SYMBOLS

Areas of extensive glacial overburden
Geological boundary (defined, approximate, inferred, highly uncertain)
Fault (defined, approximate, inferred)
Thrust fault (approximate, inferred; teeth indicate direction of dip)
Lineament (from aerial photographs)
General trend of gneissosity or schistosity (from aerial photograph and outcrop observation)
Gneissosity (inclined, vertical, horizontal, dip unknown)
Bedding, tops unknown (inclined, vertical)
Bedding, tops known (inclined, vertical) 90
Generalized trend of bedding in Ramah Group (from aerial photograph)
Lineation (horizontal, inclined, vertical) 90
Antiform, synform (showing plunge direction)
Anticline, syncline, (showing plunge direction)
Overturned antiform, synform (showing plunge direction)
Overturned syncline (showing plunge direction)
Fracture cleavage f
Schistosity: horizontal, inclined, vertical, dip unknown (including mylonitic fabrics in shear and fault zones)
Second generation schistosity or crenulation cleavage where more than one fabric present
Plunge of small fold (sense of symmetry when viewed along plunge direction
Fold axial plane (inclined, vertical, dip unknown)
Form of folded bedding on flat outcrop surface (Ramah Group)
Zone of ultramylonite ± pseudotachylite
Agmatite structure in gneiss
Interpreted areas with high degree of uncertainty ?
Kyanite, sillimanite and staurolite localities in Ramah Group ✱ ky, sill, st
Pseudotachylite localities ● P
Blebby texture in gneisses and granites (blebs are an expression of the retrogression of orthopyroxene or garnet) B
Granulite facies minerals well preserved G
Granulite facies minerals preserved but with pervasive retrogression G_R
Amphibolite facies assemblage, having either field or microscopic indications of having been at granulite grade A/G
Amphibolite facies; no indication of earlier granulite assemblage in thin section (refers both to Archean assemblages and Hudsonian overprint on Archean rocks) A
Nebulous or ghost banding in gneisses N

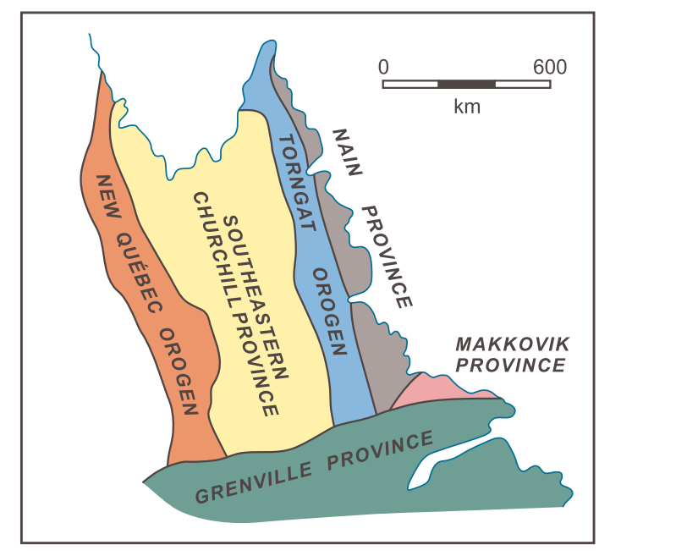
Inclusions within quartzofeldspathic gneisses and granitoids (Schematic designation in areas having numerous small rafts):

- *mafic gneiss*
- *gabbro-anorthosite*
- *ultramafic rocks*
- *various paragneisses (C = metachert and Fe-formation)*

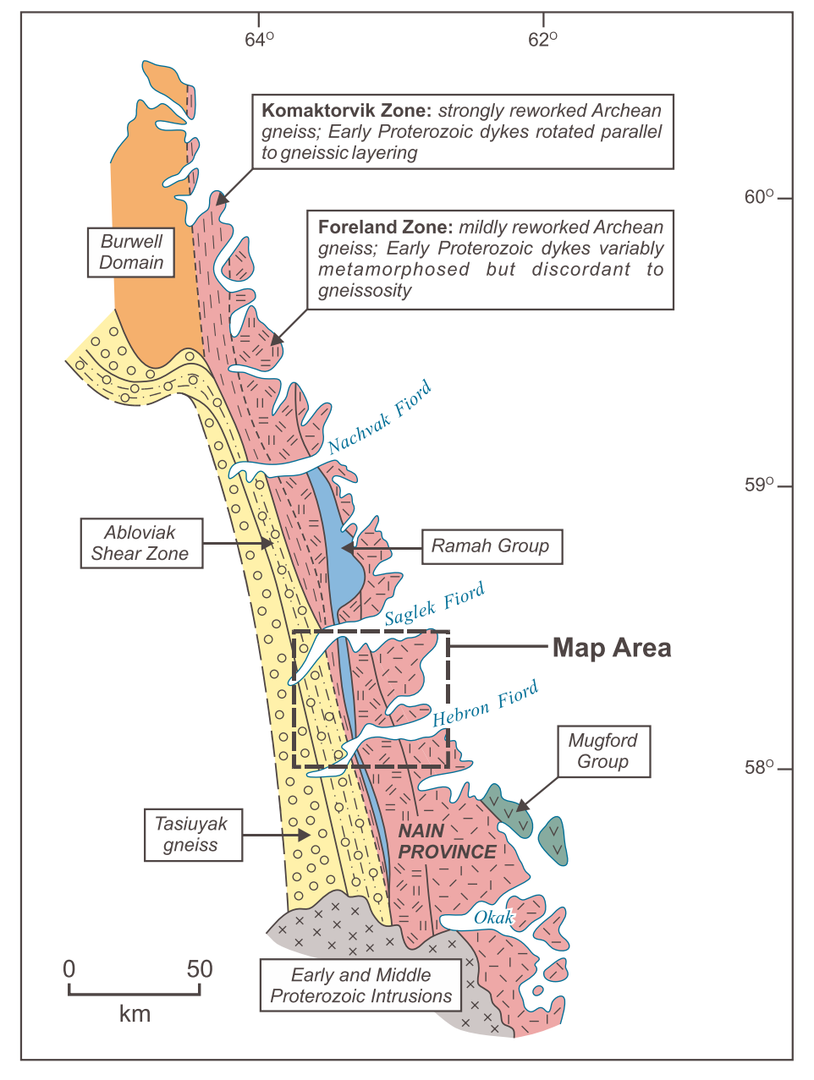
NOTE: These symbols mainly designate Nulliak assemblage remnants but also include dismembered Upernavik supracrustals in areas where the latter and the Uivak gneisses have been structurally reworked, extensively remobilized by melting, or injected by younger intrusions.

Mineralization:

Fe = magnetite iron formation
Cu = chalcopyrite veins, malachite stain



Orogenic Subdivisions of Labrador



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

LEGEND

GNEISSES OF THE CHURCHILL PROVINCE (TORNGAT OROGEN)

ARCHEAN AND EARLY PROTEROZOIC

10 Brown- to greenish grey weathering quartzofeldspathic granulite, locally garnetiferous

9 **Tasiuyak gneiss:** Garnetiferous 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; characterized by mylonitic foliation and a well developed, subhorizontal, quartz lineation

- 9g White-weathering garnetiferous granite, pink granite and white-weathering pegmatite, locally having graphic texture
- 9p Rusty, garnet + biotite + sillimanite gneiss
- 9q Grey to black quartzite
- 9m Black-weathering, homogeneous to layered, garnetiferous mafic and ultramafic granulite

8 Brown- to buff- to grey-weathering, well-layered, granulite-facies, quartzo-feldspathic gneiss; foliation is 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 unit

7 Mylonitic rocks derived from Archean gneiss and granite by structural and metamorphic modification during the Early Proterozoic

- 7m Grey- to greenish-grey weathering, biotite + epidote ± muscovite-bearing quartzo-feldspathic gneiss
- 7a Black- to dark green-weathering amphibolite, locally contains relicts of orthopyroxene
- 7p Porphyritic, grey, hornblende tonalite; probably equivalent to 4p
- 7g White-weathering massive to foliated granite

SEDIMENTARY AND IGNEOUS ROCKS OF THE NAIN PROVINCE AND ITS REACTIVATED MARGIN

EARLY PROTEROZOIC

6 **Ramah Group:** Quartzite, graphitic slate and siltstone, dolomitic sandstone, minor conglomerate and dolostone, and their metamorphic equivalents, that rests with modified unconformity against Archean Nain Province gneisses and granite

- 6q Undivided white to brown, locally dolomitic, cross bedded, quartzite, having interbedded slate (mica schist), siltstone, pebble conglomerate and dolostone (tremolite marble). Deformation and metamorphism in southern belts have modified primary characteristics
- 6s Slate and kyanite-, garnet-, staurolite- and sillimanite-bearing mica schists derived from graphitic shale and siltstone; minor quartzite
- 6g Metagabbro sills

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

- **5d** **Domes mafic dyke swarm:** Diabase dykes of at least two generations, mildly altered in eastern part of area, but progressively metamorphosed westwards; no igneous clinopyroxene preserved in dykes in western one-third of Nain Province
- **5π** Schistose amphibolite dykes (metadiabase, metagabbro, diorite), commonly confined to shear zones
- **5β** Breccia dykes; brown-weathering dykes containing numerous gneissic and diabasic inclusions
- **5α** Orthoyproxene-bearing (gabbronoritic) dykes

GNEISSES AND ASSOCIATED INTRUSIVE ROCKS OF THE NAIN PROVINCE

ARCHEAN

4 Granitoid rocks of several generations, in part including intrusions equivalent in age to the numerous thin dykes and veins that occur in most outcrops of the area but that are too small to show at map scale. Age range of these rocks is ca. 3240 – 2500 Ma

- 4g Aplitic to pegmatitic, grey to white tonalitic to granitic rocks; may have a weak foliation, and may be orthopyroxene-bearing in areas of granulite-facies metamorphism; gneissic screens common in widest units
- 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))
- 4p Grey hornblende tonalite and foliated porphyritic (augen) granite
- 4l Lister gneiss: polyphase granitoid sheet
- 4s White, schlieric, aplitic to pegmatitic, granite to granodiorite on Maidmonts Island, having screens of Uivak II gneiss and intruded by grey granitoid sheets

3 **Upernavik supracrustals:** A diverse group of metasedimentary and metaigneous rocks believed to be largely younger than the Uivak gneisses and Saglek dykes; not easily distinguished from Nulliak assemblage in isolated outcrops. Probably comprises several age-packages of rocks, some of which may be pre-Saglek dyke in age

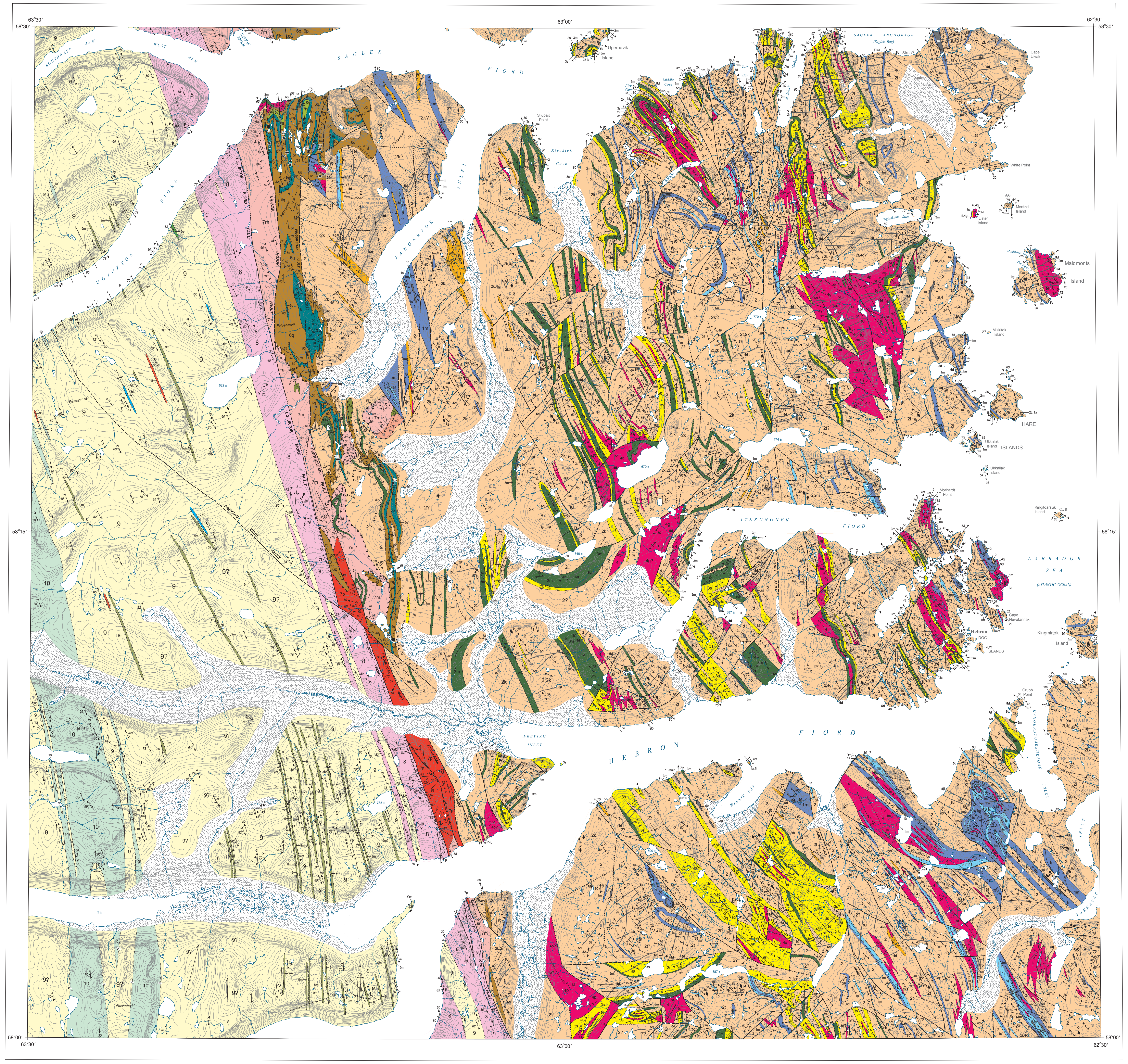
- 3s Rusty-weathering, garnet + biotite + sillimanite ± cordierite paragneiss, commonly having a layer-parallel to slightly discordant network of garnetiferous leucogranite veins and dykes.
- Q Grey- and green-weathering (fuchsite-bearing), diffusely banded quartzite; locally garnet- and sillimanite-bearing
- M Grey- to dark brown-weathering, locally nodular, marble and calc-silicate rocks
- 3m Dark green- to black-weathering, massive to well-banded, locally garnetiferous, amphibolite and mafic granulite
- 3u Black, brown, and yellow-orange weathering ultramafic rocks, including variably serpentinized dunite, peridotite and pyroxenite

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 derivatives, and also gneisses that cannot be confidently correlated with the Uivak gneisses

- 2t Grey, pink and brown, layered tonalitic to granodioritic gneiss and migmatite (Uivak I gneiss) containing abundant inclusions of Nulliak assemblage. Locally intruded by transgressive 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-green, foliated, megacrystic granodiorite, granodioritic augen gneisses and derived migmatite (Uivak II gneiss); contains rafts of Nulliak assemblage and Uivak I 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 on Mentzel Island that may be related to 2m plutonism
- 2k Well-layered and migmatitic to nebulitic granulite-facies gneiss (Kiyuktok gneiss) commonly exhibiting porphyroblasts of garnet and orthopyroxene in quartzofeldspathic segregations that are both concordant and discordant to layering. Derived in part by static melting of Uivak gneisses during ca. 2800 – 2700 Ma granulite-facies metamorphism. Abundant sheets of orthopyroxene-bearing granite
- 2i Well-layered and migmatitic to nebulitic gneiss (Iterungnek gneiss) derived mainly by structural reworking of the Uivak gneisses under granulite-facies conditions, ca. 2800 – 2700 Ma; abundant sheets of syn- to late-metamorphic granite. Zones of gneiss having Uivak characteristics locally well-preserved

1 **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 the Saglek dykes (amphibolite, mafic granulite). These rocks are areally distributed as abundant inclusions in younger gneisses, most of which are too small to show at map scale (see symbols), and as larger coherent belts that are generally in tectonic contact with the enclosing rocks

- 1c Grey to white weathering, banded, clinopyroxene-bearing metachert
- 1i Massive to thin-banded, magnetite iron formation, usually associated with 1c, but also occurs within 1 m
- 1s Grey to rusty-brown, biotite + sillimanite-rich paragneiss
- 1q Grey, massive to diffusely banded, quartzite and biotite + garnet quartzo-feldspathic gneiss
- 1m Massive to finely layered mafic rocks, likely of both intrusive and extrusive origin
- 1u Massive to finely layered ultramafic rocks, likely of intrusive and extrusive origin; associated with 1m and as independent units
- 1g Grey-green-weathering, clinopyroxene + biotite-bearing quartzofeldspathic gneiss



Compiled by B. Ryan, 1983-84, 1989.

Based on mapping by B. Ryan and Y. Martineau, 1982-83 under the Canada-Newfoundland Co-operative mineral program. 1982-84. Project 820028.

Focussed examinations of specific inland areas, general reconnaissance mapping, and field discussions are acknowledged, alphabetically, for the 1982 and 1983 surveys as follows: D. Bridgwater, 1982-83; K.D. Collerson, 1983; J. Korstgård, 1983 (area west of Freytag Inlet); D. Lee, 1982-83; J. Lewry, 1982 (area south of Pangertok Inlet); F. Mengel, 1983 (Ramah Group directly south of Saglek Fiord); A. Nutman, 1983; L. Schiøtte, 1982-83.

This map is a result of field surveys carried out in 1982 and 1983 as Project 820028 under the Canada – Newfoundland Co-operative Mineral Program. Further funding was provided by the Geological Survey of Canada through the Canada – Newfoundland Mineral Development Agreement 1984-89, a subsidiary accord under the Economic and Regional Development Agreement.

This map supercedes: 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, Map 92-18B and Geological Survey of Canada, Open File 2466, 1:100 000 scale.

Recommended citation
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2012: Revised and coloured edition of 1992 map showing the Geology of the Saglek Fiord - Hebron Fiord area, Labrador (NTS 14L/2,3,6,7). Scale: 1:100 000. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Map 2012-15, Open File 14L/0091. (Update of map originally released as Newfoundland Department of Mines and Energy, Geological Survey Branch, Map 92-18B and Geological Survey of Canada, Open File 2466).

MAP 2012-15
OPEN FILE 14L/0091

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

Scale 1:100 000
0 2 4 6 8 10
Kilometres

GIS/digital cartography by T. Paltanavage.

Base map in digital format published by Geomatics Canada, Earth Sciences Sector, Natural Resources Canada, Ottawa.

Approximate magnetic declination, 2012, at centre of map 25° 31' west, decreasing 18' annually.

Elevations in feet above mean sea level. Contour interval 100 feet.

Universal Transverse Mercator projection (UTM) Zone 20.

North American Datum (NAD) 1927.

Copies of this map may be obtained from: Geoscience Publications and Information Section, Geological Survey Division, Department of Natural Resources, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, NL, A1B 4J6

EXPLANATORY NOTES

(italicized numbers in parentheses refer to references listed in "Suggested Reading")

The survey area is accessible by boat, helicopter or fixed-wing aircraft. The nearest community is Nain, 230 km to the south. A Canadian Forces radar site having a paved airstrip is situated at Saglek Bay. The community of Hebron, at the entrance to Hebron Fiord, was abandoned in 1959-60, but is occasionally the summer base for Inuit fishermen from Nain. The Nunatsiavut (Labrador Inuit) Government and Parks Canada maintain a base camp and research station at St. John's Harbour for scientific investigations in northern Labrador and for tours of the Torngat Mountains National Park. The Saglek–Hebron map area lies north of the tree line, and its ice-scoured coastline offers superb rock exposures. The southern extent of the alpine topography of the Torngat Mountains can be admired along Saglek Fiord, where the bounding walls tower over 1300 m above sea level. Overall, the topography of the map area is characterized by rounded hills and broad valleys, except for steep valley walls along the rivers west of Hebron Fiord.

The map depicts the geology of the boundary between the Archean Nain Province and the eastern fringe of the southeastern arm of the Early Proterozoic Churchill Province. Here, the Churchill Province comprises rocks deformed during development of the Torngat Orogen, a 100-km-wide tectonometamorphic zone resulting from oblique convergence of the Nain Province and exotic crustal blocks, now represented by the rocks to the west, ca. 1860 to 1800 Ma *(1)*. The effect of this Early Proterozoic tectonism on the Nain Province can be evaluated from its imprint on the ca. 2400 to 2200 Ma Domes mafic dyke swarm and on the folded Early Proterozoic Ramah Group supracrustal rocks, the latter originally resting 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 Orogen 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 comprises predominantly quartzofeldspathic gneisses derived from intrusive protoliths, interlayered with subordinate belts 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 an amphibolite-facies terrane in the east, and a 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)*. Metamorphic grade on the eastern side of the Handy Fault increases to granulite facies southward from Tigigakyuk Inlet, a result of the scissor-like movement on the fault.

The earliest gneissic components are small (1 to 10 m^2) rafts and more continuous belts (10 by 0.5 km) of Early Archean mafic and ultramafic 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 recognized as pre-migmatitic inclusions 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 dykes, the Saglek dykes, and is broken and veined by granitoid intrusions that accompanied Middle and Late Archean migmatization.

Sediments of the Nulliak assemblage included both chemical precipitates such as cherty iron formation, and clastic deposits such as siltstones and shales. These are now represented, respectively, by quartz + hedenbergite + magnetite rocks and quartz + feldspar + biotite + garnet + sillimanite gneisses. The largest belt of Nulliak iron formation (1i) occurs on the south shore of Pangertok Inlet, where a grey- to white-weathering, layered (2 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 and siltstones of the Nulliak assemblage are represented by rusty biotite + garnet + sillimanite +/- cordierite gneisses (1s), such as those that are associated with cherty iron formation in a disrupted belt south of St. John's Harbour, and those that occur with mafic gneisses in a recumbent structure west of Kangerdluarsuksoak Inlet. Other paragneisses that appear to be derived from clastic sediments include feldspathic quartzite and grey, well-banded biotite + garnet gneisses (1q) south of Hebron Fiord. A clinopyroxene-rich quartzitic gneiss (1g) at the southern end of Ukkalek Island may be derived from calcareous quartzite or arkose.

Mafic and ultramafic rocks (1m, 1u) assigned to the Nulliak assemblage are prominent on the north 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 Inlet. The rocks in these belts display a variety of textures and structures: from dark-green- to black-weathering, massive, salt-and-pepper and porphyritic-textured metagabbros, to fine-grained mafic and ultramafic rocks of probable volcanic flow (basalt, komatiite) derivation, to finely laminated rocks that may be metamorphosed volcaniclastic sediments. An association of layered, dark-green, clinopyroxene-bearing amphibolite and brown olivine-pyroxenite that occurs in some Nulliak rafts appears to represent differentiated mafic sills or meta-komatiitic flows. Dunitic and peridotitic rocks isolated from, but adjacent to, Nulliak basic gneisses, probably represent fragments of once coherent layered intrusions, or else are tectonically disrupted bodies emplaced during younger interleaving of gneisses and supracrustals. Some bodies of the latter type retain minerals indicative of primary crystallization at mantle depths and may be fragments of the Archean mantle *(7)*. Meta-leucogabbro and meta-anorthosite derived from leucocratic, layered intrusions occur only as rafts within younger gneisses; no large belts of these compositions are known.

Quartzofeldspathic gneisses (Unit 2), constituting the major rock type of Nain Province, are younger than the Nulliak assemblage. These felsic rocks are all considered to be part of the 3800 to 3300 Ma Uivak gneisses and their reworked equivalents *(4,5)*, although older, but quite similar, quartzofeldspathic rocks (Nanok gneisses) have been identified by isotopic studies (K.D. Collerson, University of Queensland, Brisbane, personal communication, 1991). The Uivak gneisses *(6,8)* are a polyphase quartzofeldspathic suite derived from plutonic protoliths emplaced prior to 3300 Ma; subsequently, they were profoundly tectonized under amphibolite- and granulite-facies conditions between 2800 and 2700 Ma *(9)*. The Uivak gneisses have been divided into two types: Uivak I, even-grained tonalitic and granodioritic rocks (2t) emplaced ca. 3800 to 3700 Ma and migmatized ca. 3600 Ma *(6,10)*, and Uivak II, megacrystic, Fe-rich granodioritic rocks (2m) emplaced into migmatized Uivak 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, but an older age cannot be ruled out. A suite of aphyric to plagioclase-porphyritic basic to ultrabasic dykes, now preserved largely as pods and lenses in the Uivak gneisses, was intruded prior to a major deformational and migmatizing event ca. 2800 to 2700 Ma. These intrusions are known as the Saglek dykes *(2,6)*, and they are the most reliable criteria for demarcating the Early Archean gneisses in the map area. Discordant relations between the Saglek dykes and older rocks have been preserved only in areas that have escaped subsequent intense tectonism. One such area is on the mainland opposite Nulliak Island, where Uivak II foliated to gneissose megacrystic granodiorite containing fragments of already migmatized Uivak I gneiss is intruded by several amphibolitized Saglek dykes; one such inclusion is itself intruded by an even older, pre-incorporation, amphibolite dyke. The 2800 to 2700 Ma tectonism was such a pervasive crust restructuring event, however, that the original characteristics of Uivak I, Uivak II and the Saglek dykes are seldom preserved. The felsic metaplutonic rocks are instead, on a regional scale, grey to brown amphibolite- and granulite-facies migmatites in which younger pegmatites form 10 to 30 percent of the layers, and the Saglek dykes are now disposed as dispersed and attenuated foliation-parallel mafic layers within these more leucocratic migmatized rocks. Characteristics that can sometimes be used as field criteria to distinguish the two components of the Uivak migmatites are the preservation of remnant microcline megacrysts and the generally darker colour of the Uivak II gneisses (reflecting their higher content of ferromagnesian minerals). Uivak 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 mesoscopically different gneisses which, in both cases, have transitional contacts with the parent. *In situ* static partial melting and granitoid neosome injection under granulite-facies conditions, probably triggered by dehydration deeper in the crust, produced a series of migmatitic rocks west of the Handy Fault, collectively known as Kiyuktok gneisses (2k) after the locality (Kiyuktok Cove) where they are well displayed. Kiyuktok gneisses *(11,12)* have a distinctive concordant to discordant quartzofeldspathic melt component characterized by porphyroblasts of garnet and orthopyroxene. These melts in many exposures exhibit irregular outlines having diffuse 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 orthopyroxene-bearing granite. Retrogression of the garnet and orthopyroxene porphyroblasts lends a diagnostic blebby texture to the Kiyuktok gneisses. East of the Handy Fault, granulite-facies gneisses of the Tigigakyuk–Hebron area show more of a dynamic reworking. The gneisses here are termed Iterungnek gneisses (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 Uivak 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. These veined rocks locally resemble the Kiyuktok gneisses. Iterungnek gneisses are well displayed at Jerusalem Harbour, Cape Nuvotannak, and on the Harp Peninsula.

Upernavik supracrustals (Unit 3), as originally defined *(2,3)*, are an assemblage of predominantly metaclastic and basic meta-igneous rocks not known to be intruded by Saglek dykes, and interpreted to be interleaved with the Uivak gneisses prior to, or coeval with, high-grade metamorphism and deformation ca. 2800 to 2700 Ma. The relationship between the Upernavik supracrustals and Uivak gneisses is everywhere tectonic, but they may have originally been in depositional contact. The type-area for Upernavik supracrustals is Upernavik Island in Saglek Fiord; the largest belts interpreted to be Upernavik supracrustals occur south of Hebron Fiord. Rocks of the Upernavik supracrustals include garnet + sillimanite + biotite pelitic and semipelitic gneisses (3s), grey and green (fuchsite-bearing) quartzite (shown by Q and ••••• symbol), grey to brown marble (shown by M and ++++++ symbol), and mafic and ultramafic rocks (3m, 3u) that locally retain porphyritic textures and are interpreted to be of volcanic and plutonic origin. The garnet + biotite-rich paragneisses (3s) are conspicuous by their brown-weathering. They commonly have 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. Ultramafic rocks (3u) are commonly marginal to the metasedimentary and basic gneisses, and include compositions such as dunite, harzburgite, pyroxenite and lherzolite. It is difficult to distinguish between the Upernavik and Nulliak supracrustal rocks in the absence of such diagnostic lithological features of the Nulliak assemblage as iron formation and in the absence of Saglek dykes, so in cases where cumulative diagnostic criteria of the Nulliak assemblage are absent, the supracrustal rocks have been assigned to the Upernavik subdivision. This may not always be strong grounds for separation. For example, some of the supracrustal rocks belts assigned to the Upernavik subdivision southwest of Hebron village are intruded by metamorphosed porphyritic basic dykes and layered porphyritic sills that resemble the Saglek dykes *(13,14)*, implying a correlation with the Nulliak assemblage. They are here grouped with the Upernavik supracrustals because no metasedimentary rocks typically associated with belts of Nulliak assemblage (i.e., iron formation) occur in close proximity. It should also be noted that, in addition to the questionable field assignment, zircon geochronology indicates that the Upernavik supracrustals comprise rocks of more than one depositional age *(14)*. The problems highlighted by these field and isotopic anomalies underscore the complexities of polylithologic gneiss terranes.

Granitoid rocks (Unit 4) of variable character, ranging in age from 3240 to 2500 Ma, severely dilute the Uivak gneisses and the various supracrustal units across the area. Their intrusion shapes range from local dykes and veins from several centimetres to several metres in width, to polyphase aplitic and pegmatitic sheets several hundred metres wide having a *lit-par-lit* morphology, to larger massive to weakly foliated stocks and dyke-like intrusions that have stoped into earlier gneisses. Most of 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 and granodioritic dykes in the St. John's Harbour–Maidmonts Island area *(15)*, and the ca. 2520 Ma Igukshuak granite, a stockwork of pink, potassic, pegmatitic to aplitic rocks exposed between Cape Uivak and Saglek Bay *(16)*. The larger bodies of granitic rocks portrayed on the map have a wide array of textures and minerals. 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 (4l), exposed on the island of that name, is a composite tonalitic to granodioritic intrusion emplaced into mafic supracrustal rocks, and injected by younger pegmatites *(9)*. A schlieric granodiorite to granite sheet (4s) underlies the eastern half of Maidmonts Island; it contains many rafts of Uivak gneisses and basic gneisses and is intruded by 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 foliated to massive, medium-grained to pegmatoidal, granitoid of unknown extent underlies the area south of Tigigakyuk Inlet. This granitoid is intrusive into well-layered quartzofeldspathic gneisses on its western margin and has many scattered screens of these gneisses, as well as amphibolite. K.D. Collerson (personal communication, 1991) has suggested that this granite may, in fact, be a well-preserved phase of Uivak I gneiss in a low-strain zone, implying that the gneisses to the west are pre-3800 Ma rocks (Nanok gneiss?). White-weathering augen gneiss (4a), derived from megacrystic granite, which locally contains retrogressed orthopyroxene, occurs within an isoclinal fold structure south of Fire Cove. It may be equivalent to Uivak II gneiss, but is tentatively assigned a younger age because it lacks the dispersed Nulliak inclusions and Saglek dykes and it is a more leucocratic rock than typical Uivak II gneiss. White-weathering, leucocratic, weakly foliated to massive granodiorite (4g) containing fragments of adjacent basic and ultrabasic rocks is present inland on Morhardt Point and east of Jerusalem Harbour. A deformed porphyritic charnockitic to gabbronoritic rock (4c), discordant to layering in paragneiss, occupies part of a small fault block south of Winnie Bay; it is a white- to brownish-weathering rock containing plagioclase phenocrysts up to 3 cm in maximum dimension. A partly recrystallized rock (4p), which is texturally similar to 4c but contains hornblende instead of orthopyroxene and displays both plagioclase and K-feldspar phenocrysts, occurs in the southwest corner of Nain Province south of Hebron Fiord. This rock may be equivalent to the ca. 2780 Ma Ikarut gneisses, the latter being foliated, porphyritic metaplutonic rocks on the north shore of Hebron Fiord *(17)*. The rocks south of the fiord show an Early Proterozoic metamorphic overprint of biotite, epidote and garnet. Layer-parallel and discordant intrusions of blebby-textured, white-weathering, commonly garnet- and orthopyroxene-bearing leucogranite seem unique to the granulite-facies terrane southwards from Kiyuktok Cove. These are diagrammatically represented on the map by several narrow units and a couple of larger bodies (4o) in the gneisses north-northwest of Iterungnek Fiord. Such granites may be broadly coeval with the formation of the Kiyuktok gneisses, and could be time equivalents of the pegmatitic and aplitic sheets that form more extensive intrusions within the Uivak gneisses of the Cape Uivak–Tigigakyuk Inlet area *(14)*.

MAFIC DYKES

Mafic dykes (Unit 5) of four different types are present.

The Domes mafic dykes (**5d**) are a swarm of generally east-northeast- to northeast-striking 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 Island. 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 north-striking dykes are younger than the northeast-striking set. The Domes dykes are augite + plagioclase-bearing rocks that show only very minor secondary alteration in the east, but are progressively amphibolitized to the west *(18)*. Dykes west of Pangertok Inlet and south of inner Hebron Fiord have a more northerly strike than those of the eastern part of the map area, a feature that is either a function of regional variations in original emplacement orientation or a local counterclockwise rotation during subsequent sinistral shear. Domes dykes are transformed to foliated amphibolites parallel to layering in the mylonitized gneiss at the basement-cover interface immediately adjacent to the Ramah Group.

Rare schistose amphibolite dykes (**5π**) are present locally across the whole area. These occur in areas where nearby Domes dykes are undeformed and fairly fresh, implying that the schistose amphibolites are an earlier set. Some of these dykes are confined to mylonite along shear zones, or are themselves the loci of shear.

Several dykes (**5β**) in the Jerusalem Harbour–Hebron Fiord area and one just north of White Point are characterized by abundant entrained fragments of the surrounding gneisses and diabase. These dykes are brown-weathering, but dark grey-green on fresh surface. The matrix to the fragments is a finely comminuted mixture of igneous minerals and material from the country rock. These are interpreted as volatile-charged intrusions; their age is unknown.

Two orthopyroxene-bearing diabase dykes (**5α**) are known from the region. One of these is a folded dyke in the Ramah Group, 2 km south of Saglek Fiord; the other is a northeast-trending dyke 4 km west of Hebron village.

RAMAH GROUP

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 suggest that it may also be present in the inaccessible faces and felsenmeer-strewn mountain tops immediately south of the fiord.

The Ramah Group along the southern shore of Saglek Fiord and to the west of Mount Pinguksoak is composed largely of interbedded white, grey and buff quartzite, brown dolostone, minor pebble conglomerate, and black to grey pelite (6q). Within the succession are larger and more continuous units of pelite (6s) and a couple of metagabbroic sills (6g). These rocks are stratigraphically undivided here but likely include the Rowsell Harbour and Reddick Bight formations and their younger mafic intrusions as defined to the north of the fiord *(19)*. The quartzites are well-bedded to rather structureless rocks, preserving primary heavy-mineral laminations and carbonate-cemented, sandy, crossbedding. The pelitic rocks are dominated by black slate and tourmaline-bearing biotite + muscovite schists locally containing chloratoid, kyanite, and staurolite. Brown dolostone of the eastern side of the Ramah Group has been transformed into pale-green, tremolite marble along the western side of the belt, attesting an increase in metamorphic grade westwards. The gabbroic sills have metamorphic assemblages that include actinolite, biotite and epidote. The Ramah Group is largely bounded by steep reverse faults on its western margin in the Saglek Fiord–Mount Pinguksoak area but a sheared and folded contact against Archean gneisses underlying its western side is exposed on the plateau just south of the fiord. A steeply dipping gneissic foliation at this location is drawn into conformity with the cover along a subhorizontal mylonite zone that separates the older and younger rocks; the mylonitized contact is folded by eastward-overturned open folds.

The Ramah Group narrows in outcrop width southwards from Saglek Fiord, is entirely bounded by tectonic junctions, and is increasingly tightly folded and metamorphosed *(4,5)*. An extensive area of black, muscovite + biotite +/- garnet pelitic schist (6s) southwest of Pangertok Inlet may be the metamorphic equivalent of the Nullataktok Formation, a black-shale-bearing subdivision occurring above the Rowsell Harbour and Reddick Bight formations to the north of Saglek Fiord *(19)*. The quartzite and tremolite-marble sequence to the east of these pelitic schists is tectonically thinned, and the contact between the sedimentary rocks and the adjacent gneisses is a folded décollement (mylonite, tectonic schist) surface. Narrow, folded belts of white quartzite, tourmaline-bearing pelitic (biotite + muscovite + sillimanite) schist and minor calc-silicate rocks, generally less than 1 km in width, mark the expression of the Ramah Group from Pangertok Inlet south to near the Ikarut River, where the group seems to be excised by the Freytag Inlet fault. These belts possibly belong to the Rowsell Harbour Formation. Bedding has been largely obliterated by deformation and metamorphism, although many of the quartzites retain relicts of primary sedimentary structures and an alternating pelite–quartzite compositional layering that represents original bedding. All contacts are tectonic; on both margins of the belts, Ramah Group is separated from basement gneisses by a 1- to 15-m-wide zone of tectonic schist, phyllonite, and mylonite derived both from cover and basement *(18)*. The present configuration of the southern belts is due to folding of the Ramah Group and its décollement. Discordances between the internal subdivisions of the Ramah Group and the trace of the contact with basement are interpreted on the basis of large-scale map patterns, and are attributed to thrust excision of parts of the cover sequence, juxtaposing varying stratigraphic levels of the Ramah Group against the basement prior to folding. The only vestiges of Ramah Group south of the Ikarut River are two narrow subvertical slivers of white quartzite and calc-silicate rocks south of Hebron Fiord, the northern of which has retained a basal regolith along its contact with the gneisses (M. Van Kranendonk, University of New South Wales, Sydney, personal communication, 1989).

CHURCHILL PROVINCE (TORNGAT OROGEN) GNEISSES

Gneissic rocks of Torngat Orogen are exposed west of Ramah Group and are divided into four units: (i) mylonitically refoliated Archean gneisses, (ii) two-pyroxene quartzofeldspathic granulite, (iii) Tasiuyak gneiss, and (iv) enderbitic gneiss.

A fault-bounded strip of mylonitically foliated amphibolite-facies rocks (Unit 7) derived from Archean gneisses of the Nain Province and from a younger dark-grey tonalite occurs immediately adjacent to Ramah Group. The quartzofeldspathic gneisses (7m) are all grey- to green-weathering rocks characterized by biotite + epidote +/- muscovite fabrics; relict orthopyroxene is preserved in some basic gneisses (7a), a remnant of their former higher grade assemblage. The grey tonalite (7p) shows no indication of having been strongly metamorphosed prior to the mylonitic overprint because primary dark-green hornblende is well preserved. It may be equivalent to subunit 4p and the Ikarut gneisses. A biotite + epidote fabric, as in the mylonitic gneisses, denotes the effect of Proterozoic deformation. The tonalite is transformed into a spectacular black ultramylonite, that marks the Ugjuktok Fiord fault, on its western border in the Hebron Fiord area. Gently dipping gneisses (7m), which have mylonitic biotite + epidote +/- muscovite fabrics, astride and east of Ramah Group south of Pangertok Inlet, are interpreted as eastward-directed thrust sheets of the 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 narrow unit west of the Ujguktok Fiord fault. It is split into two narrow units by a septum of diatexite in the Hebron Fiord area. This gneiss locally contains mafic granulite pods and layers that are probably derived from basic dykes, and it has textures reminiscent of the Kiyuktok gneisses, 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 contact. The age and nature of the protolith for Unit 8, whether it is a reworked Archean gneiss or an Early Proterozoic plutonic rock, are thus uncertain.

The Tasiuyak gneiss (Unit 9), a garnetiferous diatexite, is a regionally monotonous white- to rusty-weathering garnet + biotite + quartz + feldspar rock *(4,5)*. It is well layered at the mesoscopic scale, and in hand specimen has an apparent medium-grained granitoid texture. However, mineral subdomains are polycrystalline and the rock, in fact, has a blastomylonitic microstructure. Locally, lenticular grey quartz is slightly oblique to the compositional layering, and a pronounced mineral rodding lineation, plunging gently (2° to 20°) north and south, is evident throughout the unit. Two generations of garnet, predating and postdating the main tectonic fabric, are present. Intrafolial folds of an earlier gneissosity can be recognized locally, but in most cases the foliation is a composite one derived by transposition of earlier layering. Lenticular grey quartz forms the axial plane fabric in these folds. Tasiuyak gneiss locally has characteristics of a garnetiferous leucogranite, but also shows indications of derivation from pelitic and semipelitic to quartzitic protoliths. The metasedimentary protolith composition is represented by purplish to 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 narrow lenses locally within Tasiuyak gneiss. Unique to Tasiuyak gneiss, especially west of Hebron Fiord, are narrow (5 to 50 m) belts of black- to dark-brown-weathering, dense, garnetiferous mafic granulite and hornblende + spinel-bearing olivine websterite (9m) that have a marked continuity along strike. These rocks are characterized by deep-red garnets disposed either within discrete layers or as irregular polycrystalline clots scattered through the rock.

A grey- to brown-weathering enderbitic (hypersthene tonalite) to opdalitic (hypersthene granodiorite) 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 well-layered and lacking clinopyroxene. It is interpreted to be derived from a plutonic rock and it has an interdigitating (modified intrusive?) contact with the Tasiuyak gneiss, adjacent to which it is locally garnet-bearing.

METAMORPHIC PATTERNS

Metamorphic assemblages of the map area reflect the influence of both Archean and Proterozoic events *(18)*. The gneisses of the Nain Province exhibit the imprint of Late Archean (2800 2700 Ma) granulite-facies metamorphism, with the exception of the northern one-third of the area east of the Handy Fault, which experienced only amphibolite-facies conditions *(2,14)*. Subsequent zonal retrogression, probably due to fluid flushing accompanying emplacement of some of the younger granitoids, overprinted the area. As a result, orthopyroxene in quartzofeldspathic gneisses was transformed to orthoamphibole, giving rise 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 accompanied formation of the Early Proterozoic Torngat Orogen *(1)*. The imprint of this thermotectonism is evident in the change in the metamorphic and structural stability of the dykes and the cover *(18)*. The dykes are transformed from subophitic rocks having minor chlorite in the east to foliated amphibolites in the west; a line drawn from Kiyuktok Cove in Saglek Fiord to Winnie Bay in Hebron Fiord marks the approximate westward extent of igneous clinopyroxene in the dykes. West of this line, pyroxene is replaced by actinolitic amphibole, plagioclase is partly recrystallized, and metamorphic biotite is present. The existing data do not allow definition of such zones on the south side of Hebron Fiord because of a pervasive development of actinolite and epidote in all dykes examined east of Winnie Bay.

Dark-green, ragged, biotite coronas of Early Proterozoic age on orthoamphibole pseudomorphs of orthopyroxene contribute to the blebby texture of quartzofeldspathic gneisses in the central and eastern parts of the Nain Province. The orthoamphibole + biotite assemblage of the blebs is replaced in the west by an assemblage of granoblastic quartz + feldspar containing disseminated biotite, muscovite, epidote and titanite. The Archean quartzofeldspathic gneisses directly adjacent to the Ramah Group, have been refoliated by Early Proterozoic basement-cover translation, and have a mylonitic, ribbon-like foliation of biotite + muscovite + epidote.

Metamorphic minerals within the Ramah Group are chiefly biotite, muscovite and epidote. Chloritoid, chlorite, kyanite and staurolite are common in the north, whereas garnet and fibrolitic sillimanite are characteristic of the pelites in the southern belts, indicating the attainment of higher temperature metamorphic conditions to the south.

Mylonitically foliated amphibolite-facies gneisses west of the Ramah Group likely represent original Archean granulite-facies rocks overprinted by Early Proterozoic metamorphism. All rocks west of these contain Early Proterozoic granulite-facies assemblages.

STRUCTURE

There is an obvious map-scale structural contrast between the Nain and Churchill provinces. The Nain Province 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 gneiss (metagabbro) and metasedimentary gneiss sequence that forms a recumbent structure west of Kangerdluarsuksoak Inlet, and the shallowly dipping gneisses that underlie Cape Uivak. The Churchill Province, in contrast, lacks this folded and closely alternating polylithological pattern, and is, instead, typified by broad gneiss belts having a steeply dipping, north-northwest trend in which the intensity of Early Proterozoic deformation has destroyed or effectively masked any map-scale 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 gently plunging mineral rodding lineation that is especially prominent within Tasiuyak gneiss, where it is 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 Abloviak shear zone, a ductile, sinistral, transcurrent fault of crustal scale generated by Early Proterozoic oblique collision between the Nain Province and rocks to the west *(1)*.

The Ramah Group, on the western margin of Nain Province, is the best indicator of the effects of Early Proterozoic deformation on the edge of the Archean craton *(18)*. It is widest and moderately deformed in the north but becomes narrower and more intensely deformed and metamorphosed to the south, and in the latter area appears to be structurally intercalated with adjacent Archean gneisses. The widest part of the belt, directly south of Saglek Fiord, may still be anchored to its Nain Province gneissic basement on the eastern margin, but it appears that the original unconformable relationship between basement and cover has been largely obliterated elsewhere by a tectonic slide. The result of this tectonic sliding is a mylonite zone, marking the transition from recognizable supracrustals on one side to recognizable basement on the other. The thinning and increasing deformational complexity of the sedimentary rocks from north to south indicate deeper stratigraphic and structural levels of the Ramah Group are exposed in the south, consistent with a northerly plunge of the Group north of Saglek Fiord *(19)*. The outcrop pattern of the Ramah Group is controlled by upright to inclined folds that have re-oriented it and its décollement. Easterly overturned folds along the western margin of the Ramah Group directly south of Saglek Fiord, for example, expose a folded mylonite at the junction between quartzite and the Archean gneisses. The mylonitically foliated quartzites and schistose pelites of the two Ramah Group belts located south of Pangertok Inlet are internally polydeformed and bounded on both sides by mylonitic and refoliated gneisses. The interpreted folds in the narrow sedimentary belts are depicted as synforms and antiforms because facing criteria were not observed. A case can be made from small-scale relationships (e.g., gneisses structurally overlying schistose quartzite) that thrust slices of the basement were imbricated with the cover prior to the map-scale folding. Thus, the bayonet-type map patterns depicted between the belts of sedimentary rocks and the adjacent Archean gneisses could be the expression of allochthonous gneissic wedges within the Ramah Group. The tectonically bounded, moderately to steeply dipping, and locally monoclinal, easternmost narrow belt of Ramah Group is a slice of metasedimentary rock apparently sandwiched between Archean gneisses, and is a candidate for being a transported slab of cover that is both overlain and underlain by allochthonous older rocks rather than being a folded keel of the supracrustals tightly pinched into basement. The Ramah Group shows the effects of at least three periods of internal deformation. A bedding-parallel foliation (S_1) and isoclinal folds (F_1), likely the products of thrust nappe (and fold nappe?) formation, have been reoriented by upright to easterly and westerly overturned, moderately doubly plunging F_2 folds having a general north-south orientation and in which the S_1 mineral fabric (especially muscovite) is locally transposed to a composite S_2 foliation. These folds and the regional foliation are, in turn, crenulated by small-scale chevron structures having generally northeast- and southeast-trending axes. A larger expression of these cross-structures may be the partial annular pattern and the broad warp evident in the Ramah Group south of Pangertok Inlet, and they may also be responsible for the doubly plunging nature of the F_2 folds. The regional muscovite + biotite schistosity is particularly well developed in the pelitic rocks, where it is locally enhanced by quartz seams. The folds that produced the present outcrop distribution of the Ramah Group may have been generated during development of the Abloviak shear zone; however, F_2 fold axes in the Ramah Group are generally more steeply plunging than lineations and folds associated with the Abloviak shear zone. Mylonitically refoliated gneisses, having a biotite + epidote + muscovite fabric, are interpreted to sit astride folded Ramah Group and more steeply dipping gneisses south of Pangertok Inlet, a discordance attributed to post-F_2 eastward thrusting of Unit 7 gneisses.

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 subvertical structure having scissor-like movement extending north–south through St. John's Harbour and separating different crustal levels of the Nain Province. It is characterized by rusty fault gouge and local 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 other faults in this area appear to be late features in the evolution of Torngat Orogen. This is based on 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 Group and truncates a belt of shallowly dipping, amphibolite-facies, mylonitic gneisses interpreted to be a thrust sheet that structurally straddles these folds. Shallow- to moderate-dipping layering and map-scale discordancies imply two klippen of similar mylonitic rocks occur atop and 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. These include several thrusts interpreted from narrow, shallow-dipping mylonite zones west and southwest of St. John's Harbour, on Nulliak Island, on the south shore of Pangertok Inlet, and on the north shore of Iterungnek Fiord.

ECONOMIC GEOLOGY

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)*. Disseminated sulphide minerals occur in many of the metasedimentary gneisses of the map-area, a feature that contributes to the rusty colour of these rocks. No other minerals of economic interest are known from the Archean supracrustals of the Nain Province but, by analogy with similar rocks in western Greenland *(21)*, some of these gneisses have potential to carry scheelite. Anomalous gold values have been detected in stream sediments adjacent to some paragneisses *(22)*, indicating possible local gold mineralization.

Chalcopyrite veinlets accompanying malachite staining in a basic dyke on the east shore of Kiyuktok Cove are the only indications of sulphides in the dykes. A rusty pyrite zone below the easternmost sill of the Ramah Group on the south shore of Saglek Fiord seems to be the sole occurrence of mineralization within that map unit.

Churchill Province gneisses have few indicators of significant mineralization. Noteworthy concentrations of graphite are present within Tasiuyak gneiss west of the map area *(23)* but occurrences here are confined to small nodules in restite layers along the south shore of Ugjuktok Fiord. 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:

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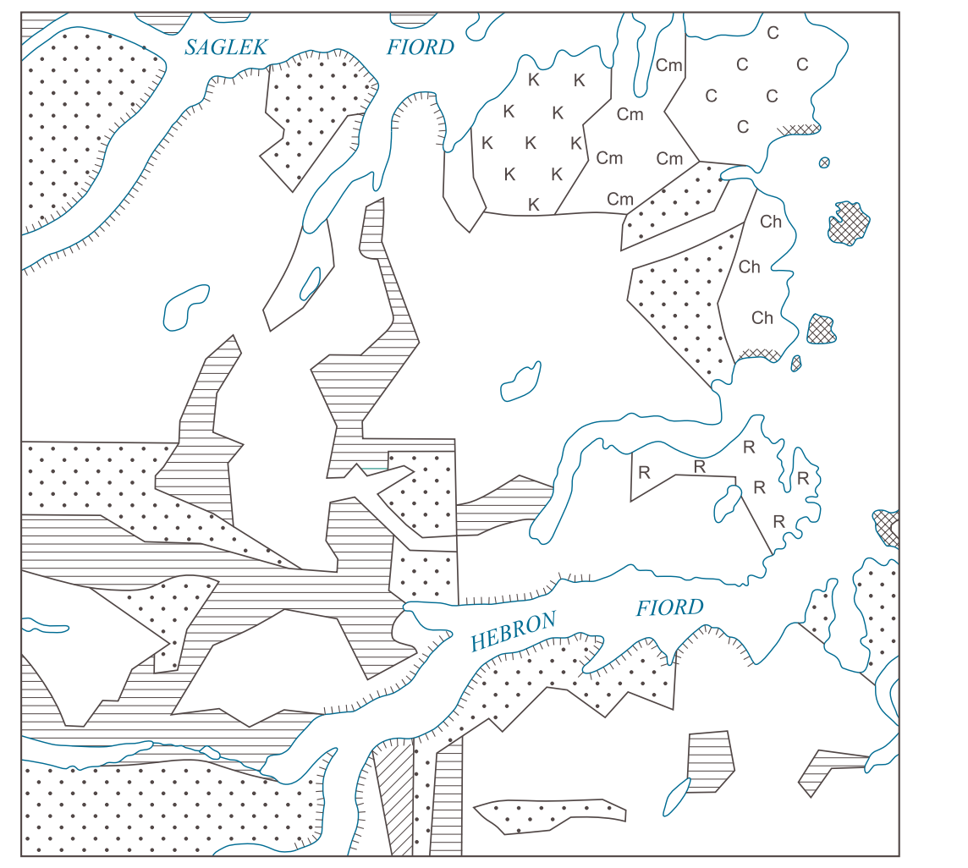
21. Appel, P.W.U. and Garde, A.A., 1987, Grønlands Geologiske Undersøgelse, Bulletin 156, 26 p.
22. Geological Survey of Canada, 1987, Open File 1354.
23. Meyer, J.R. and Dean, P.L., 1988, Newfoundland Department of Mines, Report 88-1, 247-259.

RELIABILITY DIAGRAM



▢ Foot-traversed, with helicopter fill-in
▢ Helicopter reconnaissance mapping
▨ Coastal areas examined in detail by D. Bridgwater, A. Nutman and L. Schiøtte
Cm Modified after Collerson and Bridgwater (Ref 6)
C Compiled from Collerson and Bridgwater (Ref 6) with additional data supplied by K.D. Collerson, 1985
Ch Compiled from Collerson and Bridgwater (Ref 6) with minor helicopter reconnaissance; additional data supplied by K.D. Collerson, 1985
K Modified after Kerr (Ref 11)
R Modified after Ryan (Ref 13)
▢ Shoreline boat traverses
▤ Not examined; areas having heavy glacial debris cover; areas compiled from other sources; air photo interpretation
▨ Data supplied by M. Van Kranendonk, 1989