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GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

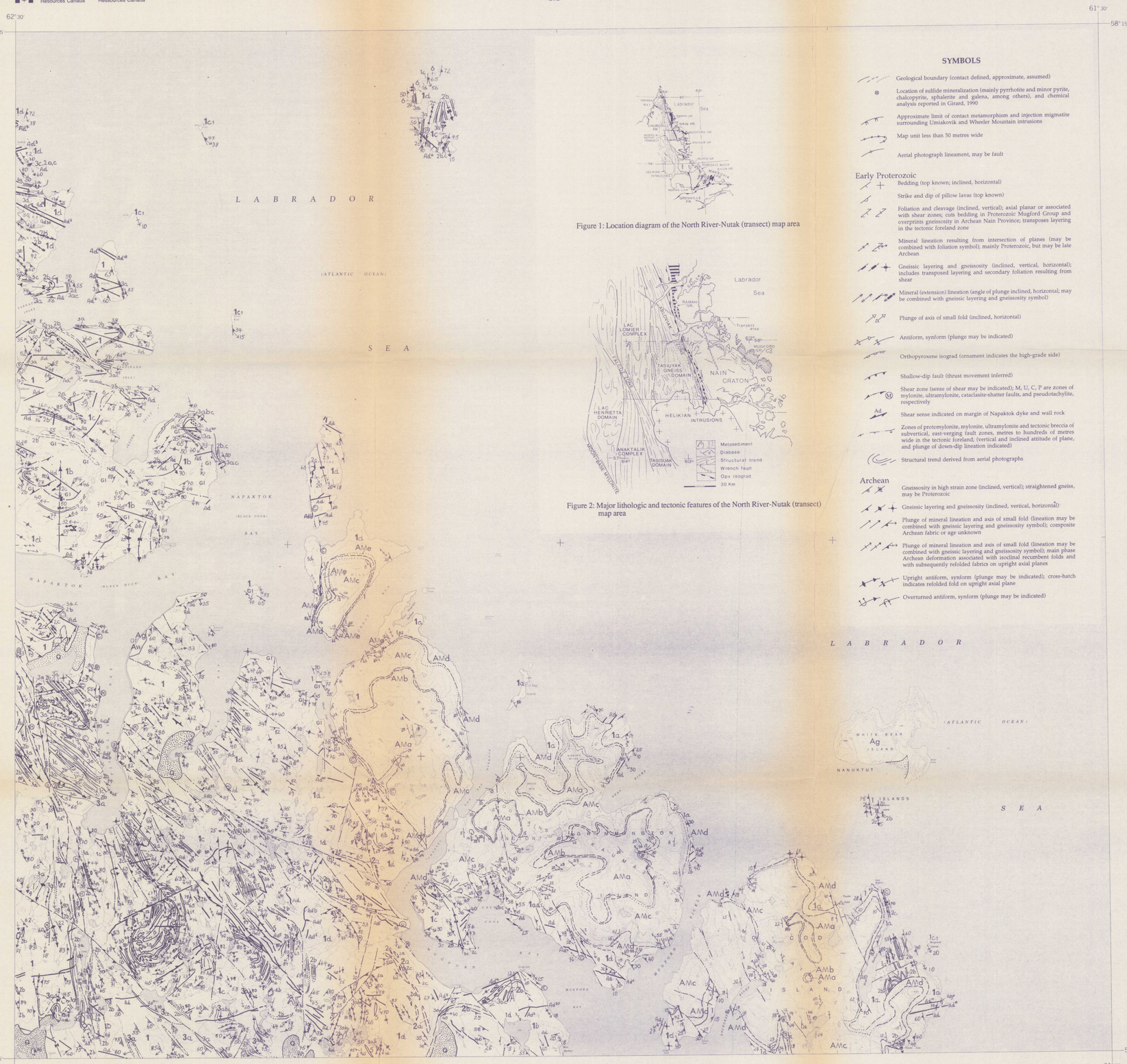

Figure 1: Location diagram of the North River-Nutak (transect) map area

Figure 2: Major lithologic and tectonic features of the North River-Nutak (transect) map area

SYMBOLS

Geological boundary (contact defined, approximate, assumed)

Location of sulfide mineralization (mainly pyrrhotite and minor pyrite, chalcopyrite, sphalerite and galena, among others), and chemical analysis reported in Girard, 1990

Approximate limit of contact metamorphism and injection migmatite surrounding Umiakovik and Wheeler Mountain intrusions

Map unit less than 50 metres wide

Aerial photograph lineament, may be fault

Early Proterozoic

Bedding (top known; inclined, horizontal)

Strike and dip of pillow lavas (top known)

Foliation and cleavage (inclined, vertical); axial planar or associated with shear zones; cuts bedding in Proterozoic Mugford Group and overprints gneissosity in Archean Nain Province; transposes layering in the tectonic foreland zone

Mineral lineation resulting from intersection of planes (may be combined with foliation symbol); mainly Proterozoic, but may be late Archean

Gneissic layering and gneissosity (inclined, vertical, horizontal); includes transposed layering and secondary foliation resulting from shear

Mineral (extension) lineation (angle of plunge inclined, horizontal; may be combined with gneissic layering and gneissosity symbol)

Plunge of axis of small fold (inclined, horizontal)

Antiform, synform (plunge may be indicated)

Orthopyroxene isograd (ornament indicates the high-grade side)

Shallow-dip fault (thrust movement inferred)

Shear zone (sense of shear may be indicated); M, U, C, P are zones of mylonite, ultramylonite, cataclasite-shatter faults, and pseudotachylite, respectively

Ad — Shear sense indicated on margin of Napaktok dyke and wall rock

Zones of protomylonite, mylonite, ultramylonite and tectonic breccia of subvertical, east-verging fault zones, metres to hundreds of metres wide in the tectonic foreland; (vertical and inclined attitude of plane, and plunge of down-dip lineation indicated)

Structural trend derived from aerial photographs

Archean

Gneissosity in high strain zone (inclined, vertical); straightened gneiss, may be Proterozoic

Gneissic layering and gneissosity (inclined, vertical, horizontal)

Plunge of mineral lineation and axis of small fold (lineation may be combined with gneissic layering and gneissosity symbol); composite Archean fabric or age unknown

Plunge of mineral lineation and axis of small fold (lineation may be combined with gneissic layering and gneissosity symbol); main phase Archean deformation associated with isoclinal recumbent folds and with subsequently refolded fabrics on upright axial planes

Upright antiform, synform (plunge may be indicated); cross-hatch indicates refolded fold on upright axial plane

Overturned antiform, synform (plunge may be indicated)

LEGEND

Churchill and Nain Province

QUATERNARY

Q — Unconsolidated Deposits
Mainly drift-covered areas comprising gravel and sand

NEOHELIKIAN

Nd7 — Nutak Dykes
Olivine diabase, gabbro and noritic dykes; superscript indicates width of dyke in metres; dated by U-Pb baddeleyite at ca. 1270 Ma

Nqm — Umiakovik Quartzmonzonite
Massive, medium- to coarse-grained, leucocratic, pyroxene-bearing rocks; may include biotite-hornblende granite and fayalite monzodiorite, all part of the Umiakovik Lake Batholith.Dated by U-Pb zircon at ca. 1320 Ma.The area of contact metamorphism and injection migmatite surrounding the body is indicated

Churchill Province

EARLY PROTEROZOIC

11 — Granitic Gneiss
Pink to red, leucocratic, xenolithic, mylonitic gneiss, intruded by pegmatite; L>S fabric at amphibolite grade in the Falcoz zone of sinistral shear
11a: The same rocks as unit 11, but occurring immediately east of the opx-isograd of the eastern Falcoz zone; L>S fabric* at granulite grade
11b: Brown-red, biotite-hornblende gneissic granite at amphibolite grade in granulite facies rocks
11c: Layered quartzofeldspathic rocks (unit 7) injected by abundant pink, leucocratic (alaskitic) granite

10 — Gneissic Charnockitic and Enderbitic Rocks
Homogeneous, brown, medium- to coarse-grained, orthopyroxene-bearing intrusive rocks, locally containing abundant inclusions of wall rocks (units 7, 8, 9 and Tp); L>S fabric*. The rocks also occur as a common component, at outcrop scale, in the regional gneisses of unit 7. A singular sample dated by U-Pb zircon at ca. 1880 Ma, 1840 Ma and 1825 Ma reflect times of intrusion and two phases of metamorphism, respectively

Tp — Tasiuyak Paragneiss
Generally white, medium- to very coarse-grained, discontinuously layered to locally mylonitic, L-S tectonite; the paragneiss contains garnet (10 to 30 %), quartz, and feldspar (generally An30,and lesser amounts of microcline) and less than 10 per cent collectively of biotite, sillimanite, graphite, rutile and sulphide; includes numerous layer-concordant and -discordant, sheared, white, perthite or microcline-bearing, pegmatoid layers
Tp2: Rusty, pelitic paragneiss with isolated units of feldspathic quartzite less than one metre wide
Tpg: White, megacrystic perthite granite (anatectite) containing less than 10 per cent biotite and garnet
Tpm: Migmatite; diatexite of paragneiss and perthite granite components. Dated by U-Pb zircon at ca. 1860 Ma and ca. 1840 Ma reflecting times of melting and deformation
Tpma, nebulous mixtures of brown charnockitic rocks (unit 10) and the paragneiss
Tpo: Rocks mineralogically similar to Tasiuyak paragneiss but intercalated with metasediments of unit 9, and containing orthopyroxene locally
Isolated Rock Units within Tasiuyak Paragneiss
Tgn: Quartzofeldspathic gneiss; magnetite, biotite, hornblende and hypersthene (+/- garnet); minor quartzite; rusty and flaggy weathering
Tum: Ultramafic rocks and amphibolite; garnet, hornblende, olivine, plagioclase, clino- and orthopyroxene

9 — Metasedimentary Rocks of Lac Lomier Complex
Undivided, granoblastic, garnetiferous quartzofeldspathic paragneiss (garnet,orthopyroxene), feldspathic quartzite, and calc-silicate and impure marble (vesuvianite, diopside, forsterite, calcite, garnet); lesser amounts of metapelite (garnet, sillimanite,cordierite, biotite) and meta-semipelite, (garnet, hypersthene, biotite); locally, includes rocks similar in mineralogy to Tasiuyak Paragneiss
9a: Mainly metapelite and meta-semipelite
9b: Mainly calc-silicate and impure marble
9c: Diopside gneiss; quartz-rich, clinopyroxene-bearing rocks locally containing layers and lenses of clinopyroxene amphibolite
9d: A singular occurrence of magnetite Fe-formation in amphibolite and calc-silicate rocks

8 — Basic Rocks and Amphibolite
Undivided, gneissic, basic rocks and layered amphibolite (hornblende, clino- and orthopyroxene, plagioclase)
8a: Medium- to coarse-grained, texturally variable, basic rocks and minor amphibolite probably derived from gabbro and dioritic rocks; L>S fabric*
8b: Fine- to medium-grained, layered amphibolite (+/- garnet), generally associated with layers of rusty Fe-sulphide facies rocks adjacent to metasediments of unit 9; probably derived from mafic volcanic rocks

7 — Layered Quartzofeldspathic Gneiss, Orthogneiss, and Migmatite
Undivided rocks of Lac Lomier complex at granulite grade containing abundant remnants of amphibolite and supracrustal rocks; includes charnockitic and enderbitic rocks of unit 10, basic rocks of unit 8a, and late syn-shear granitoids and pegmatites in amphibolite facies
7a: Strip of quartzofeldspathic, layered gneisses in the Nain-Churchill boundary zone in amphibolite and granulite facies; the gneisses occur without the Napaktok amphibolite dykes (Ad), considered to be diagnostic of Nain Province basement rocks

Nain Province

EARLY PROTEROZOIC

Ag — Granite
Massive, medium- to coarse-grained, pink-grey, biotite granite; microcline microperthite, zoned plagioclase, strained quartz and trace amounts of hornblende; accessory minerals include zircon, allanite, apatite, opaque oxide and fluorite; these rocks appear to be confined to the Labrador Sea shelf on White Bear, Saddle, Stirrup, and Opingivikssuak Islands which yield U-Pb zircon ages of ca. 1775 Ma
Agr: Massive, brick-red weathering, masses of leucocratic granite (alaskite, e.g. Coopers Island), and dykes that cut Mugford Group and the early Proterozoic Napaktok dykes (Ad)
Agg: Massive, coarse grained, orthopyroxene gabbro; a singular occurrence located on the western side of Opingivikssuak Island; intruded by cogenetic granite

AM — Mugford Group
Well bedded, weakly foliated rocks in subgreenschist facies
AMa: Upper volcanic unit; agglomerate, breccia, minor basaltic flows and sills
AMb: Middle sedimentary unit; argillite, calcareous argillite
AMc: Lower volcanic unit; basalt flows, massive and pillowed; volcanic breccia, agglomerate, minor interbedded argillite and chert; numerous basalt sills near base
AMd: Lower sedimentary unit; black slate, argillite, dolostone, mudstone breccia, chert; intruded by basaltic sills
AMe: Basal clastic unit; purple sandstone, flaggy sandstone and minor conglomerate; the unit is rarely intruded by basaltic sills, and is confined to the northwestern part of the group

Previous geology by Taylor (1977); geology of Mugford Group after Smyth (1976); petrographic description of granitic rocks for Wheeler Mountain, Umiakovik Lake, and of the coastal massive granite masses, after R.F. Emslie , (pers. comm.,1991); location of sulphide mineralization and chemical analyses from Girard (1990).
Geology by I. Ermanovics, M. Van Kranendonk, F. Mengel and L. Corriveau; in 1987, also by R. Vande Kemp; in 1988, also by R. Sherlock, F. Falardeau and N. Ravnsborg; in 1989, also by R. Girard, K. Bethune, S. Hanmer and D. Scott. Compilation and interpretation by I. Ermanovics, M. Van Kranendonk and in part by R. Girard. Cartography by I. Ermanovics and by staff of the Cartography Section of the Geological Survey of Canada.

AR — Ramah Group
Undivided, tectonic remnants of schists probably derived from the Rowsell Harbour Formation of Ramah Group that includes pelite, quartzite, greywacke, and minor amounts of calc-silicate, conglomerate and mafic sills; the intensity of deformation (mainly sinistral shear) and degree of amphibolite facies metamorphism increases southward; metamorphic mineral assemblages include sillimanite-biotite-garnet, perthite-hornblende-garnet, and hornblende-plagioclase-garnet
Areas of outcrop of the group are considered to be important and hence are indicated with stipple ornament

- Unconformity -

Ad7 — Napaktok Dykes
Tholeiitic, clinopyroxene-bearing, diabase and medium grained gabbroic rocks; the dykes are progressively altered from east (subgreenschist facies) to west (amphibolite facies) where hornblende-garnet develops in shear-foliated amphibolite dykes
Adb: Diabase-wall rock breccia dykes
Adf: Fragmental and breccia dykes
The superscript indicates the width of dyke in metres

AW — Wheeler Mountain Granite
Weakly foliated, coarse grained, pink to grey-pink hornblende-biotite granite; microcline microperthite, zoned plagioclase, highly strained to polygonal quartz, and chloritized biotite; accessory minerals include zircon, allanite, apatite, opaque oxide and fluorite; intruded by Napaktok dykes (Ad). Dated by U-Pb zircon at ca. 2135 Ma. The area of contact metamorphism and injection migmatite surrounding the body is indicated

LATE ARCHEAN

The Archean rocks in Nain Province are overprinted by the Proterozoic metamorphism that grades from subgreenschist facies in eastern Nain Province, to amphibolite facies in the tectonic foreland, to granulite facies in the Torngat orogen of eastern Churchill Province. The mineralogy of rocks listed below reflect Archean assemblages.The age of the rocks and times of Archean metamorphism and deformation range from ca. 2550 Ma to 3700 Ma but have eluded systemization as events

6 — Granitic Rocks
6a: Okak Harbour granite; massive to weakly foliated, grey, medium grained, biotite granite intruded as subhorizontal sheets 5 to 20 metres thick. Dated by U-Pb zircon at ca. 2555 Ma
6b: Areas of abundant, pink, late granitic veins and small irregular masses of pegmatitic biotite granite

5 — Ultramafic Rocks
Rusty brown weathered, coarse grained, variably serpentinized, massive to locally layered, pyroxene-olivine bearing rocks intruded into units 1 to 4
5a: Mainly serpentinite

MIDDLE AND EARLY ARCHEAN

4 — Layered Basic, Mafic and Ultramafic Rocks
Meta-anorthosite, metagabbroic anorthosite, metagabbro, metadioritic rocks, amphibolite and ultramafic rocks in granulite facies and in overprinted Proterozoic amphibolite facies in rocks of the tectonic foreland; probably derived from layered intrusions of possibly more than one age. Three principal associations are recognized
Okak Harbour type:
4a: Anorthosite, and gabbroic anorthosite; white homogeneous and tiger-striped components; CI 5 to 25; hornblende-plagioclase+/-orthopyroxene; minor layers of gabbroic and ultramafic rocks
4a1: Amphibolite, minor gabbro and ultramafic rocks
Sarah Lake type (associated with metasediments):
4b: Coarse grained, white to pale lilac to buff coloured anorthosite; CI<10, garnet-plagioclase-clinopyroxene
4b1: Dioritic and minor gabbroic rocks (+/- orthopyroxene)
4b2: Gabbro and minor amphibolite and ultramafic rocks
4b3: Ultramafic rocks; layered to massive; hornblende, clino- and orthopyroxene, olivine, spinel
Tectonic Foreland type (west of Ramah Group):
4c: Anorthosite, gabbroic anorthosite and diorite, associated with minor amphibolite and ultramafic rocks; texturally variable rocks occurring as tectonic remnants overprinted by Proterozoic high grade metamorphism

3 — Metasedimentary Rocks
Schistose and layered rocks injected by coarse grained, granitic material; generally intercalated with layered amphibolite (unit 2b)
3a: Metapelite, garnet-sillimanite-biotite-cordierite; meta-semipelite, garnet-orthopyroxene-biotite; paragneiss, (granoblastic, quartz-rich, quartzofeldspathic gneiss)
3b: Quartzite; may be indicated with other rocks as 3a,b
3c: Fe-formation; magnetite-orthopyroxene-quartz, commonly interlayered with 'quartzite'(chert); may be indicated with other rocks as 3a,b,c
3d: Impure marble and calc-silicate rocks; diopside-carbonate +/-forsterite; may be indicated with other rocks as 3a,b,c,d
3e: Areas of metasediment and amphibolite containing abundant (up to 60%) internally mobilized or injected granitic components

2 — Amphibolite and Basic Gneiss
Undivided rocks, commonly injected with up to 30 per cent coarse grained granitic material; the rocks contain hornblende, plagioclase, clino- and orthopyroxene
2a: Homogeneous, medium- to coarse-grained, black to dark green, locally plagioclase-phyric rocks; probably derived from mainly gabbro and dioritic rocks
2b: Layered (cm/dm-scale) green, black, and white-grey, medium grained, granoblastic rocks (+/-garnet), usually intercalated with metasedimentary rocks (unit 3); probably derived from mafic volcanic rocks
2c: Undivided ultramafic rocks

1 — Metaplutonic Rocks, Gneisses and Migmatite
Undivided, leucocratic and minor mesocratic, polydeformed, compositionally and texturally hybrid metaplutonic rocks of several generations; in part older and younger than rocks of units 2,3 and 4; subdivisions below characterize the main rock types of the map area and are indicated *en carte* without geological boundaries
1a: Layered and gneissic quartzofeldspathic rocks underlying Mugford Group (Kaumajet Mountains); amphibolite grade in these rocks is an Archean feature
1b: Enderbitic (granodioritic and tonalitic) orthogneiss; areas of relatively homogeneous and minor layered rocks; orthopyroxene occurs in layers and in coarse grained feldspathic segregations; locally, L>S fabric*
1c: Layered and gneissic granodioritic rocks characterized by trains of podiform enclaves and sheets of amphibolite possibly derived from Saglek dykes; 1c1, megacrystic feldspar, L>S*, granite
1d: Migmatite; includes reworked rocks listed above and blocks of reworked amphibolite in masses of concordant and discordant gneissic, locally orthopyroxene-bearing, white granitic rocks
G1: Areas of well preserved Archean granulite facies rocks

* Footnote: L tectonites are dominated by linear fabric elements
S tectonites are dominated by planar fabric elements

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Girard, R., 1990, Géologie de la région du lac Courdon: Ministère de l'Énergie et des Resources du Québec, Preliminary Report, MB 90-20, 60p.
Taylor, F., 1977, Geology, North River-Nutak map area, Geological Survey of Canada, Map 1436-A.
Smyth, W.R., 1976, Geology of the Mugford Group, northern Labrador, *in* Report of Activities: Newfoundland Department of Mines and Energy, Report 76-1, p. 72-79.
See also Wardle et al. (p217), Ryan (p. 276), Ermanovics (p.279) and Van Kranendonk (p. 231 and p.283) in the December 1990 issue of Geoscience Canada, volume 17 number 4.
1:50,000 scale geological maps are available for certain parts of the map area. These include the Archean supracrustal structural basin 6 km SSE of Pisolet Bay, and the layered intrusion (unit 4b) south of Sarah Lake. Such maps were produced by M. Van Kranendonk as part of his PhD dissertation at Queen's University.

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COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA
1992

Map 1: NTS sheets 14L/1, 14E/16 and 14F/13

GEOLOGY–GEOLOGIE

NORTH RIVER - NUTAK MAP AREA

NEWFOUNDLAND (LABRADOR)–QUEBEC

Scale 1:100 000 - Échelle 1/100 000

Kilometres 2 0 2 4 6 8 Kilomètres

Universal Transverse Mercator Projection — Projection transverse universelle de Mercator

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