss belt. Major and trace element chemistry have been completed for most of these. Isotopic analyses are underway, but no age data are available yet.

268. BELL, K., Carleton Univ. (Geology), Saskatchewan Geol. Surv.:
Saskatchewan shield geochronology, 1978-.

See:
Sask. Geol. Surv., Summ. Investig., Misc. Rept. 79-10, p. 43,44, 1978.

To date selected Precambrian igneous and high-grade metamorphic rocks using the Rb/Sr isochron method, and to use the initial $^{87}Sr/^{86}Sr$ ratios to help unravel the history of the crustal sequences, including the degree of reworking during the late Precambrian. Sixty-five samples from seven suites were collected from across the Shield in the 1978 summer.

269. CORMIER, R.F., St. Francis Xavier Univ. (Geology):
Rb/Sr dating of granitic rocks of the northern Appalachians, 1970-.

Most of the granite bodies on mainland Nova Scotia have been sampled and will be dated. Detailed geochronologic work on the eastern end of the South Mountain batholith has been completed and is being written up for publication. Detailed chronology of the Plymouth (Wedgeport) pluton is completed and in preparation for publication. Several plutons in the Cobequid highlands have been dated; the same is true in the Antigonish highlands. More detailed dating of plutons on Cape Breton island has been started in conjunction with mapping by the Nova Scotia Department of Mines. Additional work is in progress on the eastern end of the St. George batholith of southern New Brunswick.

270. DREIMANIS, A., HUTT, G., RAUKAS, A., WHIPPEY, P.W., Univ. Western Ontario (Geology):
Thermoluminescence dating, 1977-78.

See:
Geoscience Canada, vol. 5, p. 55-60, 1978.

271. FLETCHER, I.R., FARQUHAR, R.M., Univ. Toronto (Physics):
Lead isotope variations in Zn-Pb sulphides from Grenville series and related rocks, 1972-; Ph.D. thesis (Fletcher).

See:
Lead isotope evidence for the existence and possible origin of some Mississippi Valley type deposits in southeastern Ontario; U. S. G. S. Open file Rep. 78-701, p. 117-119, 1978.

Improved mass spectrometer analysis techniques have enabled us to delineate Pb isotopic differences among volcanogenic, metamorphic-vein, and low temperature cavity-filling types of Zn-Pb mineralizations. The least radiogenic leads are of the volcanogenic stratiform class, metamorphic-vein leads have undergone some isotopic mixing which has resulted in a shift in isotopic ratios relative to the volcanogenic leads; low temperature cavity-filling leads show wide variations in isotopic abundances suggesting additions of relatively large amounts of radiogenic lead probably generated over a period of the order of 600-800 m.y. Isotopic variations in sulphides from the Balmat, New York, mining district have also been studied in detail. The data suggest a mixing process involving two end members each of which may be the product of single stage lead isotope evolution, but in significantly different U/Pb environments.

272. FRAREY, M.J., Geol. Surv. Can.:
Correlation and geochronological studies in the Canadian Shield, 1975-.

273. HEAMAN , L., McMaster Univ. (Geology):
Rb-Sr geochronology of the Loon Lake Pluton, Chandos Township, Ontario, 1978-79; M. Sc.thesis.

To date each mappable phase of the Loon Lake pluton; to determine the extent that possible country rock assimilation may have on the Rb/Sr systematics.

274. HUNTLEY, D.J., WINTLE, A.G., BERGER, G.W., Simon Fraser Univ. (Physics):
Thermoluminescence dating of ocean sediments, 1977-.

We have developed a new technique of thermoluminescence dating based on the use of a sunlamp for removing electrons from traps. Thermoluminescence dates so obtained on Antarctic core RC8-39 are in substantial agreement with those obtained from oxygen-isotope and Cyclodaphore davisiana variations.

275. KARROW, P.F., HUNTLEY, D.J., Univ. Waterloo (Earth Sciences), Simon Fraser Univ. (Physics):
Thermoluminescence of tills as a possible dating method in the Quaternary, 1977-80.

275. LONGSTAFFE, F.J., BIRK, D., Univ. Alberta (Geology):
Oxygen isotope geochemistry of small Archean granitoid plutons, 1978-79.

To determine the nature of the source materials that formed the small late to post-kinematic granitoid plutons that intrude granitoid-greenstone belts of the Archean Superior Province. Oxygen isotope analyses show that these small plutons have been derived from similar sources to those involved in the formation of batholoithic granitoids and granitoid gneisses of the Archean terranes. These source materials have not previously participated in a supracrustal weathering cycle.

276. MATHEWS, W.H., Univ. British Columbia (Geological Sciences):
Anomalous K-Ar dates from the Enderby Clifs and Trinity Hills areas, North Okanagan, British Columbia, 1973-79.

Laboratory work nearing completion; data analysis in progress, writing of report initiated.

277. MORRISON, G., GODWIN, C.I., Univ. British Columbia (Geological Sciences), Univ. Western Ontario (Geology):
Geochronometry of granitic rocks, Whitehorse Map-Area. Yukon Territory, 1977-79; Ph.D thesis (Morrison).

Regional map showing ages and types of granitic rock in the Whitehorse map-sheet has been compiled. Pending receipt of several K-Ar analyses, the work will be published.

278. OLDENBURG, D.W., Univ. British Columbia (Geophysics and Astronomy): Inversion of geophysical data, 1977-.

See:
Interpretation of direct current resistivity measurements; Geophysics, vol. 43, no. 3, p. 610-625, 1978.

An attempt is being made to investigate the different geophysical methods used to determine the electrical nature of the Earth's crust. Thus far, algorithms have been developed which invert directly magnetotelluric responses and the potential differences measured in direct current resistivity sounding. Geomagnetic depth sounding data and electromagnetic data from a horizontal loop current source are also being inverted to determine one-dimensional conductivity as a function of depth.

In a different vein, lead isotope ratios from common lead ores are being used to determine the mu-history of the earth. The growth curve is found by using standard inversion techniques, and an appraisal of the nonuniqueness in the problem should determine whether or not multi-stage models are required to explain the isotope ratios in these ores.

279. SCHWARCZ, H.P., FORD, D.C., GASCOYNE, M.A., YONGE, C.E., BLACKWELL, B., MUREIKA, M., McMaster Univ. (Geology; Geography): U-series dating, stable isotopic studies of calcite precipitates and their fluid inclusion, 1967-; Ph. D. theses (Gascoyne, Yonge), M.Sc. thesis (Blackwell).

See:
Uranium series dating and stable isotope studies of speleothems: Part 1: Theory and techniques; Trans. British Cave Research Assoc., vol. 5, no. 2, p. 91-111, 1978.

Late Pleistocene palaeoclimates of North America as inferred from stable isotope studies of speleothems; Quaternary Res.,vol. 9, p. 54-70, 1978.

Stable isotope geochemistry of speleothems and cave waters from the Flint Ridge - Mammoth Cave system, Kentucky; J. Geol., vol. 86, p. 373-384, 1978.

U Series dating of calcite speleothem continues and has been expanded to new geomorphic and archaeological sites in Britain, France, Yugoslavia and Israel. The method is now being applied to terrace travertines as well as to cave deposits. Evaluation of the suitability of molluscan deposits continues.
$^{18}O-^{16}O$ studies of speleothem calcites from Vancouver Island, the U.S.A., Britain and Jamaica are in progress. $^{18}O-^{16}O$ and D/H ratios in cave waters and fluid inclusions are being investigated intensively. Calcite-water partition coefficients of trace metals found in speleothem have been determined.