Areas of extensive glacial overburden...... Fault: defined, approximate, inferred..... Thrust fault: approximate, inferred, teeth indicate direction of dip..... Lineament: from aerial photograph..... General trend of gneissosity: from aerial photograph and outcrop observation....... Gneissosity: inclined, vertical, horizontal, dip unknown..... Bedding, tops unknown: inclined, vertical...... Bedding, tops known: inclined, vertical...... Generalized trend of bedding: from aerial photograph... Lineation: horizontal, inclined, vertical..... Antiform; anticline, showing plunge direction..... Synform; syncline, showing plunge direction..... Schistosity: horizontal, inclined, vertical, dip unknown (including mylonitic fabrics in shear and fault zones)...... Second generation schistosity or crenulation cleavage where more Plunge of small fold; sense of symmetry when viewed along plunge direction........... A 6mn/ Form of folded bedding on flat outcrop surface..... Zone of ultramylonite ± pseudotachylite.... Overturned antiform, synform...... Overturned anticline, syncline..... Mineralization: e = magnetite iron formation Cu = chalopyrite veins, malachite stain Extra Symbols Agmatite structure in gneiss......

Amphibolite facies mineralogy, with either field or microscopic indications of having been at granulite grade..... Amphibolite facies, no indication of earlier granulite assemblage in thin section (refers both to Archean assemblages and Hudsonian overprint on Archean rocks)..... Nebulous or ghost banding in gneisses...... Nulliak inclusions (schematic designation in areas with numerous small rafts)

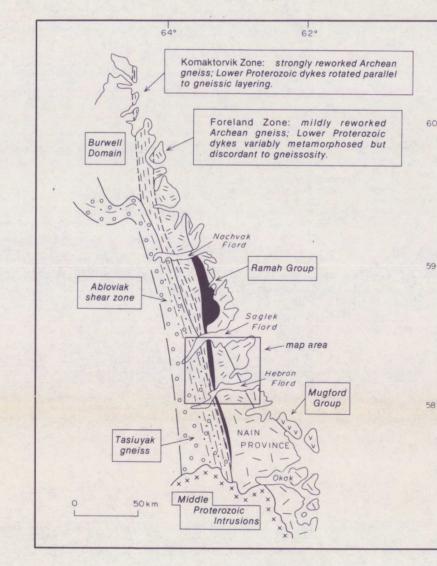
various paragneisses (C = metachert and Fe-formation)

Interpreted areas with high degree of uncertainty.....

of the retrogression of orthopyroxene or garnet.....

Granulite facies mineralogy well preserved.....

Blebby texture in gneisses and granites: blebs are an expression



Regional tectonic framework of northern Labrador in relation to area covered by map.

OPEN FILE DOSSIER PUBLIC 2466 GEOLOGICAL SURVEY OF CANAD COMMISSION GEOLOGIQUE DU CANA OTTAWA 1992

GNEISSES OF THE CHURCHILL PROVINCE (TORNGAT OROGEN)

9q grey to black quartzite

ARCHEAN AND EARLY PROTEROZOIC 10 Brown- to greenish grey weathering quartzofeldspathic granulite, locally garnetiferous 9 Tasiuyak gneiss: Garne ilferous diatexite and associated paragneiss, lesser mafic granulite;

predominant unit is a white- to brown-weathering, blastomylonitic garnet + biotite + quartz + feldspar gneiss containing thin layers rich in sillimanite and graphite that is characterized by mylonitic foliation and a well developed, subhorizontal, quarz lineation. 9g white-weathering garnetiferous granite, pink granite, and white-weathering pegmatite, locally 9p rusty, garnet-biotite-sillimanite gneiss

9m black-weathering, massive to layered, garnetiferous matic and ultramatic granulite 8 Brown- to buff- to grey-weathering, well-layered, granulite-facies, quartzofeldspathic gneiss; foliation s typically mylonitic and has an associated lineation; garnet is locally present; mafic granulite layers and disrupted, podiform ultramafic and mafic granulite units are a minor component of this Mylonitic gneisses derived from Archean gneiss by structural and metamorphic modification during

the Early Proterozoic. Subdivisions shown are as follows: 7m grey- to greenish-grey weathering, biotite + epidote ± muscovite-bearing quartzofeldspathic gneiss 7a black- to dark green-weathering amphibolite, locally contains relicts of orthopyroxene

7g white-weathering massive to foliated granite SEDIMENTARY AND IGNEOUS ROCKS OF THE NAIN PROVINCE AND ITS REACTIVATED MARGIN

7p porphyritic, grey, hornblende tonalite; probably equivalent to 4p

Ramah Group: quartzite, graphitic slate and siltstone, dolomitic sandstone, minor conglomerate Archean Nain Province greisses and granite. Subdivisions shown are as follows: 6q,6p undivided white to brown, locally dolomitic, cross-bedded, quartzite, with interbedded slate-mica schis, siltstone, pebble conglomerate and dolostone-tremolite marble.

characteristics. The largest pelite-mica schist units are shown as 6p kyanite-, garnet-, staurolite- and sillimanite-bearing mica schists derived from graphitic slate and siltstone; minor quartzite

5d Domes dykes: diabase dykes of at least two generations, mildly altered in eastern part in dykes in western one-third of Nain Province 5π schistose amphibolite dykes (metadiabase, metagabbro, diorite), commonly confined to

5 Mafic dykes of variable character, probably representing several discrete periods of mafic

5β breccia dykes; brown-weathering dykes containing numerous gneissic and diabasic 5α orthopyroxene-bearing dykes

GNEISSES AND ASSOCIATED INTRUSIVE ROCKS OF THE NAIN PROVINCE

4 Granitoid rocks of several generations, in part including intrusions equivalent in age to the show at map-scale. Age lange of these rocks is ca. 3240-2500 Ma. The following subdivisions 4g aplitic to pegmatitic, grey to white tonalitic to granitic rocks; may have a weak foliation,

4c porphyritic charnockite to gabbronorite 4o orthopyroxene- and/or garnet-bearing granitoid rocks, possibly late-kinematic with respect to granulite facies metamorphism in units 2i, 2k 4a leucocratic augen gneiss (may be equivalent to Uivak II gneiss (2m))

41 Lister gneiss: polyphase granitoid sheet to be largely younger than the Uivak gneisses and Saglek dykes, not easily distinguished from of which may be pre-Saglek dyke in age. The following subdivisions are shown:

4p grey hornblende tonalite and foliated porphyritic (augen) granite

grey- and green-weathering (fuchsite-bearing), diffusely banded quartzite; locally garnet- and sillimanite-bearing My grey- to dark brown-weathering, massive to nodular marble and calc-silicate rocks 3m dark green- to black-weathering, massive to well-banded, locally garnetiferous, amphibolite

a layer-parallel to slightly discordant network of garnetiferous leucogranite veins and dykes

3u black, brown, and yellow-orange weathering ultramafic rocks, including variably 2 Quartzofeldspathic gneisses of variable character, ranging from diffusely layered, weakly migmatized rocks to lit-par-lit migmatite with over 50 percent neosomal component of several generations. These rocks include the 3800 – 3300 Ma Uivak gneisses and their younger derivitives, and also gneisses that cannot be confidently correlated with the Uivak gneisses. The following

grey, pink and brown, layered tonalitic to granodioritic gneiss and migmatite (Uivak I gneiss) Saglek mafic dykes, but more commonly the dykes form subparallel mafic layers and lenses due to Late Archean deformation and metamorphism

2m grey to dark grey-çreen, foliated, megacrystic granodiorite, granodioritic augen gneisses and derived migmatite (Uivak II gneiss) contains rafts of Nulliak assemblages and Uivak gneiss, and is intruded by Saglek dykes. Like the Uivak I gneiss, the Uivak II was also migmatized and deformed by late Archean events, and throughout most of the area the Saglek dykes now form basic layers within a migmatite 2g a layered metagabbro that may be related to 2m plutonism 2k well-layered and migmatitic to nebulitic granulite-facies gneiss (Klyuktok gneiss) common

ivak gneisses during ca. 2800 – 2700 Ma granulite-facies metamorphism. Abundant sheets 2i well layered and migmatitic to nebulitic gneiss (Iterungnek gneiss) derived mainly by Ma; abundant sheets of syn- to late-metamorphic granite. Zones of gneiss having Uivak

Nulliak assemblage: a diverse group of metasedimentary and metaigneous rocks, in excess of

3800 Ma, and intruded by the plutonic precursors of the Uivak gneisses and by amphibolite-mafic granulite derived from the Saglek dykes. These rocks are areally distributed as abundant inclusions cherent belts that are generally in tectonic contact with the enclosing rocks. The following 1c grey to white weathering, banded, clinopyroxene-bearing metachert

1i massive to well-banded, magnetite iron formation, usually associated with 1c, but also 1s. grey to rusty-brown, biotite + sillimanite-rich paragneiss 1q grey, massive to diffusely banded, quartzite and biotite + garnet quartzofeldspathic gneiss

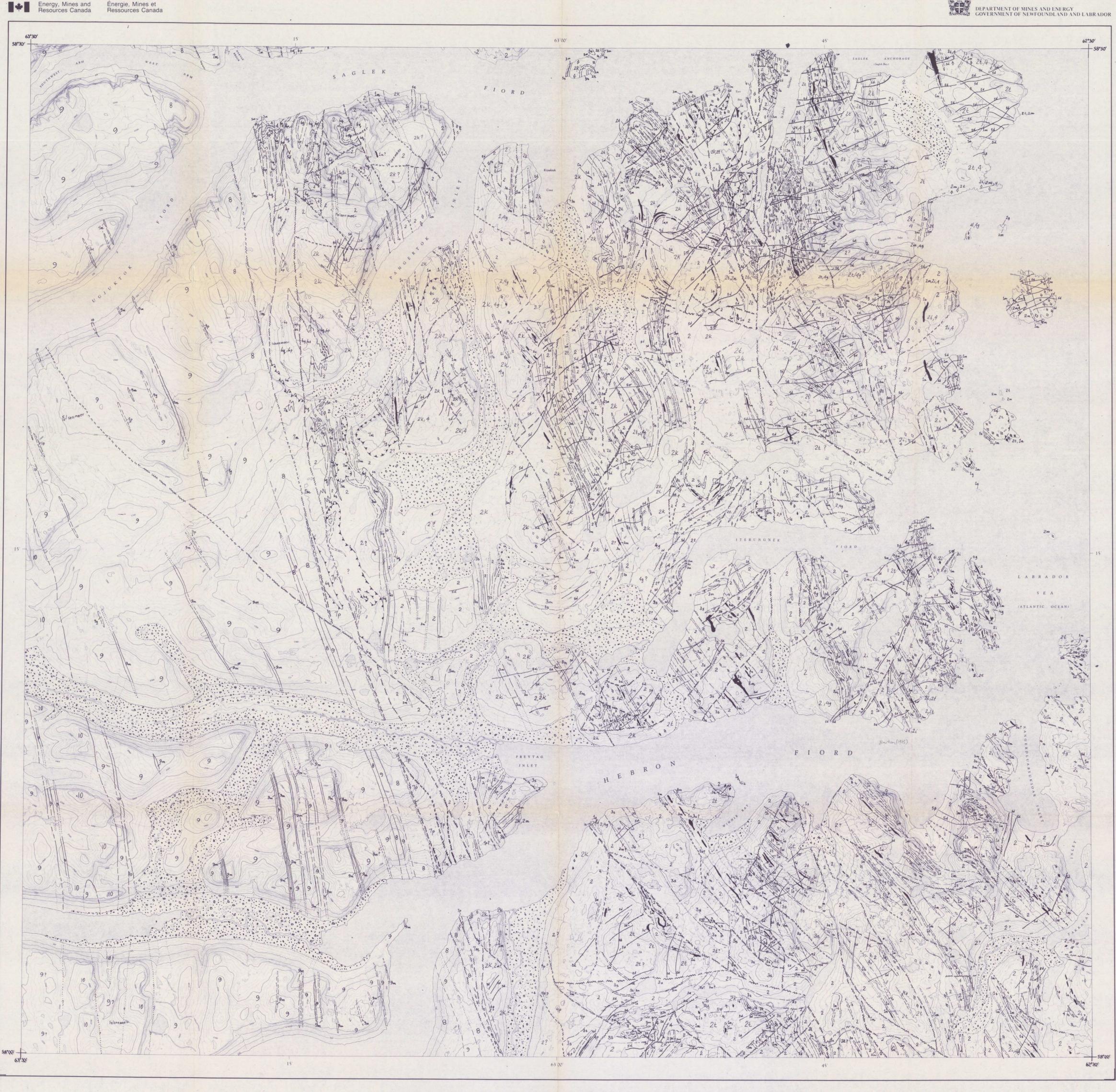
1m,1u massive to finely banded mafic (1m) and ultramafic (1u, black) rocks of both intrusive and 1q grey-green-weathering, clinopyroxene + biotite-bearing quartzofeldspathic gneiss

1a metagabbro and meta-anorthosite (small inclusions only)

MAP 92-18

This map is a joint release of the Geological Survey Branch (Newfoundland Department of Mines and Energy, St. John's) and the Geological Survey of Canada (Energy, Mines and Resources Canada, Ottawa). The release comprises showing the structural symbols, metamorphic symbols, fault names and additional geographic names. Copies of this map may be obtained from Publications and Information, Geological Survey Branch, P.O. Box 8700, St. John's, Newfoundland, A1B 4J6.

> Contribution to Canada-Newfoundland Mineral Development Agreement 1984-1989, a subsidiary agreement under the Economic and Regional Development Agreement. Project funded by the Geological Survey of



GEOLOGY OF THE SAGLEK FIORD - HEBRON FIORD AREA, LABRADOR (NTS 14L/2,3,6,7)

SCALE 1:100,000 ÉCHELLE

Miles 1 0 1 2 3 4 5 Milles

Kilometres 1 0 1 2 3 4 5 6 Kilomètres

EXPLANATORY NOTES

(italicized numbers in parentheses refer to references listed in 'Suggested Reading') The area is accessible by boat, helicopter of fixed-wing aircraft. The nearest community is Nain, 230 km to the south. A military radar site having a paved airstrip is situated at Saglek Bay. The community base for Inuit fishermen from Nain. The Saglek - Hebron map area lies north of the tree line, and its icescoured coastline offers superb rock exposures. The southern extent of the Alpine topography of the Torngat Mountains can be admired along Saglek Fiord, where fiord walls tower over 1300 m above sea level. Overall, the topography of the map area is characterized by rounded hills and broad valleys, except volatile-charged intrusions; their age is unknown. for steep valley walls along the rivers west of Hebron Fiord.

during development of the Torngat Orogen, a 100-km-wide tectonometamorphic zone resulting from oblique convergence of the Archean Nain and Rae provinces ca. 1860 to 1800 Ma (1). The effect of this Early zoic tectonism on the Nain Province can be evaluated from its imprint on the ca. 2400 to 220 Ma Domes mafic dyke swarm and on the folded Early Proterozoic Ramah Group supracrustal rocks, which originally rested unconformably upon the western margin of the Nain Province in this area.

NAIN PROVINCE GNEISSES AND GRANITES

The Archean rocks of Nain Province constitute the partially reactivated foreland of the Torngat Oroge but, except for a structural overprint along its western margin near the Ramah Group, the Nain Province has not been severely reworked during Early Proterozoic thermotectonism. The Nain Province comprise predominantly quartzofeldspathic gneisses derived from intrusive protoliths, interlayered with subordinate s of supracrustal rocks derived from sedimentary and volcanic successions (2,3,4,5). Radiometric ages indicate an accretionary history ranging from > 3800 to 2500 Ma. The northern part of the Archean block can be conveniently divided across the Handy Fault into a largely amphibolite-facies terrane in the east, and a largely granulite-facies terrane in the west. Major lithological units can be correlated on both sides of the fault and the two terranes are interpreted to represent different structural levels of the same crustal components (2). As a result of the scissor-like movement on the Handy Fault, metamorphic grade on the eastern side increases to granulite facies southward from Tigigakyuk Inlet.

The earliest gneissic components are small (1 to 10 m² in area) rafts and belts (10 by 0.5 km) of Early Archean basic and ultrabasic intrusive and extrusive rocks, magnetite iron formation, calc-silicate rock and pelitic gneiss, known collectively as the Nulliak assemblage (Unit 1). The Nulliak assemblage is clearly older (> 3800 Ma) than the regional grey gneisses, forming an areally but unevenly dispersed group of rocks that can be recognized as pre-migmatitic rafts within the grey gneiss (6). The largest belts appear to be bounded by tectonic contacts resulting from structural modification of original intrusive contacts during the Middle and Late Archean. The Nulliak assemblage is also intruded by a swarm of metabasic lykes, the Saglek dykes, and is broken and veined by granitoid rocks that accompanied Middle and Late

formation, and clastic sedimentary rocks such as siltstones and shales. These are now represented by quartz + hedenbergite + magnetite rocks and quartz + feldspar + biotite + garnet + sillimanite nlet, where a grey- to white-weathering, layered ("to 50 cm) magnetite ironstone and a metachert sequence 1c) is preserved (4). Associated with it are lesser amounts of forsterite marble and basic gneiss. Shales ordierite gneisses (1s), such as those that are associated with cherty iron formation in a disrupted belt outh of St. John's Harbour, and those that occur with mafic granulite in a recumbent structure west white quartzite south of Hebron Flord, one of which has retained a regolith along its contact with basement of the property of the propert of Kangerdluarsuksoak Inlet. Other paragneisses that appear to be derived from clastic sediments include feldspathic quartzite and grey, well-banded biotite + garnet (1q) gneisses south of Hebron Fiord. A TRITIC gnelss (1g) at the southern end of Ukkalek Island may, be derived from CHURCHILL PROVINCE (TORNGAT OROGEN) GNEISSES

and south sides of Pangertok Inlet, as units outlining a domal structure southeast of Kiyuktok Cove, along the coast between the Hare Islands and Cape Nuvotannak, southwest of Winnie Bay, and west of Takkatat nlet. The basic rocks range from dark-green- to black-weathering, massive, salt-and-pepper and porphyritic textured metagabbroic rocks, to fine-grained mafic and ultramafic rocks of probable volcanic flow (basal komatiite) derivation, to finely laminated rocks that may be metamorphosed volcaniclastic sediments. mantle (7). Leucogabbro and anorthosite (1a) derived from leucocratic, layered intrusions occur only as rafts within younger gneisses; no large belts of these compositions are known.

than the Nulliak assemblage. These felsic rocks are all considered to be part of the 3800 to 3300 Ma Divak gneisses and their reworked equivalents (4,5), although recent work by K.D. Collerson (personal emplaced prior to 3300 Ma; subsequently, the Uiyak gneisses were profoundly tectonized under amphibolite- and granulite-facies conditions ca. 2800 to 2700 Ma (9). The Uivak gneisses have been divided to 2700 Ma (9). into two types: Ulvak I, even-grained tonalitic and granodioritic rocks (2t) emplaced ca. 3800 to 3700 Ma and migmatized ca. 3600 Ma (6,10), and Ulvak II, megacrystic, Fe-rich granodioritic rocks (2m) emplaced into migmatized Ulvak I ca. 3350 Ma (6,10). A layered gabbroic body (2g) exposed on the north shore of Mentzel Island may be a more basic member of Uivak II plutonism. A suite of aphyric to plagioclase - porphyritic basic to ultrabasic dykes, now preserved largely as pods and lenses in the Uiva gneisses, was intruded prior to a major deformational and migmatizing event ca. 2800 to 2700 Ma. These ntrusions are known as the Saglek dykes (2,6), and are the most reliable criteria for demarcating the Ear Archean gneisses in the map area. Only in areas that have escaped subsequent intense tectonism have discordant relations between the Saglek dykes and older rocks been preserved. One such area is on the nainland opposite Nulliak Island, where Uivak II foliated to gneissose megacrystic granodiorite contain nts of already migmatized Uivak I gneiss is intruded by several amphibolitized Saglek dykes. The characteristics of Uivak I, Uivak II and the Saglek dykes are seldom preserved. The felsic metapluton oudinaged and foliation-parallel mafic layers within them. Characteristics that can sometimes be used microcline megacrysts and the generally darker colour of the Ulvak II gneisses due to their higher content of ferromagnesian minerals. Ulvak II migmatites are particularly well displayed on the coastal strip and islands between White Point and Kingmirtok Island.

The 2800 to 2700 Ma tectonothermal event (9) modified the Uivak gneisses to form two types of nesoscopically different gneisses, which in both cases, have transitional contacts with the parent. In iggered by dehydration deeper in the crust, produced a series of migmatitic rocks west of the Hand , collectively known as Kiyuktok gneisses (2k) after the locality (Kiyuktok Cove) where they are wel exhibit irregular outlines having blurred and transitional contacts against their hosts, implying little migration from their source. Extremes of mobility within Kiyuktok gneisses have led to large areas of agmatite in which pre-2700 Ma supracrustals occur as rafts in a homogeneous orthopyroxene-bearing granitoid host. The gneisses are also diluted by many syn- to late-metamorphic sheets of orthopyrobearing granite. Retrogression of the garnet and orthopyroxene porphyroblasts lends a diagnostic bi texture to the Kiyuktok gneiss. East of the Handy Fault, granulite-facies gneisses of th Tigigakyuk – Hebron area show more of a dynamic reworking. The gneisses here are termed iterungne neisses (2i), and as a regional unit are migmatites that have been derived by ductile structural modification of an earlier migmatite (13). Small folds having an axial-planar foliation of orthopyroxene may be present, and Ulvak gneisses having an early migmatite layering in various stages of transposition are preserved in many places. In situ partial melting and the syn- to post-metamorphic injection of a granitoid component into gneisses of the Hebron area produced rocks that range from lit-par-lit migmatites to nebulites in which only a ghost-like biotite foliation is recognizable. In places, these veined rocks resemble the Kiyuktok gneisses. Iterungnek gneisses are well displayed at Jerusalem Harbour, Cape Nuvotannak, and on the

Granitoid rocks (Unit 4) of variable character and ranging in age from 3240 to 2500 Ma, severely dilute discordant dykes and veins from several centimetres to several metres in width, to polyphase these granitoid rocks are too small to show at 1:100 000 map-scale, but some are worthy of mention Among the smaller bodies are the ca. 2685 Ma grey to pink, massive to weakly foliated tonalitic an granodioritic dykes in the St. John's Harbour – <mark>M</mark>aidmonts Island area (*15*), and the ca. 2520 Ma Igukshuak Aplitic, medium-grained, and pegmatitic types are present in adjacent outcrops in some areas, without indications of relative ages. The ca. 3240 Ma Lister gneiss (4I), exposed on the island of that name, is migmatized by younger pegmatites (9). A schlieric granodiorite to granite sheet underlies the eastern half of Maidmonts Island; it contains many rafts of older basic gneisses and is intruded by younger grey granitoid sheets. Layer-parallel sheets and small discordant bodies south of St. John's Harbour are composed of fine- to medium-grained, pale-grey to pink granodiorite (4g). A white-weathering, weakly liated to massive, medium-grained to pegmatoidal, granitoid of unknown extent underlies the area south nargin and has many scattered screens of these gneisses, as well as amphibolite. K.D. Collerson (personal veathering augen gneiss (4a), derived from megacrystic granite that locally contains retrogressed thopyroxene, forms the core of an isoclinal structure south of Fire Cove. It may be equivalent to Uivak I gneiss, but is tentatively assigned a younger age because it lacks the dispersed Nulliak inclusions saglek dykes and it is a more leucocratic rock than typical Uivak II gneiss. White-weathering, leucocrati weakly foliated to massive granodiorite (4g) containing fragments of adjacent basic and ultrabasic rocks s present inland on Morhardt Point and east of Jerusalem Harbour. A deformed porphyritic charnocki o gabbronoritic rock (4c), discordant to layering in paragneiss, occupies part of a small fault block south n maximum dimension. A partly recrystallized rock, (4p) which is texturally similar to 4c but contains normblende instead of orthopyroxene and displays both plagioclase and K-feldspar phenocrysts, occurs n the southwest corner of Nain Province. This rock shows an Early Proterozoic metamorphic overpring of biotite, epidote and garnet and may be equivalent to the ca. 2780 Ma Ikarut gneiss (17). Unique to the granulite-facies terrane southward from Kiyuktok Cove are layer parallel intrusions of white-weatheri garnet + orthopyroxene - bearing granites (40) that appear to be broadly coeval with formation of the sheets that form extensive components within the Uivak gneisses of the Cape Uivak-Tigigakyuk Inlet

MAFIC DYKES

Sheet 1 of 2

Mafic dykes (Unit 5) of four different types are present. The Domes dykes (5d) are a swarm of generally east-northeast- to northeast-trending ca. 2400 to 2200 Ma diabase intrusions that vary from a few centimetres to tens of metres wide (18). They are especially conspicuous where they occur in the white-weathering amphibolite-facies rocks underlying the Domes west of the Saglek airstrip and on Maidmonts sland. Airphoto interpretations indicate that mafic dykes having other orientations intersect the generally east-northeast to northeast ones but, without absolute age data, these too are assigned to the Domes dyke swarm. Relative ages based on field relationships have not been established for all dykes but some orth-trending dykes are younger than the northeast-trending set. The Domes dykes are augite + imphibolitized to the west (18). The dykes appear to be rotated counterclockwise into a more norther

rend by sinistral shear west of Pangertok Inlet. Immediately adjacent to the Ramah Group they become

The map depicts the geology of the boundary between the Archean Nain Province and the eastern fringe of the Early Proterozoic Churchill Province, Here, the Churchill Province comprises rocks deformed during development of the Toronto Corners of the Tor

The Ramah Group (Unit 6) is a sequence of arenitic and pelitic sedimentary rocks and basic sills that unconformably overlies the Archean gneisses and mafic dykes (19). The depositional contact with peneplaned Archean basement is well-preserved north of Saglek Fiord. Binocular observations sugge

The Ramah Group along the south shore of the fiord is composed largely of interbedded white, gre and buff quartzite, brown dolostone, and interbedded black to grey pelite belonging to the Rowsell Harbo and Reddick Bight formations (6q). Two diabase sills (6g) outcrop within the sequence at the high stratigraphic levels exposed. The quartzites are well-bedded to massive rocks, preserving primary here. black slate and biotite + muscovite schists containing chloratoid, kyanite and staurolite. Brown dolosto interbedded with quartzite in the east, is converted to a pale-green tremolite marble in the west as a res by steep reverse faults on its western edge, but a sheared and folded contact with basement is expose on the plateau just south of Saglek Fiord. In this area, steeply dipping gneissic foliation is drawn int the mylonitized contact is folded by eastward-overturned open folds. Southward from Saglek Flord, Ramah Group narrows markedly in outcrop width, is entirely bounded by tectonic junctions, and is increasingly tightly folded and metamorphosed (4,5). Approximately 15 km south of the fiord it bifurcat into narrow belts, generally less than 1 km in width. Just north of the bifurcation, an extensive area plack, muscovite + biotite ± garnet schist (6s) may be an expression of the Nullataktok Formatio he quartzite sequence to the east of the schists is tectonically thinned, and the eastern contact is folded décollement surface. The southernmost narrow belts of the Ramah Group in the Pangertok II ocks possibly belonging to the Rowsell Harbour Formation. Bedding has been largely obliterated sedimentary structures and an alternating pelite - quartzite compositional layering that represents orig bedding. All contacts are tectonic; on both margins of the belts, recognizable Ramah Group is separate from basement gneisses by a 1- to 15-m-wide zone of tectonic schist, phyllonite, and mylonite derive both from cover and basement (18). The present configuration of the belts is due to later folding of the Ramah Group and its décollement. Discordances between basement and Ramah Group are interprete

Sediments of the Nulliak assemblage included both chemical precipitates, such as cherty iron

Mafic and ultramafic rocks (1m, 1u) assigned to the Nulliak assemblage are prominent on the north

(i) mylonitically refoliated Archean gneisses, (ii) two-pyroxene quartzofeldspathic granulite, (iii) Tasiuyak lows. Dunitic and peridotitic rocks isolated from, but adjacent to, Nulliak basic gneisses, probably during younger interleaving of gneisses and supracrustals. Some bodies of the latter type retain

Upernavik supracrustals (Unit 3), as originally defined (2,3), are an assemblage of predominantly ca. 2800 to 2700 Ma. The relationship between the Upernavik supracrustals and Uivak gneisses is where diagnostic criteria of the Nulliak assemblage are absent, the rocks have been assigned to the Upernavik supracrustals. The type-area for Upernavik supracrustals is Upernavik Island in Saglek Fiord; he largest belts interpreted to be Upernavik supracrustals occur south of Hebron Fiord. Rocks of the pernavik supracrustals include garnet + sillimanite + biotite pelitic and semipelitic gneisses (3s), grey ymbol), and mafic and ultramafic rocks (3m, 3u) that locally retain porphyritic textures and are interpreted be of volcanic and plutonic origin. The garnet + biotite-rich paragneisses (3s) are conspicuous by the brown-weathering. They commonly have a white-weathering, garnetiferous leucogranite as a foliation parallel feature. Basic gneisses (3m) of the Upernavik supracrustals are not mesoscopically distinct from those of the Nulliak assemblage, being massive to well-layered amphibolite and mafic granulite. Ultramafi such as dunites, harzburgite, pyroxenite and lherzolite. Some supracrustal belts traditionally assigned to the Upernavik supracrustals have recently been found to be cut by metamorphosed dykes that resemble he Saglek dykes (14), implying a correlation with Nulliak assemblage. In addition, zircon geochronol ndicates that the Upernavik supracrustals comprise rocks of more than one depositional age (14). The problems posed by these discoveries highlight the complexities of polylithologic gneiss terranes.

collision between Nain and Rae provinces (1).

oliated amphibolites parallel to layering in the mylonitized gneiss at the basement-cover interface. Rare schistose amphibolite dykes (5π) are present locally across the whole area. These occur in areas are an earlier set. Some of these dykes are confined to mylonite along shear zones, or are themselves Several dykes (5β) in the Jerusalem Harbour-Hebron Fiord area and one just north of White Point

at it may also be present in the inaccessible faces and felsenmeer strewn mountain tops immediately

of the cover sequence that have juxtaposed varying stratigraphic levels of the cover against the baseme The only vestiges of Ramah Group south of the Freytag Inlet Fault are two narrow subvertical slivers

Immediately adjacent to Ramah Group is a fault-bounded strip of mylonitically foliated amphibolite cies rocks (Unit 7) derived from Archean gneisses of the Nain Province and from a younger dark-grey tonalite. The quartzofeldspathic gneisses (7m) are all grey- to green-weathering rocks characterized biotite + epidote ± muscovite fabrics; relict orthopyroxene is preserved in some basic gneisses (7 a remnant of their once higher grade assemblage. The grey tonalite (7p) shows no indication of h been strongly metamorphosed prior to the mylonitic overprint since primary dark-green hornblende vell preserved. It may be equivalent to Unit 4p. As in the gneisses, a biotite + epidote fabric denotes transformed into a spectacular black ultramylonite that marks the Ugjuktok Fiord fault. Gently dipp gneisses (7m), which have mylonitic biotite + epidote ± muscovite fabrics that occur astride and east reworked Archean rocks west of Ramah Group. The easternmost klippe has a white weathering, massive to mylonitically-foliated granite (7g) along its southern border.

Buff-weathering, granulite-facies charnockitic to gabbronoritic gneiss (Unit 8) forms a continuous that are probably derived from basic dykes and has textures reminiscent of the Kiyuktok gneisse: suggesting the protolith was Archean gneiss of the Nain Province (4,5). However, where it is not fault bounded, it has an interfingering contact with the Tasiuyak gneiss (garnetiferous diatexite) to the west. Tasiuyak gneiss also occurs as lenses within the granulite unit suggesting an original intrusive co The protolith for Unit 8, whether an Archean gneiss or younger plutonic rock, is therefore uncertain. Th granulite unit is split into two narrow units by a septum of diatexite in the Hebron Fiord area. The Tasiuyak gneiss (Unit 9), a garnetiferous diatexite, is a regionally monotonous white- to rus weathering garnet + biotite + quartz + feldspar rock (4,5). Mesoscopically, it is well layered and in ha specimen, has an apparent medium-grained granitoid texture. However, mineral subdomains ar plycrystalline and the rock, in fact, has a blastomylonitic microstructure. Locally, lenticular grey qua slightly oblique to the compositional layering. A pronounced mineral rodding lineation, plunging gen postdating the main tectonic fabric, are present. Intrafolial folds of an earlier gneissosity can be recognienticular grey quartz forms the axial plane fabric in these folds. Tasiuyak gneiss locally has t

> rusty layers in which graphite + biotite + garnet + sillimanite form a restite assemblage. Narrow belts of pelitic gneiss (9p) and grey quartzite (9q) are separately distinguished on the map from the more typical Tasiuyak gneiss. Garnetiferous leucocratic granitic pegmatite and pink foliated granite (9g) form cornblende + spinel-bearing olivine websterites (9m) that have a marked continuity along strike. Thes rocks are characterized by dark-red garnets disposed either within discrete layers or as irregular polycrystalline clots scattered through the rock. gneiss forms a discrete unit (Unit 10) within Tasiuyak gneiss along the west margin of the map area (5). Although it superficially resembles the eastern felsic granulite unit (Unit 8), it differs from it in being less

interdigitating (modified intrusive ?) contact with the Tasiuyak gneiss, adjacent to which it is locally

Metamorphic assemblages of the map area reflect the influence of both Archean and Proterozoi events (18). The gneisses of the Nain Province exhibit the imprint of Late Archean (2800 – 2700 Ma) granulite hich experienced only amphibolite-facies conditions (2,14). Subsequent zonal retrogression, proba as a result, orthopyroxene in quartzofeldspathic gneisses was transformed to orthoamphibole, giving ri to gneisses having a distinctive green, blebby texture. Following intrusion of the Domes dykes and deposition of the Ramah Group, the area was variably affected by tectonometamorphic processes that ccompanied formation of the Early Proterozoic Torngat Orogen (1). The imprint of this thermotectoni is evident in the change in the metamorphic and structural stability of the dykes and the cover (18). The the westward extent of igneous clinopyroxene in the dykes. West of this line, pyroxene is replaced actinolitic amphibole, plagioclase is partly recrystallized, and metamorphic biotite is present. On the south development of actinolite and epidote in all dykes examined east of Winnie Bay. Within the pseudomorphs contribute to the blebby texture of rocks in the central and eastern parts of the Nai Province. In the west, the orthoamphibole + biotite assemblage of the blebs is replaced by an assemblage adjacent to the Ramah Group, the Archean quartzofeldspathic gneisses have been refoliated by Earl oterozoic basement-cover translation, and have a mylonitic ribbon-like foliation of biotite + muscov Chloritoid, chlorite, kyanite and staurolite are common in the north, whereas garnet and fibrolitic sillimani are characteristic of the pelites in the southern belts, indicating the attainment of higher temperature

West of the Ramah Group, mylonitically foliated amphibolite-facies gneisses represent original rchean granulite-facies rocks overprinted by Early Proterozoic metamorphism. West of these, all rocks contain Early Proterozoic granulite-facies assemblages.

There is an obvious map-scale structural contrast between the Nain and Churchill provinces. The Nain is typified by alternating orthogneiss and supracrustal gneiss units having a general north-northwest grain, displaying refolded folds and dome-and-basin type interference patterns. Layering and fold axial planes are commonly steep, the most obvious exceptions being a compositionally layered mafic gneist (metagabbro) and metasedimentary gneiss sequence that forms a recumbent structure west of Kangerdluarsuksoak Inlet, and the shallowly dipping gneisses that underlie Cape Uivak. The Churchil Province on the other hand, lacks this folded and closely alternating polylithological pattern, but, instead, is typified by broad gneiss belts having a steeply dipping north-northwest trend in which the intensity of Hudsonian deformation has destroyed or effectively masked any fold closures. A few fold closures in the southwestern part of the map-area have been interpreted from airphoto study, but they have not been verified by ground examination. A very prominent feature of the Churchill Province gneisses is a chiefly defined by grey quartz, graphite smears, and minute rutile needles (4). Aluminous paragneisses have sillimanite as a lineation-forming mineral, and in the basic and quartzofeldspathic granulites elongate orthopyroxene produces the lineation. This lineation and associated mylonitic fabric define the Ablo shear zone, a ductile, sinistral, transcurrent fault of crustal scale generated by Early Proterozoic oblique

The Ramah Group, on the western margin of Nain Province, is the best indicator of the effects of relationship between basement and cover has been largely obliterated by early translation along the nterface between the Nain gneisses and Ramah Group. The result of this tectonic sliding is a mylonite one, marking the transition from recognizable supracrustals on one side to recognizable basement or the other. Internally, the Ramah Group shows the effects of at least three periods of deformation. Pri bedding and a bedding-parallel foliation, probably the result of thrust nappe formation, have been reoriented by upright to easterly and westerly overturned, moderately doubly plunging F₂ folds having a general nort outh orientation. These folds and the regional foliation are in turn crenulated by small-scale chevro structures with generally east-trending axes. The regional muscovite + biotite schistosity is particular that produced the present outcrop distribution of the Ramah Group may have been generated during development of the Abloviak shear zone; however, fold axes in the Ramah Group are consistently more mylonitically refoliated gneisses having a biotite + epidote + muscovite fabric appear to sit astride folder Ramah Group and more steeply dipping gneisses. This discordance is interpreted to be the result of post-F Faults are a prominent feature of the map area. Some of the faults south of St. John's Harbour truncate the Domes dykes yet other faults are cut by the dykes, indicating the existence of more than one age

of faulting and/or dyke intrusion. One of the most significant faults is the Handy fault (2), a major subvertic structure having scissor-like movement extending north-south through St. John's Harbour and separatir different crustal levels of the Nain Province. It is characterized by a rusty fault gouge and lo pseudotachylite veining. The Ugjuktok Fiord fault is a similar structural break that juxtaposes granulite-facies gneisses of uncertain origin within Torngat Orogen against retrogressed (amphibolite facies) gneisses and foliated tonalite of Nain Province parentage. Pseudotachylite veining is common in the area of the Ugjuktok Fiord Fault, and the southern expression of the fault is a spectacular, generally west dipping, black, pseudotachylite ultramylonite having a down-dip lineation. The Ugjuktok Fiord fault and ther faults in this area appear to be late features in the evolution of Torngat Orogen. This is based or the map pattern south of Pangertok Inlet, interpreted to indicate that the Pinguksoak Fault, which is subparallel to and probably coeval with the Ugjuktok Fiord fault, disrupts second-generation folds in Ramah be a thrust sheet that structurally straddles these folds. Shallow- to moderate-dipping layering and man scale discordancies imply two klippen of similar mylonitic rocks occur east of Ramah Group in this area.

There are a few shallow-dipping faults in the map area that are of unknown age and significance. St. John's Harbour, on Nulliak Island, on the south shore of Pangertok Inlet, and on the north shore **ECONOMIC GEOLOGY**

indicating potential for gold mineralization.

The Archean iron formation that occurs in several belts of Nulliak supracrustals in the Pangertok Inlet area is the largest concentration of mineralization of economic interest, but it is not present in commercially exploitable quantities (20). Sulphide mineralization in the area is present as disseminated o other minerals of economic interest are known from the supracrustals, but by analogy with similar nean rocks in western Greenland (21), some of these gneisses have potential for scheelite min nomalous gold values have been detected in stream sediments adjacent to some paragneisses (22

Cove is the only indication of sulphides in the dykes. The Ramah Group is apparently devoid of mineralization, the exception being a zone of rusty pyrite mineralization below the easternmost sill on the south shore of Saglek Fiord. ignificant concentrations of graphite are present within Tasiuyak gneiss west of the map area (23). mall nodules of graphite in restite layers occur sporadically along the south shore of Ugjoktok Fiore but none are of economic interest. A grey quartzite lens in Tasiuyak gneiss near the mouth of Ugjuktok Fiord contains disseminated pyrrhotite. Garnet-rich sands from erosion of Tasiuyak gneiss characterize

some of the shoreline areas of Ugjuktok Fiord. Suggested Reading

Details on specific aspects of the geology of the map area can be found in the following: Wardle, R.J., Ryan, B. and Ermanovics, I., 1990, Geoscience Canada, 17, 217-222.

Bridgwater, D., Collerson, K.D., Hurst, R.W. and Jesseau, C.W., 1975, Geological Survey of Canada, Paper 75-1, 287-296. Bridgwater, D., Collerson, K.D. and Myers, J.S., 1978, in *Evolution of the Earth's Crust* (ed. Tarling, D.H.) 19-69 (Academic Press).

5. Ryan, B., Martineau, Y., Korstgard, J. and Lee, D., 1984, Geological Survey of Canada, Paper 84-1,

Collerson, K.D. and Bridgwater, D., 1979, in *Trondhjemites, Dacites and Related Rocks* (ed. Barker, F.), 205-273 (Elsevier, Amsterdam). Collerson, K.D., Campbell, L.M., Weaver, B.L. and Palacz, Z.A., 1991, Nature, 349, 209-214. 8. Bridgwater, D. and Collerson, K.D., 1976, Contributions to Mineralogy and Petrology, 54, 43-59.

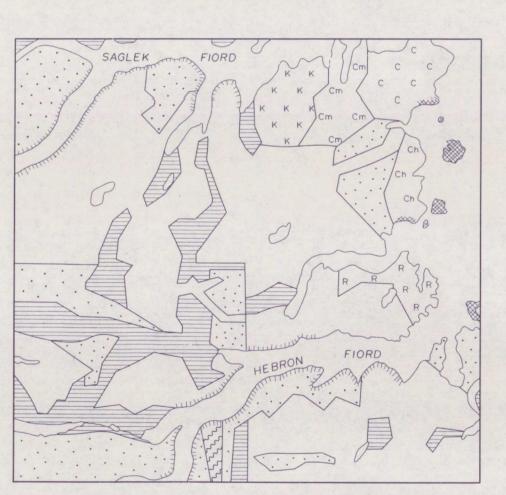
 Collerson, K.D., 1983, in Abstracts for Early Crustal Genesis Workshop (Ashwal, L.D. and Card, K.D., eds.) Lunar and Planetary Institute, Report 80-03, 28-33. 11. Kerr, A., 1980, M.Sc. thesis, Memorial University of Newfoundland, St. John's, 267 p.

12. Collerson, K.D., Kerr, A., Vocke, R.D. and Hanson, G.N., 1982, Geology, 10, 202-208. 13. Ryan, B., 1977, M.Sc. thesis, Memorial University of Newfoundland, St. John's, 230 p.

Schiøtte, L. and Bridgwater, D., 1990, in *Granulites and Crustal Evolution* (Vielzeuf, D. and Vidal, P., eds.), 157-169 (Kluwer Academic Publishers). Baadsgaard, H., Collerson, K.D. and Bridgwater, D., 1979, Canadian Journal of Earth Sciences, 16, 951-961

17. Collerson, K.D., Kerr, A. and Compston, W., 1981, Geological Society of Australia, Special Publication 18. Ryan, B., 1990, Geoscience Canada, 17, 276-279. 19. Knight, I. and Morgan, W.C., 1981, Geological Association of Canada, Special Paper 81-10, 313-330.

20. Schlobohm, S.F., 1958, Unpublished BRINEX report, 6 p. 21. Appel, P.W.U. and Garde, A.A., 1987, Grønlands Geologiske Undersøgelse, Bulletin 156, 26 p. 22. Geological Survey of Canada, 1987, Open File 1354. 23. Meyer, J.R. and Dean, P.L., 1988, Newfoundland Department of Mines, Report 88-1, 247-259.



Foot-traversed, with helicopter fill-in

Helicopter reconnaissance mapping Area worked in detail by D. Bridgwater, A. Nutman and L. Schiotte Modified after Collerson and Bridgwater (Ref 6)

Compiled from above with minor helicopter reconnaissance; additional data supplied by K.D. Modified after Kerr (Ref 11) Shoreline boat traverses

Not examined: areas with heavy glacial debris cover; areas compiled from other sources, air photo Foot traversed by M Van Kranendonk. 1989 Compiled by B. Ryan, 1983-84, 1989.

Based on mapping by B. Ryan and Y. Martineau, 1982-1983 under the Canada-Newfoundland Co-operative mineral program. 1982-1984. Project 820028. Additional mapping by D. Bridgwater, 1982-83 and J. Korstgard, 1983.

Compiled from Collerson and Bridgwater (1979) with additional data supplied by K.D. Collerson, 1985

Ryan, B. and Martineau, Y., 1992, Geology of the Saglek Fiord – Hebron Fiord area, Labrador (NTS 14L/2,3,6,7). Newfoundland Department of Mines and Energy, Geological Survey Branch, Open File Map 92-18 and Geological Survey of Canada, Open File 2466, 1:100 000 scale.

This map has been produced from a scanned version of the original map Reproduction par numérisation d'une carte sur papier