GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Mines and Energy
Geological Survey

OPEN FILE 013E/0061
MAP 2000-01

BEDROCK GEOLOGY MAP OF THE WILSON LAKE AREA (13E/SE)

LABRADOR

Scale 1:100 000

Kilometres

2 0 2 4 6 8

Geology by A. Thomas, P. Blomberg 1989 and V. Jackson, G. Finn, 1982

Geological cartography by A. Thomas, 2000

This preliminary map is subject to revision and modification

Recommended citation:

Thomas, A., Blomberg, P., Jackson, V. and Finn, G.
2000: Bedrock geology map of the Wilson Lake area (13E/SE), Labrador. Newfoundland and Labrador Department of Mines and Energy, Geological Survey, Map 2000-01, scale 1:100 000. Open File 013E/0061

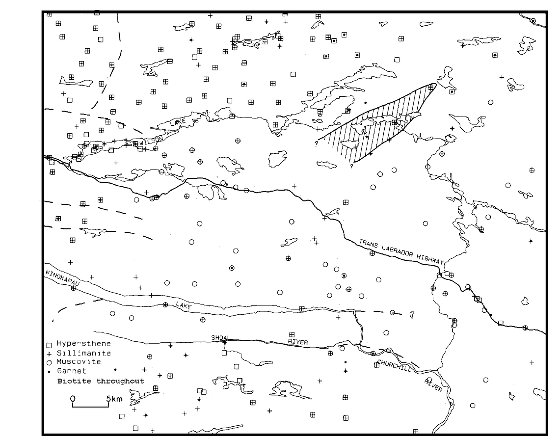
Approximate mean magnetic declination (based on 1984 and 1985 data recalculated to 2000) for centre of map is 25° 50' West, decreasing 9.6' annually

Universal Transverse Mercator Projection, Zone 20

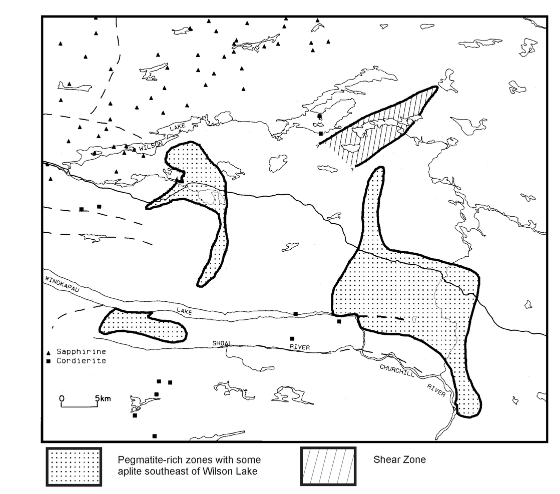
Elevations in metres above mean sea level
CONTOUR INTERVAL 30 METRES
North American Datum 1927

Contribution to the Canada-Newfoundland Mineral Development Agreement, 1984-1990

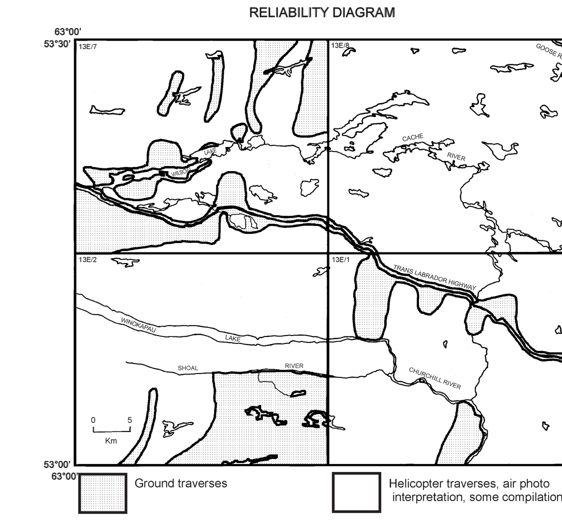
HYPERSTHENE, SILLIMANITE, MUSCOVITE, GARNET LOCALITIES



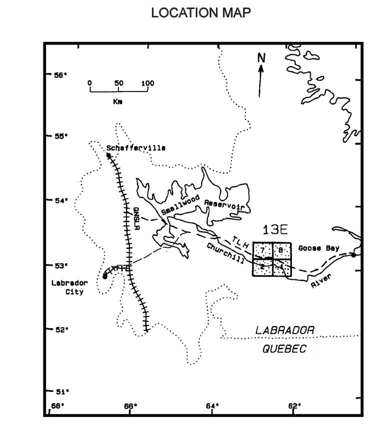
SAPPHIRINE AND CORDIERITE LOCALITIES



RELIABILITY DIAGRAM



LOCATION MAP



Copies of this map can be obtained from the Geoscience Publications and Information Section, Geological Survey, Department of Mines and Energy, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, Newfoundland, Canada, A1B 4J6, Tel (709) 729-3159 or Fax (709) 729-4491

NOTES

The Wilson-Winokapau lakes area lies within a mid to late Precambrian mixed gneiss, granitoid and gabbroid crystalline terrane, which belongs to the northern Grenville Province in central Labrador. Rocks within the map area are part of a widespread regional, in part thrust fault bounded, salient block termed the Wilson Lake allochthon. Paragneiss derived from an aluminous sedimentary protolith is the oldest lithology present, and has been dated by Currie and Loveridge(1985) at **1699 ± 3 Ma**, and Corrigan(1997) at **1639 ±1 Ma.**

There are nine main bedrock units recognized in the Wilson-Winokapau lakes area, the oldest of which is banded amphibolite to granulite facies Disappointment Lake paragneiss. Granulite facies paragneiss **(Awph)** is welded, quartzofeldspathic, rusty pink to buff coloured on weathered surfaces and exhibits a polygonal granoblastic texture. Banding comprises prismatic to fibrous sillimanite, hypersthene, magnetite, and locally abundant sapphirine and/or cordierite, as well as minor biotite, in anastomosing, melanocratic restite layers, separated by quartz and feldspar mobilizate layers. Both layer parallel and crosscutting quartz-feldspar sweats and veinlets are common, and may or may not contain hypersthene. Granulite gneiss contains numerous boudinaged mafic dykes and inclusions, probably related to gabbronoritic bodies (Pwgn). Also present locally in proximity to these mafic rocks, are sizeable oxide zones **(Awpo)** containing massive magnetite-ilmenite layers. Middle to upper amphibolite facies paragneiss **(Apm)**, is less dense and more fissile than its granulite facies counterpart. Also pink to buff-white in colour, it is comprised of sillimanite, abundant biotite and muscovite, garnet, and magnetite-ilmenite as well as rare cordierite, in melanocratic restite layers. Quartz and feldspar are confined to mobilizate layers. Sillimanite tends to form radiating clusters with biotite and muscovite, along restite/mobilizate layer boundaries. Garnet occurs as porphyroblasts in a polygonal granoblastic matrix. Diabase dykes and boudins are also present in amphibolite paragneiss, as are zones of banded diorite or quartz diorite gneiss **(Aod)**. Pegmatite occurs everywhere in amphibolite gneiss, but particularly southeast of Wilson Lake, south of Winokapau Lake, and northeast of the outlet from the lake of the Churchill River. Early pegmatite dykes are contorted and/or ptygmatically folded; bodies are sheared and cataclasized. Late pegmatite dykes and dykelets are undeformed and crosscut gneissic banding. Disappointment Lake paragneiss exhibits well developed linear and planar fabrics throughout, as well as complex major and minor fold patterns including mushroom, dome and basin, isoclinal, chevron and hook fold structures.

Marble **(Am)** occurs at two places southeast of the east end of Winokapau Lake. It is bright white where fresh; but has a dull grey surface that weathers in relief. It is banded, with prominent silica-rich layers, separated by coarsely granoblastic calcite dominated layers. In addition to calcite and dolomite which constitute 75 to 80 percent of the rock, talc, tremolite, diopside, siderite, microcline, muscovite and chlorite are also present. Layering within the marble represents transposed bedding, and the marble may be derived from original, impure siliceous limestone interbeds within paragneiss.

Intrusive bodies of noritic to gabbroic composition **(Pwgn)** occur throughout granulite facies paragneiss, especially north of Wilson Lake. They are deformed and elongated, likely derived from dykes and sills. Gabbronorite is massive, medium-grained, with ophitic to subophitic textures in the central parts of the bodies, becoming polygonal granoblastic along sharp, intrusive, commonly chilled marginal contacts with paragneiss. These rocks contain hypersthene, augite, hornblende, brown biotite, plagioclase, magnetite-ilmenite and rare olivine or garnet.

Beaver River gneiss **(Pmgns)** is melanocratic, dark green, and exhibits medium- to coarse-grained granoblastic texture. Although locally wider, banding is poorly to moderately well-developed on a centimetre scale. White to grey, garnet, feldspar, magnetite-rich leucocratic mobilizate layers, alternate with melanocratic restite layers containing hypersthene, augite, hornblende, biotite, garnet, magnetite and minor pyrite, chlorite and green spinel. These features impart to the gneiss a mottled salt and pepper appearance. Compositional and mineralogical similarities, as well as local gradational contact relationships between Beaver River gneiss and unit Pwgn gabbronorites, suggest that the former is a more intensely deformed and metamorphosed equivalent of the latter.

Several small isolated peridotitic ultramafic bodies **(Pum)** occur within granulite facies paragneiss. They are dark green to black, massive, medium- to coarse-grained, and contain olivine, ortho- and clinopyroxene, brown biotite, serpentine and magnetite-ilmenite. These bodies are probably intrusive into the paragneiss, and may be genetically related to Pwgn gabbronorite.

A large body of orthogneiss **(Pogn)** occurs along three quarters of the eastern border of the map area. The gneiss is pink, migmatitic, has a well developed banded and/or augen textute, and is probably derived from equigranular and porphyritic granite/granodiorite, as evidenced by the preservation of a porphyritic to megacrystic igneous textured core within the body. Quartz-, orthoclase-, and microcline-rich leucocratic mobilizate layers alternate with melanocratic restite layers containing biotite, hornblende, muscovite, chlorite. minor sillimanite and rare epidote. Orthoclase augen after megacrysts, occur in a groundmass of equigranular polygonal, to interlobate granoblastic textured quartz and feldspar. Xenoliths or screens of both gabbro **(Pg)** and muscovite-sillimanite paragneiss **(Apm)** are present within the orthogneiss. Part of a body **(Pognh)** of similar nature, composition and appearance occurs near the south-central edge of the map, but includes hypersthene in addition to the mineralogy listed for Pogn.

The Mouni Rapids pluton **(Pmg)** comprises three separate, tectonically dismembered segments of a small, originally diapiric(?) body. All segments occur in granulite facies paragneiss, and two appear to occupy the cores of major regional folds. The third is stretched into an elongate northeast-trending mass. Rocks of the pluton are pink to buff white, exhibit porphyritic to megacrystic igneous textures where little deformed, and banded gneissic to augen textures where moderately to intensely foliated. Composition of rocks within the pluton is mostly granitic to granodioritic, with local dioritic, quartz dioritic and hornblende granite variants. Mineralogy comprises clinopyroxene, hornblende, biotite, garnet, muscovite, chlorite, minor sillimanite, quartz, orthoclase, microcline and magnetite-ilmenite.

The Wilson Lake granodiorite body **(Pgrd)**, which intrudes amphibolite facies paragneiss **(Apm)** just west of the centre of the map area, includes pink to white megacrystic, porphyritic and aplitic variants. The core of the body is massive and megacrystic, whereas the borders exhibit gneissic polygonal granoblastic and/or augen textures. White to pink aplite intermixed with pegmatite-rich material, dominates in western and northwestern parts of the body, whereas pegmatite veins and dykes are common throughout. Wilson Lake granodiorite contains quartz, orthoclase, microcline, biotite, muscovite, chlorite and magnetite-ilmenite.

Several outcrops of foliated gabbro to quartz gabbro **(Pg)** occur within orthogneiss near the eastern boundary of the map area. These rocks are deformed and metamorphosed, but show relict igneous texture. Mineralogy consists of plagioclase, pyroxene, hornblende, biotite and magnetite-ilmenite with rare quartz crystals. Age and affinity are unknown.

Rocks within the Wilson-Winokapau lakes area have been subjected to both the Labradorian **(ca. 1700 to 1600 Ma)** and Grenvillian **(ca. 1000 Ma)** orogenies, and form a 65 km wide S-shaped crustal belt which is part of an allochthonous thrust sheet (nappe?). This sheet has been emplaced from the south or southeast, and its deepest level is exposed in the northwestern part of the map area as a granulitic massif, with progressively shallower levels occurring in a southeasterly direction. Within the crustal belt, complex polyphase structural patterns have resulted in refolded folds, transposition structures, hook folds, and chevron folds occurring at scales from the microscopic to the megascopic. At outcrop and map scales there is evidence for four generations of folds. At present none are correlated specifically with individual orogenic events. Early isoclinal F1 folds have been refolded about later F2 fold axes of unknown original orientation, such that F1 and F2 are now coaxial. These have then been folded into F3 isoclinal structures, which are generally overturned to the southeast, with axes trending northeast, and axial planes dipping northwest., although some F3 folds are open and upright. Both mineral and tectonic lineations associated with F1, F2, and F3 folds, plunge primarily to the northwest, and to a lesser extent the south or southeast. F1, F2, and F3 structures are now for the most part colinear or nearly so, and the F3 folds define the predominant structural grain of the map area. Late, large scale open F4 folds with easterly to northeasterly trending axes, have refolded earlier structures into dome and basin patterns, and have imparted to the belt its regional S-shaped geometry. One of these folds has its nose in the vicinity of Wilson Lake, and another in the Cache River area near the east end of Winokapau Lake.

F3 folds have been faulted and sheared out along their limbs by east-west trending normal or strike slip faults. Examples of these occur in the valleys of both Winokapau Lake and the Shoal River, where sheared, mylonitic and fault brecciated rocks are common. An 8 km wide northeasterly trending zone of sheared and mylonitized granulite facies paragneiss, extends over a strike length of 15 km along the northern part of the Cache River. It may represent a fault zone, but its significance is unknown due to lack of exposure.

With the exception of the cores of some gabbroic and plutonic igneous bodies, all rocks within the Wilson-Winokapau lakes area have been intensely metamorphosed. Paragneiss, orthogneiss and gabbroids in both the northwestern and southern parts of the map area have been metamorphosed to granulite facies. The northwestern paragneiss is rich in the high pressure and temperature magnesium-iron silicate mineral sapphirine, whereas in the southern paragneiss cordierite predominates. An assemblage consisting of hypersthene, sillimanite, biotite, sapphirine, cordierite, quartz, feldspar and garnet typifiies these rocks. Evidence of retrogression is present in the northwest, by the reaction sapphirine + quartz = hypersthene + sillimanite, supported by textures of coarse sapphirine crystals with rims of hypersthene and sillimanite. Rocks within the central and eastern parts of the map area have undergone middle- to upper amphibolite facies metamorphism, as evidenced by the paragneiss assemblage sillimanite, biotite, muscovite, quartz, feldspar, and garnet. Much or all of the muscovite may be retrograde, the paragneiss **(Apm)** being an amphibolite retrogressed equivalent of granulite facies **(Awph)** paragneiss, but textures are inconclusive. Secondary greenschist facies metamorphism indicated by the presence of chlorite, epidote, retrograde biotite, and calcite, is widespread but discontinuous and patchy. Geochronological and metamorphic studies in surrounding areas suggest that most of the high-grade metamorphism occurred during the **ca. 1700 to 1600 Ma** Labradorian Orogeny. These rocks may also have been affected by an intense **ca. 1000 Ma** Grenvillian metamorphism, but due to their anhydrous nature the affects of this latter event are difficult to identify.

Evidence of economic mineralization is sparse, but ultramafic bodies **(Pum)** are mineralized with magnetite-ilmenite and possibly chromite. In addition, the oxide zones **(Awpo)** contain significant concentrations of magnetite and ilmenite. Wide expanses of the area are underlain by pegmatite, some of which is very coarse-grained with orthoclase crystals and muscovite books up to 10 cm in length. Coarse crystals of blue-green amazonite occur in boulders of pegmatite found at several localities along the Trans Labrador Highway, and it is possible that economic mineralization may be present in this rock type.

REFERENCES

Corrigan, D., Rivers, T., and Dunning, G.R.
1997: Preliminary report on the evolution of the allochthon boundary thrust in eastern Labrador; Metchin River to Goose Bay; *in* Wardle, R.J. And Hall, J. (compilers), 1997. Eastern Canadian Shield Onshore-Offshore Transect (ECSOOT), Transect Meeting (April 14-15, 1997), The University of British Columbia, LITHOPROBE Secretariat, Report number 61, 218p.

Currie, K.L., and Loveridge, W.D.
1985: Geochronology of retrogressed granulites from Wilson Lake, Labrador; *in* Current Research, Part B, Geological Survey of Canada, Paper 85-1B, p. 191-197.

LEGEND

MESOPROTEROZOIC or OLDER

- **Pg** — *Foliated gabbro and/or quartz gabbro*
- **Pgrd** — Wilson Lake granodiorite: *foliated porphyritic to megacrystic granite/granodiorite, massive pink granodiorite, augen gneiss after porphyritic granite/granodiorite, biotite orthogneiss, pegmatite, aplite. Intrusive into middle to upper amphibolite Disappointment Lake paragneiss*
- **Pmg** — Mouni Rapids pluton: *foliated porphyritic to megacrystic granite/granodiorite and/or augen gneiss after megacrystic granite/granodiorite; minor quartz diorite, diorite and hornblende granite. Intrusive into granulite facies Disappointment Lake paragneiss*
- **Pogn** — *Banded- to augen-textured pink, migmatitic, biotite, quartz, feldspar orthogneiss after possible equigranular to porphyritic granite/granodiorite. Commonly intruded by coarsely crystalline pegmatite dykes.* **Pognh** *is same unit, but hypersthene-bearing*
- **Pum** — *Pyroxene, magnetite-bearing ultramafic rocks of unknown affinity*
- **Pmgns** — Beaver River gneiss: *well banded mafic orthogneiss derived in part from gabbro-norite and containing orthopyroxene, clinopyroxene, amphibole, garnet, feldspar and minor quartz*
- **Pwgn** — Gabbronorite: *massive igneous to metamorphic textured gabbro, quartz gabbro, norite and leuconorite. Intrusive into granulite facies Disappointment Lake paragneiss*

PALEOPROTEROZOIC or OLDER (Note: to maintain continuity of geological units with those in adjacent map areas, label A representing Aphebian in the old classification system is used)

Disappointment Lake paragneiss (Apm to Am)

- **Am** — *Talc, tremolite, diopside and wollastonite(?)-bearing white marble*
- **Awph** — **Awph;** *welded granulite facies quartzofeldspathic paragneiss containing sillimanite, biotite, hypersthene, magnetite and rare garnet with or without sapphirine, cordierite and minor muscovite. Contains numerous boudinaged mafic dykes and inclusions, rare oxide zones* **(Awpo)** *and small intrusive bodies of charnockite and charnockite gneiss*
- **Apm** — **Apm;** *middle to upper amphibolite quartzofeldspathic paragneiss containing sillimanite, abundant muscovite, biotite and garnet with or without kyanite and rare cordierite. Intruded by abundant deformed and undeformed, coarsely crystalline pegmatite dykes. Also contains zones of banded diorite to quartz diorite gneiss* **(Aod)** *and granodiorite melt*

Rock outcrop, area of outcrop
Geological boundary (defined, approximate, assumed)
Gneissosity, gneissic banding (horizontal, inclined, vertical)
Schistosity, cleavage, foliation (horizontal, inclined, vertical)
Bedding, tops unknown (horizontal, inclined, vertical)
Lineation, mineral, cleavage intersection (inclined)
Lineation, axes of minor folds (inclined)
Structural trend with dip (interpreted from air photos)
Synform, antiform (plunging)
Synform, antiform overturned (plunging)
Fault, relative movement indicated (defined, approximate)
Fault (defined, approximate)
Mineral occurrence (mineral type indicated) — Pyrite
Geochronology sample locality

Note: Structural symbols are offset slightly in position from their respective outcrop localities, which are marked with an outcrop symbol.