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

SUMMARY DESCRIPTIONS OF MAP UNITS FOR 1:50 000 scale NTS SHEETS 14D/3,4,5 and 6, and 24A/1 and 8 (Not all units are present on this sheet)

QUATERNARY

Surficial deposits

Glacial and fluviatile deposits of sand, gravel, and boulders; swamp and bog locally, especially on map sheets 14D/4 and 14D/5. (Significant bedrock outcrops, in addition to those indicated on the maps as being visited on the ground or spotted from the air, are likely present within some of the areas dominated by the glacial debris, particularly on the walls of river valleys.)

MIDDLE MESOPROTEROZOIC

Strange Lake intrusive suite

M2:S *Western part of map sheet 24A/8, along the border with Québec.*
Fine- to medium-grained, rare-metal-enriched, peralkaline, arfvedsonite granite; includes pegmatitic and aplitic phases; crystallization age, indicated by U-Pb isotopic data from zircon, is 1240 +/- 2 Ma (see Geochronological Notes for map sheet 24A/8).

Nain (Harp) dykes?

M2:Dm *The largest olivine gabbro dykes in the area, particularly those found on map sheets 14D/5 and 6. These are especially prominent examples of rocks otherwise encompassed by "second generation" dykes as described in an accompanying map note regarding dyke symbols.*
Predominantly medium- to coarse-grained olivine- and titanaugite-bearing, locally friable, diabase and gabbro, but some rocks are olivine-free. Except for a local low-temperature alteration of the constituents, these are fresh rocks, in which the mauve titanaugite is disposed as poikilitic masses; the finest grained parts of these dykes exhibit microscopic quenched textures and microphenocrysts of plagioclase and pyroxene. These dykes are probably members of a 1270 Ma swarm which intrudes the Nain Plutonic Suite along the Labrador coast. The olivine gabbro intrusion (Unit M2:Y) may be contemporaneous with these dykes or it may be an older intrusion.

Nain Plutonic Suite

M2:Y *Confined to the northeast corner of map sheet 14D/3.*
Fine-grained to very coarse-grained, dark-green- to brown- to white-weathering, biotite-bearing olivine gabbro and leucogabbro; locally displays a crude stellate array to the plagioclase laths. Generally massive, but locally exhibits a well-defined plagioclase lamination and a diffuse compositional layering. This intrusion is geographically divorced from the closest members of the 1350 -1290 Ma Nain Plutonic Suite (NPS), but may be the same age. Alternatively, it may be related to a slightly younger olivine-gabbro dyke swarm that transects the NPS (see Unit M2:Dm above), and thus be a particularly large example of these gabbroic dykes.

EARLY MESOPROTEROZOIC

Napeu Kainiut intrusion

M1:N *Confined to the western edge of map sheets 14D/4, and parts of 24A/1 and 8.*
Hypidiomorphic quartz monzonite and granite; probably the same age as the Mistastin Lake batholith, but lacks rapakivi characteristics.

Mistastin Lake batholith

M1:Mg *Occupies the southern parts of map sheets 14D/3 and 4.*
Predominantly medium to coarse-grained charnockitic (orthopyroxene-bearing) quartz monzonite and granite, displaying rapakivi characteristics such as oval quartz "eyes" and potassium feldspar megacrysts having plagioclase mantles; locally has more mafic, quartz-free, variants (mangerite) along its margin. The chief mafic mineral is inverted pigeonite, locally occurring with subordinate hornblende and biotite along the western margin; olivine appears to be absent. Fine-grained mafic enclaves derived from the disaggregation of contemporaneous mafic intrusions are locally present. Fragments of the country-rock gneisses and abutting massive anorthositic rocks are widely distributed, and a pyroxene hornfels thermal metamorphic aureole has developed in the gneisses adjacent to the intrusion (see accompanying additional note on map sheets 14D/3 and 4 regarding the extent of the aureole).

M1:Ma *Occurs only along the southern part of map sheet 14D/3.*
Medium- to coarse-grained subophitic leuconorite and anorthosite, having widespread distribution of chatoyant plagioclase (labradorite).

LATE PALEOPROTEROZOIC

Granite of uncertain affinity

P3:CGp *Designates an areally-restricted unit near the Quebec border, straddling map sheets 14D/5 and 24A/8*
White-weathering massive to weakly foliated granitic pegmatite, locally having screens of gneiss and being anomalously radioactive by comparison with enclosing gneissic rocks. This unit may be a variant of Unit P3:CG or Unit P1:CQl.

P3:CG *Includes only the granitic rocks of the western parts of map sheets 14D/4 and 5.*
Massive to weakly foliated, generally medium- to fine-grained, pink biotite+/-muscovite granite, having rare garnet; pegmatoidal phases are locally present. The unit possibly includes rocks of more than one generation, and may, in part, be the larger expression of some of the massive to weakly deformed granitic pegmatites that are intruded into the gneisses. It is possible that some of the granitic rocks assigned to Unit AP:CQgp are equivalent to this unit, but the two are separated on the maps because this unit seems to postdate the mylonitic imprint of the abutting gneisses and contains inclusions of mylonitically-foliated gneisses, whereas Unit AP:CQgp predates the mylonitic imprint and exhibits the mylonitic foliation. U-Pb data from zircon and monazite within one medium-grained massive intrusion provide ambiguous ages for the time of crystallization - from ca.1990 Ma to ca. 1760 Ma (see Geochronological Notes for map sheet 14D/4, sample 14D/4(1)).

PALEOARCHEAN TO MIDDLE PALEOPROTEROZOIC

Churchill Province Gneisses and Associated Rocks

Gabbronorite dykes

P1:CDm *The largest granular dykes found in the area, especially on map sheets 14D/3, 4 and 5. These dykes are particularly prominent examples of intrusions that are otherwise encompassed by "first generation" dykes as described in the accompanying map note regarding dyke symbols.*
Generally dark-green to grey to brown, fine- to medium-grained, granular rocks, but locally are coarse-grained. These are "granulite facies" rocks, containing both ortho- and clinopyroxene, but this gabbronorite mineral assemblage may be, in part, a primary rather than metamorphic feature. The dykes retain relicts of gabbroic texture, and locally contain variably recrystallized plagioclase phenocrysts several centimetres in maximum size (e.g., southeast corner of map sheet 14D/5); some of the best preserved plagioclase phenocrysts exhibit flashes of labradorite schiller.

Gabbronorite, monzogabbronorite, garnetiferous granite, and schistose to gneissose derivatives

P1:CGm *Early Paleoproterozoic. Confined to western part of map sheet 14D/4 and the eastern part of map sheet 24A /1.*
Undivided migmatitic unit comprising the mafic rocks of units P1:CG and P1:CGa intruded by white to pink garnetiferous granite of Unit P1:CQw. Either the mafic or granitic rock may be the dominant one in individual outcrops; mafic rocks in areas of abundant garnetiferous granite are likewise garnet-bearing.

P1:CQw *Early Paleoproterozoic. Confined to western parts of map sheet 14D/4,5 and the eastern part of map sheets 24A/1 and 8.*
White-, to pale-grey-, to pink-weathering, garnetiferous and non-garnetiferous massive to foliated biotite granite, and biotite+/-garnet granitic gneiss derived from it; orthopyroxene or sillimanite is locally present, and some of the rocks are enderbitic. These granitoid rocks occur chiefly as large bodies and metre-scale dykes intrusive into units P1:CG and P1:CGa, locally giving rise to a lit-par-lit type migmatite (cf. Unit P1:CGm). These rocks display a variety of foliation types, varying from a weak mineral fabric to a distinct gneissic layering; high strain zones have ultramylonitic rocks. Garnets in this unit have two habits: (i) a homogeneous type randomly scattered through the rock, having irregular to oval morphology, and seemingly syn- to post-tectonic, and (ii) elongate, pretectonic(?) aggregates within the foliation and having associated green spinel, likely derived by granulite-facies metamorphic transformation of another mineral. The unit also locally contains numerous screens of mafic rocks, and may include some garnetiferous rocks of supracrustal origin.

P1:CC *Early Paleoproterozoic. Confined to map sheet 24A /8, near the Québec border.*
Charnockitic, mangeritic and enderbitic rocks, locally garnetiferous, of unknown stratigraphic relationship to enclosing Unit P1:CG, but could be a more quartzofeldspathic variant of it. Most of the rocks assigned to this unit contain both orthopyroxene and clinopyroxene, as well as green to brown hornblende; some of the mangeritic rocks have megacrysts of purplish-pink potassium feldspar. This unit differs from Unit P1:CQw in the paucity of biotite, the scarcity of garnet, and the lack of sillimanite.

P1:CGa *Early Paleoproterozoic. Confined to western parts of map sheets 14D/4 and 5 and the eastern parts of map sheets 24A/1 and 8.*
Rocks considered to be porphyritic equivalents of Unit P1:CG , having either plagioclase or, more commonly, potassium feldspar megacrysts. Most of the rocks are porphyritic quartz-bearing gabbronorite and monzogabbronorite, and augen schist and gneiss derived from them; restricted areas of nonporphyritic rocks also occur within this unit, as do more leucocratic rocks, including foliated enderbite and enderbitic gneisses. Regionally, this group of rocks is intruded by varying sized dykes of garnetiferous granite, leading to a distinctly migmatitic gneiss in places. The augen gneisses encompassed by this unit differ from some superficially similar augen-textured gneisses within Unit AP:CQh directly to the east in being pyroxene-bearing rocks.

P1:CG *Early Paleoproterozoic. Confined to western parts of map sheets 14D/4 and 5 and the eastern parts of 24A/1 and 8.*
A metamorphosed suite of plutonic rocks comprising predominantly fine- to medium-grained gabbronorite and foliated to gneissose derivatives, having components that locally contain quartz and potassium feldspar; rock types range from melanocratic gabbronorite to quartz-bearing gabbronorite and monzogabbronorite to leucogabbronorite. Hydrous minerals are, overall, a minor constituent of this unit on a regional scale; apatite and zircon are widespread accessory minerals, especially in those rocks having significant modal quartz and potassium feldspar. The two pyroxene mineral assemblage is so widespread that it is likely an igneous attribute of these rocks, rather than being a product of regional metamorphism. Primary subophitic and porphyritic (gray plagioclase and purplish potassium feldspar) textures, as well as primary compositional layering are locally preserved; most of these porphyritic rocks are, however, allocated to a separate map subdivision (Unit P1:CGa). U-Pb (zircon) dating of a little-deformed subophitic textured gabbronoritic rock from this metamorphosed plutonic suite has yielded an age of 2304 Ma, interpreted to be the time of crystallization (see Geochronological Notes for map sheet 24A/8, sample 24A/8(1)).

Foliated quartz diorite

AP:CD *Paleoproterozoic? Unit confined to the western part of map sheet 14D/5*
A foliated mafic rock that mesoscopically resembles parts of Unit P1:CG but lacks the pyroxene of that unit; it may be an amphibolitized equivalent, but has microscopic features suggestive of a melanocratic variant of the more quartzofeldspathic rocks to the east, especially by the presence of hornblende, biotite and titanite. White, medium -grained to pegmatitic granitic dykes are locally abundant.

Quartzofeldspathic gneisses of diverse origins

P1:CQl *Early Paleoproterozoic. Includes all the "granitic" rocks between the granulite-facies gneisses and the layered metagabbronorite on map sheets 14D/4 and 5.*
This unit includes more than one generation and variety of granitic rocks, and in places it resembles Unit P3:CG. In the south, it differs from the Unit P3:CG rocks in having much more biotite, and locally having muscovite and sillimanite. In the north, these biotite-rich rocks have an abundance of allanite and epidote. The unit locally displays high strain-zones having fabrics akin to the mylonitic foliation of some inclusions within the granite of Unit P3:CG, implying it had undergone deformation prior to the emplacement of the latter granite. The predominant rock of this unit is a white to pink, aplitic to pegmatoidal, foliated to gneissose, leucocratic one that encompasses rocks of tonalitic to granitic composition. The northern part of the unit on map sheet 14D/5 has very little potassium feldspar, whereas the southern part of the unit on map sheet 14D/4 comprises microcline-rich biotite-leucogranites; the widespread distribution of muscovite, garnet, and sillimanite in the latter imply the precursor magma was either derived from a metasedimentary source or that it has been contaminated by interaction with the same. Some of these rocks have a foliation that is defined simply by biotite-rich schlieren, others are foliated megacrystic types, whereas others are distinctly compositionally layered. This map subdivision also encompasses areas where an earlier biotite-hornblende gneiss (Unit AP:CQh) occurs as numerous screens, as well as undivided areas where the older gneiss is dominant but injected by abundant sheets of the granitoid rock. The unit is locally mylonitized, and displays an augen structure defined by relicts of feldspar megacrysts or knots of quartz and feldspar in a strongly schistose matrix. Several generations of granitic pegmatite are present; some pegmatites are affected by the mylonitic overprint whereas others postdate the mylonitization but are nevertheless locally openly folded or exhibit a pinch-and-swell morphology. Zones of anomalous radioactivity, seemingly related to an abundance of allanite or another radioactive mineral, are present throughout the unit. A U-Pb (zircon) age of 2328 +55/-47 Ma from white schlieric biotite granite in the central part of the unit (on map sheet 14D/5) probably represents the time of crystallization, whereas an age of 1946+/25 Ma from the same sample suite is assumed to be the time of metamorphism and accompanying partial melting. (There is some ambiguity with regard to the metamorphic history of this rock. No field nor microscopic evidence has been found to indicate that this ca. 2330 Ma rock was ever subjected to granulite facies metamorphism, yet the adjacent granulite facies terrane is, by comparison with other parts of the Churchill Province in northern Labrador, considered to be a product of such regional metamorphism at ca. 1860 Ma.)

AP:CQgp *Paleoproterozoic? Distributed over map sheets 14D/3 and 14D/6.*
Pink-weathering, fine-grained to pegmatoidal, microcline-bearing, biotite leucogranite; rarely garnetiferous. Has narrow screens of older migmatitic gneisses locally, and in parts of the older gneiss units these generally layer-parallel granitic intrusions may constitute over 50% of an outcrop area (smaller sheets are shown schematically in such areas on the maps). Deformational features vary widely in this unit, from being nonexistent, to a weakly developed quartz and biotite foliation anastomosing around feldspar lozenges, to strongly mylonitic; some areas of this granitoid rock have a diffusely layered and gneissic aspect. None of the numerous intrusions encompassed by this map subdivision seem to have been metamorphosed to granulite facies, implying that emplacement postdated peak regional metamorphism (see comment at end of Unit P1:CQl). Some of the rocks assigned to this subdivision through the central part of map sheet 14D/6 may, instead, be part of Unit A:CQa. These granitic rocks are especially abundant on map sheet 14D/3 where they are interlayered with amphibolite-facies gneisses of the Mistastin River mylonite (shear) zone south of the Kogaluk River and with the granulite-facies gneisses along the north margin of the Mistastin Lake batholith. Proximal to the Mistastin Lake batholith, these rocks locally contain orthopyroxene that is interpreted to be of contact metamorphic (pyroxene hornfels) origin. This map unit may be equivalent, in part, to the weakly foliated pink granitic rocks (Unit P3:CG) of map sheets 14D/4 and 14D/5, but the two have been separated by virtue of the fact that this unit is overprinted by regional mylonitic foliations whereas the western ones seem to postdate these fabrics.

AP:CQh *Unit occurs through the central and northwestern parts of map sheet 14D/4 and the western part of map sheet 14D/5.*
Dark-grey-weathering, biotite- and hornblende-rich gneiss and intercalated mafic gneiss, intruded in a lit-par-lit manner by several generations of medium-grained to pegmatoidal granite. The paleosomal component of this rock locally displays augen of feldspar suggesting derivation from a porphyritic igneous protolith, and both the paleosome and neosome locally have conspicuous black hornblende porphyroblasts. In contrast to the paleosome of mesoscopically similar granulite-facies rocks within Unit AP:CQo, those at amphibolite-facies have an abundance of titanite and allanite. The pegmatitic sheets that intrude this unit are probably related to the granitic rocks of units P1:CQl and P3:CG. This subdivision includes rocks along its eastern margin that, if orthopyroxene were present, would be assigned to Unit AP:CQo.

A:CQa *Archean. Confined to the eastern part of map sheet 14D/6.*
A pink- to white- to dark-grey-weathering, foliated granitoid to granitic gneiss, dominated by a variety containing prominent augen of white- to pink-weathering potassium feldspar and plagioclase (the former feldspar type is in excess of the latter). The unit is derived from a megacrystic plutonic protolith of overall granodiorite composition, but has within it more equigranular and finer grained granitic variants. North of Khongnekh Lake, the eastern part of the unit is charnockitic, having orthopyroxene and (lesser) clinopyroxene as regional constituents. The contact between the two subdivisions of the unit is rather abrupt at map scale, and although this boundary is portrayed as an "orthopyroxene-in" metamorphic isograd, it may demarcate, instead, a primary plutonic boundary or a tectonic contact between superficially similar rocks. In the western, pyroxene-free, rocks, biotite appears to be the sole mafic mineral north of Khongnekh Lake, but both hornblende and biotite are present south of the lake; titanite and allanite are widespread in these amphibolite-facies rocks. Some outcrops within this unit have a single simple foliation, lacking a gneissose aspect. In the small brook north of Khongnekh Lake a mylonitic fabric is crosscut by amphibolite dykes, whereas in the brook at the southeast corner of the sheet the dykes predate the mylonitic fabric, relationships that can be interpreted in several ways with respect to episodes of deformation and dyke emplacement. Other outcrops exhibit a composite fabric produced by the folding and transposition of an early foliation; granitic veining and migmatization accompanied the generation of the composite fabric. In strongly deformed rocks the original feldspar megacrysts are reduced to leucocratic streaks ("ex-augen"- lenticular to lozenge-shaped polycrystalline aggregates) separated by anastomosing mafic ribbons. Screens of biotite-rich migmatite, rusty paragneiss and mafic gneiss occur throughout the unit. One or more of garnet, sillimanite, and muscovite is present where this metaplutonic rock abuts (has intruded) the most extensive areas of metasedimentary rocks. Geochronological investigation of a foliated, sillimanite-bearing, megacrystic biotite-rich granite from this unit near Khongnekh Lake has indicated a crystallization age of 2574+/-8 Ma (See Geochronological Notes for map sheet 14D/6, sample 14D/6(2)) consistent with the field conclusion, based on the presence of "first generation" dykes, that this is an Archean rock (see accompanying notes regarding dykes).

Amphibolite-facies quartzofeldspathic gneisses

AP:CAd *Likely includes Neoarchean and Paleoproterozoic rocks. This unit encompasses all the amphibolite-facies rocks east of the granulite-facies rocks on map sheet 14D/3 as well as the gneisses on map sheets 14D/5 and 6.*
This is a multi-component, undivided, gneissic unit that includes a wide variety of rocks, and may be equivalent to the gray hornblende-biotite gneisses west of the granulites on map sheets 14D/4 and 14D/5. The majority of the gneisses assigned to this large subdivision are pale-grey-, dark grey-, buff-, pink- and white-weathering, variably migmatitic, quartzofeldspathic rocks, having a melanocratic paleosome of quartz dioritic to tonalitic to granodioritic composition, injected by a white-weathering biotite-leucogranitic neosome. The local preservation of feldspar augen in the paleosome implies that some parts of the plutonic precursor had been porphyritic; some of the augen gneisses within this unit along the northern margin of map sheet 14D/6 resemble those of Unit A:CQa to the east, and could be intrusions related to the latter unit. Hornblende and biotite are the main mafic minerals in these amphibolite-facies rocks, but in some cases hornblende is absent; titanite and allanite are variably developed and widespread. Rare occurrences of orthopyroxene indicate that granulite facies conditions were locally reached or that the plutonic precursor was locally an orthopyroxene-bearing rock (e.g, eastern part of map sheet 14D/3; northeastern part of map sheet 14D/6). These gneisses are locally characterized by conspicuous porphyroblasts of black hornblende, are rarely garnetiferous (perhaps, in some cases, signifying a metasedimentary component), and are locally strongly mylonitic (especially along the eastern side of map sheet 14D/3 - the Mistastin River mylonite zone). Mafic layers (amphibolite; mafic granulite), from a few centimetres to a couple of metres in width, some of which are derived from mafic dykes, are an integral part of these gneisses. Massive to foliated pink granite dykes (probably mostly related to Unit AP:CQgp) are widespread components, and in some places give rise to a "sheeted complex" of mesocratic to melanocratic migmatite and leucocratic granite. A greenschist-facies retrogression has affected some rocks, indicated by the replacement of biotite by chlorite and by the saussuritization of plagioclase; pumpellyite, prehnite and scapolite are also locally present. Migmatite near Khogenekh Lake has yielded a U-Pb (zircon) age of 2657 ±18 Ma, probably reflecting the time of metamorphism (see Geochronological Notes for map sheet 14D/6, sample 14D/6(1)).

Mafic gneisses

AP:CM *Archean and Paleoproterozoic. Includes all the diverse mafic gneisses and large belts of foliated mafic rocks in the area, both at amphibolite facies and granulite facies.*
Dark-grey-, dark-green-, and black-weathering, generally medium-grained, variably migmatized, mafic gneisses (amphibolite, mafic granulite or gabbronorite). Only the largest and strike-continuous belts are portrayed on the maps, but such rocks are also disposed as isolated to abundant rafts in the quartzofeldspathic gneisses throughout the region (see Symbols list). Field character varies from massive ("salt-and-pepper" texture) to compositionally layered; lenticular to ovoidal clots of poikiloblastic black hornblende locally produce a blotchy texture. Garnet is locally present, and is quite widespread in the mafic units in the southeast quadrant of map sheet 14D/5 and west of Moon-base lake. The mafic gneisses are probably derived mostly from gabbroic and gabbronoritic protoliths having more than one age; relict textures, ultramafic layers and gradation of some melanocratic layers into leucogabbroic and anorthositic variants are indicative of such a plutonic origin. The mafic rocks locally have screens of metasedimentary gneisses, and they are veined and migmatized by several generations of granitic leucosome. At the northeast corner of map sheet 14D/3 one such deformed layered mafic unit contains discrete inclusions of the abutting grey migmatitic gneiss, and another seems to be a body that is discordant to the regional layering attitude in the gneisses; both these features suggest an original intrusive relation between some of the metagabbronoritic rocks and the gneisses here.

Ultramafic rocks

AP:CPp *Archean and Paleoproterozoic? Rocks having limited extent at the centre of map sheet 14D/3, along the southern part of map sheet 14D/3, southeast of Moon-base lake on map sheet 14D/6, and north of Khongnekh Lake on map sheet 14D/6.*
Peridotite and associated mafic (metagabbroic, leucogabbroic) rocks; includes some low-grade schistose variants.

Metasedimentary rocks

AP:CPca *Archean and Paleoproterozoic? Confined to the northeastern corner of map sheet 14D/6.*
Finely laminated to coarsely layered, pink- to green-grey-weathering, clinopyroxene-rich quartzofeldspathic (in many cases, microcline-rich) gneiss probably derived from a calcareous quartzitic to arkosic protolith. The unit also contains intercalated grey garnetiferous psammitic to quartzitic gneiss, local lenses of marble and calc-silicate rocks, as well as streaky, pink, granitic gneiss of indeterminate affinity. In addition to diopsidic clinopyroxene, the calcareous quartzofeldspathic rocks also locally contain andradite or grossular garnet, titanite, scapolite and epidote; magnetite is locally abundant. Clinopyroxene forms centimetre-scale lozenge-shaped knots and lensoid aggregates in some places. Pink granitic veins locally parallel the foliation and impart a migmatitic character to the rock. The most leucocratic parts of the unit may be derived from an igneous parent, being very coarse-grained and having an igneous aspect; in fact, discrete garnetiferous granite and pegmatitic granitic dykes are present in some outcrops.

AP:CPs *Archean and Paleoproterozoic? This unit encompasses biotite-rich quartzofeldspathic gneisses throughout the region, and may include rocks not derived from a sedimentary protolith.*
Most of the unit comprises white- to grey- to rusty-weathering, biotite +/- garnet +/- sillimanite +/- orthopyroxene +/- cordierite-bearing paragneiss and associated white-weathering garnetiferous leucogranitic anatexite; in larger sheets of the latter, pelitic and psammitic gneisses form narrow screens and discontinuous wispy schlieren. Meta-carbonate and mafic rocks are locally associated with the aluminous metasedimentary rocks. White to grey, diffusely layered (relict bedding?) sillimanite+/-muscovite quartzite, perhaps derived from chert in some cases, is a widespread component within this unit, especially in the central part of map sheet 14D/3 and the northern part of map sheet 14D/6. Grey, garnetiferous, biotite - hornblende gneisses, particularly through the central part of map sheet 14D/3 north of the Kogaluk River, are also assigned to this unit, but these may not be of supracrustal origin even though elsewhere similar rocks occur within belts dominated by aluminous paragneiss and quartzite. Likewise, some of the garnetiferous biotite-rich grey gneisses assigned to this unit in the northwestern part of map sheet 14D/6 may not be of sedimentary derivation.

AP:CPcs *Archean and Paleoproterozoic? This unit denotes the meta-carbonate rocks scattered through the area.*
Dark-grey- to brown-weathering nodular marble and calc-silicate rocks, having various combinations of calcite, diopside, titanite, scapolite, and grossularite. Found as metre-scale units locally interlayered with the biotite-rich paragneiss (e.g., the easternmost belt of garnetiferous paragneiss crossing the brook east of Long Pond on map sheet 14D/3) and also as lenses and isolated inclusions within the grey hornblende - biotite migmatites elsewhere (see Symbols list). One small calcareous unit near the southeast margin of map sheet 14D/3 contains abundant phlogopite, forsterite, chondrodite (a humite group mineral) and spinel.

Tonalite and derived tonalitic gneiss

AN :CT *Neoarchean. Confined to the northeastern corner of map sheet 14D/3.*
A pale-grey- to dark-gray- to pink-weathering rock, that varies from a weakly foliated, augen textured, hornblende +/- biotite tonalite to a tonalitic gneiss; screens of older migmatitic gneiss are locally present and the tonalite forms sheets in the proximal gneisses. It is possible that this unit is a well-preserved representative of the precursor to some the regional tonalitic gneisses. The tonalite exhibits abundant primary plutonic textural characteristics where least deformed, including a network of pink granitic veins that had intruded the darker rock prior to deformation. Primary plagioclase is dark grey, and the hornblende is disposed as clots that give the rock a speckled appearance; orthopyroxene is present in the northern part of the unit and seems to be a remnant of the igneous assemblage rather than a regional metamorphic mineral. This unit is cut by metamorphosed and deformed basic dykes, a field feature that can be used as an indicator of an Archean age for this unit. A U-Pb age of 2677 +15/-12 Ma has been derived from zircon from this unit, supporting the field interpretation of the tonalite's age, and probably indicating the time of crystallization (see Geochronological Notes for map sheet 14D/3, sample 14D/3(1)).

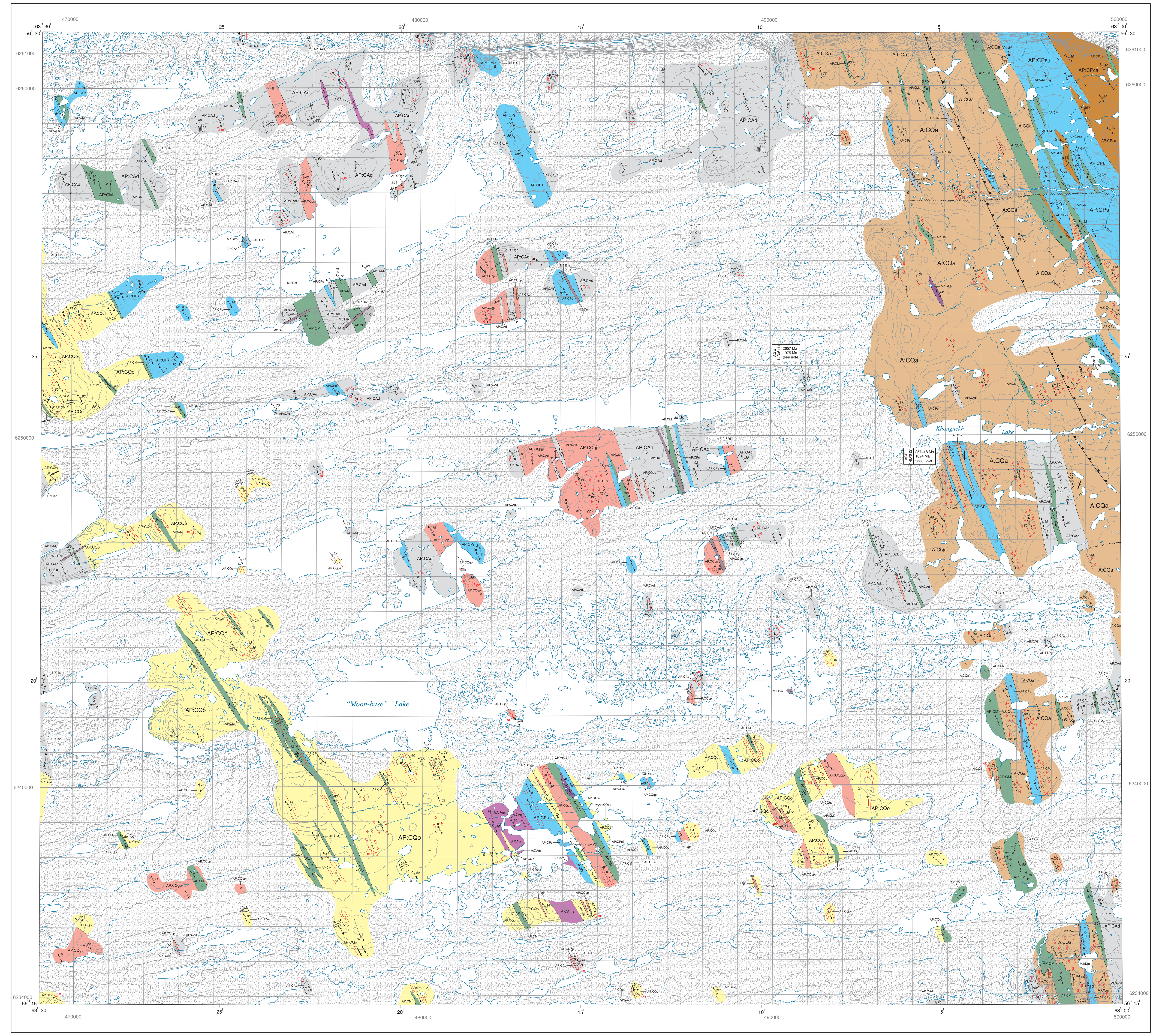
Granulite-facies quartzofeldspathic gneisses

AP:CQo *Likely includes Neoarchean and Paleoproterozoic rocks. Predominant rock type through the western part of map sheet 14D/3, the eastern half of map sheets 14D/4 and 14D/5, and the central part of map sheet 14D/6.*
An undivided and diverse group of buff-, white-, grey- and pink-weathering gneissic rocks; the white and pink colours usually reflect zones where the rocks lack orthopyroxene even though mafic compositions (including metamorphosed mafic dykes) in this setting do have granulite facies assemblages. Predominant rock comprises a gray to buff paleosome alternating with a white to pink granitic neosome (a "pink-and-grey" gneiss), especially those rocks that transgress the boundary between map sheets 14D/3 and 14D/4, and those occurring along the northern half of the boundary between map sheets 14D/5 and 14D/6. A mesocratic plutonic rock having a random array of pink granitic veins seems to have been the protolith to the gneisses in some places, and gives rise to the layered pink and grey aspect of the rocks in some places. The unit includes homogeneous, schlieric, and diffusely- to nebulous-layered metaplutonic rocks having a streaky discontinuous foliation, as well as compositionally well-layered gneisses and granite-veined migmatitic gneisses; laminar-banded "straight gneisses" are present within parts of the mylonitically re-foliated terrrane of the Moon-base shear zone (see accompanying note for map sheets 14D/5 and 6). In the Long Pond area, especially, these granulitic gneisses are invaded by largely concordant pink aplitic and pegmatitic granitic sheets. Enderbitic and charnockitic compositions dominate within the unit, but more quartz-dioritic variants are locally present. Both biotite and hornblende are normally present in the granulite-facies rocks, and define the foliation, but some parts of the unit are devoid of hornblende (e.g., the border area between map sheets 14D/5 and 14D/6). Orthopyroxene lozenges and lenticular grey quartz are the foliation-forming minerals in some areas. Clinopyroxene is locally a volumetrically significant phase; garnet is rare but widely distributed, especially in hornblende-rich layers along the western side of the unit on sheet 14D/5. The rocks locally have a speckled appearance from poikiloblastic orthopyroxene and/or hornblende.

This unit may represent the same group of rocks as the hornblende-biotite gneisses to the east and west, but at a higher metamorphic grade - the contact as demarcated on the maps is largely a metamorphic boundary. The unit certainly contains gneisses derived from more than one generation of granitoid rocks, as evident just west of Moon-base lake where interbanded mafic gneisses and quartzofeldspathic gneisses are injected by sheets of white weathering, homogeneous, more siliceous gneiss. The unit probably includes rocks with a wide age range; the least deformed and non-layered ones mesoscopically resemble the Archean tonalitic rock (Unit AN:CT) along the northeast margin of map sheet 14D/3 (e.g., have dark gray plagioclase and streaky hornblende clots). Inclusions of older rocks, including mafic, ultramafic and leucogabbroic to anorthositic types are regionally abundant. Many outcrops have metamorphosed and deformed mafic dykes, presumed to be of Paleoproterozoic age, both oblique and parallel to the gneissic layering. The dykes generally lack the veined and migmatized aspect of the gneissose plutonic host, and their presence has proven to be a fairly reliable indicator that the host protolith, as well as the migmatite event it exhibits, are Archean. Gneisses without dykes that are grouped in this unit are less-reliably designated as Archean and thus could be Paleoproterozoic. The high-grade metamorphism exhibited by these rocks is assumed to be a Paleoproterozoic feature because it overprints the mafic dykes, but alternatively, the metamorphism could be Archean and the granulite-facies assemblage of the dykes is a "primary" feature induced by recrystallization in the deep crust shortly after emplacement. Rocks of this gneissic unit from near Long Pond, where there are abundant inclusions of meta-leucogabbro and anorthosite, have yielded a U -Pb (metamorphic?) age from zircon of 2807+45/-27 Ma (see Geochronological Notes for map sheet 14D/3, sample 14D/3(2)). Mylonitic foliations and a fine laminated aspect characterize these rocks straddling the boundary between map sheets 14D/4 and 14D/5, defining the Moon-base shear zone. A laminated and mylonitic "straight gneiss" from within the Moon-base shear zone has yielded a U-Pb (metamorphic?) age of 1857 ±3 Ma from thorite(?) (see Geochronological Notes for map sheet 14D/5, sample 14D/5(1)).

Meta-anorthosite and related rocks

A:CAm *Paleoarchean to Mesoarchean. Confined largely to the Long Pond - Kogaluk River area, along the western margin of map sheet 14D/3 and the eastern margin of map sheet 14D/4; minor occurrences on map sheet 14D/6.*
Predominantly white-weathering, locally quartz-bearing, recrystallized and foliated anorthosite and leucogabbronorite and migmatized variants; biotite and black hornblende in the more mafic rocks provide a colour contrast that highlights both remnant primary textures and the superimposed foliation. The unit, as outlined on the maps, includes both areally coherent masses and also zones of inclusion trains within quartzofeldspathic migmatitic gneisses (some individual outcrops in the latter setting may have few such inclusions, and thus contacts bounding the anorthositic rocks could be constructed differently from those shown). Localized ball-shaped inclusions of anorthositic and leucogabbroic rocks are widely distributed in the gneisses distal from the main belts as well (see Symbols list). Primary structures such as oval feldspar megacrysts and compositional layering, are locally well-preserved in the rocks of this map unit, and melanocratic layers in some outcrops appear to be derived from contemporaneous basic dykes.
Most of the anorthositic and leucogabbronoritic rocks are locally plainly intruded and "exploded" by the surrounding quartzofeldspathic gneisses, and they are cross-cut by deformed and metamorphosed mafic dykes that postdate the emplacement of the plutonic precursor to the quartzofeldspathic gneisses and its subsequent migmatization. The foregoing intrusive relationships with the mafic dykes were features initially used as a field indicator of Archean age for this map unit, and this interpretation was subsequently confirmed by zircon geochronology of quartzofeldspathic gneisses that host numerous rafts of anorthositic and leucogabbroic rocks (see Unit AP:CQo and Geochronological Notes for map sheet 14D/3, sample 14D/3(2)). Parts of this map unit show the effects of pyroxene hornfels facies thermal metamorphism proximal to the Mistastin Lake batholith; the anorthositic and leucogabbroic rocks in this setting have little or no hornblende, and are granoblastic types comprising plagioclase, clinopyroxene and orthopyroxene (see accompanying note on the thermal aureole on map sheets 14D/ 3 and 14D/4).

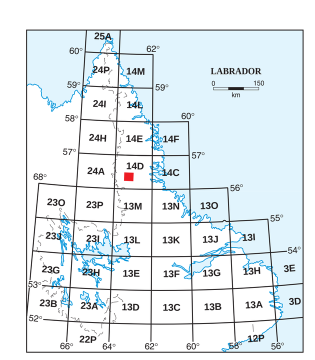


MAP 2003-10
OPEN FILE 014D/06/0288

GEOLOGY OF THE KHONGNEKH LAKE MAP SHEET (NTS 14D/6), NEWFOUNDLAND-LABRADOR

Scale 1:50 000

0 1 2 3 4 5 kilometres



INDEX MAP

Digital NTS base (14D/6) used for this map is available from Surveys and Mapping Branch, Natural Resources, Ottawa, Canada.

The 2002 Magnetic North bearing is 27° 42' West of Grid North; Grid North is 0° 12' West of True North for centre of map.

Elevations are in feet above sea level. Contour interval is 50 feet.

Universal Transverse Mercator (UTM) Grid Zone 20.

North American Datum 1927.

Copies of this map may 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-Labrador, Canada, A1B 4J6. [http:/www.geosurv.gov.nf.ca]

MAP SYMBOLS FOR NTS SHEETS 14D/3,4,5 AND 6 AND 24A/1 AND 8 (Some symbols may not be present on this sheet)

Outcrop examined on the ground

Outcrop (or possible outcrop) spotted from the air but not examined on the ground (in some cases may be very approximate locations, and could be lithologically different from unit to which it is assigned)

Outcrop compiled (and interpreted with respect to this map) from another (unpublished) source

Geological boundaries (approximate, assumed)

Gneissic layering (dip known, horizontal, vertical, dip unknown)

Primary compositional layering in plutonic and metaplutonic rocks (dip known)

Primary mineral lamination in plutonic rocks (dip known)

Mineral foliations of different types (dip known, vertical, dip unknown)

Mylonitic and high-strain foliations (dip known, vertical, dip unknown)

Mineral streaking lineation (with degree of plunge, horizontal)

Intersection lineation (with degree of plunge)

Fold axis (with degree of plunge, vertical, horizontal, plunge unknown)

Fold symmetry, seen normal to plunge (S, Z, M ; degree of plunge shown)

Folds having an open or U form (degree of plunge known, unknown)

Large wave-length folds and gentle warps of gneissic layering (arrow denotes direction and degree of plunge)

Form of open folds and warps over large outcrop area or several adjacent outcrops

Isoclinal folds (arrow denotes direction and degree of plunge)

Axial plane trend to fold structures (dip known, dip unknown, vertical)

Minor shear zones (dip known, dip unknown)

Fault (approximate, assumed)

Small "first generation " mafic dykes (dip known, dip unknown, vertical; see map Note regarding dyke designations)

Small "second generation " mafic dykes (dip known, dip unknown, vertical; see map Note regarding dyke designations)

Outcrop having "first generation " mafic dyke of undetermined attitude

Small outcrop of massive "second generation " mafic dyke of unknown attitude

Schematic indication of inclusions or metre-scale lensoid units of one gneiss within another (m=mafic; pg=undivided paragneiss; an=meta-anorthosite; gb=metaleucogabbro; cs=calc-silicate rocks and forsterite- and tremolite-bearing marble)

Undivided gneisses as inclusions in massive and mildly deformed granitoid rocks gn

Anorthositic inclusions in Mistastin Lake granite an

Gneissic inclusions in Mistastin Lake granite gn

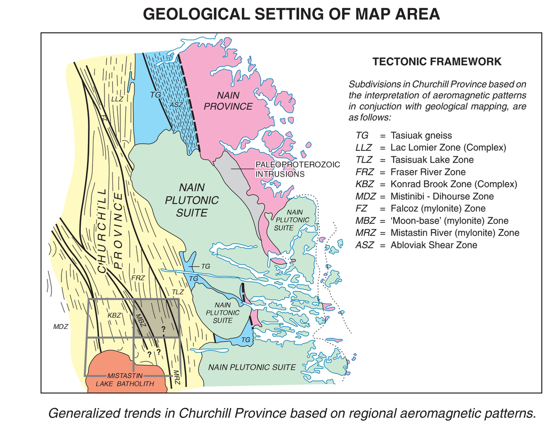
Feldspar augen texture in gneisses derived from porphyritic and megacrystic protoliths; also designates this textural attribute of mylonitic rocks in which the augen may be porphyroclastic relicts of dismembered granitic pegmatites (See map Note regarding the augen texture overprint symbol)

The "orthopyroxene-in" isograd in Unit A :CQa, only on map sheet NTS 14D/ 6; line could also represent a tectonic or primary igneous contrast within the unit

Mylonitic or high strain fabric evident in outcrop (see map Note regarding mylonitic gneisses)

Approximate extent of pyroxene hornfels contact metamorphism on gneisses proximal to the Mistastin Lake intrusion (see map Note on sheets 14D/3 and14D/4 regarding the contact aureole of the Mistastin Lake intrusion)

GEOLOGICAL SETTING OF MAP AREA



Generalized trends in Churchill Province based on regional aeromagnetic patterns.

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COMPILER'S NOTE REGARDING INTERPRETATION OF GEOLOGY FOR NTS MAP SHEETS 14D/3,4,5, AND 6 AND 24A/1 AND 8:

This sheet is one of four digital-based colour maps (Maps 2003-07 to 2003-10) representing the 1986-87 field work of the compiler, Bruce Ryan, as well as that of three senior student mapping assistants (Louise Corriveau, 1986; Daniel Lee, 1986, 1987; Donald Dunphy, 1987). The field data portrayed here were previously published as page-size interpretive maps in preliminary field reports in 1987 and 1988. The new 1:50 000 digital maps were assembled in 2002 from the archived field and petrographic data. The compiler has not independently examined territory surveyed by his assistants, and this has posed a mild challenge to unit correlations and structural interpretation between far-flung ground traverses of the different individuals. The maps represent the "best fit" for the data contained within the archived field notes, samples, and photographs from all members of the survey teams, as well as information gleaned from an examination of several hundred thin sections of rocks from the area. In some cases the disparate data have been subjected to the compiler's interpretations; other interpretations are likely possible.

The difficulties in compilation can be appreciated in areas where the polyphase structural complexity observed in outcrop provides indications that interference patterns such as re-folded folds and dome-and-basin type structures exist. The distribution of the leucogabbroic, mafic, and metasedimentary rocks in the region of the junction of map sheets 14D/3 and 14D/4 is especially problematic in this regard. Fold structures are indicated in this area based on foliation attitudes and the distribution of the differing rock types, although they are perhaps incorrectly portrayed because "marker units" were not specifically traced out.

The compiler's interpretation has been imposed on the pattern reflecting the continuity and separation between Unit P1:CQl, the gneissose granitoid having older gneissic screens, and Unit AP:CQh, the amphibolite-facies gneisses injected by numerous dykes and foliation-parallel sheets of granitoid rock, on map sheets 14D/4 and 14D/5. These rocks are poorly exposed in places, and the unit assignment may not reflect the regionally more abundant of the two. Users of these two maps are encouraged to provide to the compiler, and/or the Geological Survey, any additional data that might amend or correct the map pattern portrayed here.

NOTES ON THE DESIGNATION SYMBOLS FOR METRE-SCALE MAFIC DYKES ON MAP SHEETS 14D/3,4,5, AND 6 (see Symbols list)

At least two generations of mafic dykes occur in the region covered by these maps. One exhibits field evidence of being an "early" dyke swarm whereas the other is a "late" set, and they are designated, respectively, as "first" and "second" generation dykes on the Symbols list for this sheet.

First generation dykes: This single-tick symbol designates narrow metamorphosed and deformed basic dykes, showing both contrasting and similar deformation and metamorphism to their hosts; these dykes have a wide regional distribution, and only selected representative outcrops where such dykes occur are indicated on the maps. These dykes are considered to be equivalent to the larger ones designated as Unit P1:CDm, and all have a strong textural similarity to the massive basic rocks of Unit P1:CG, indicating that they may be temporally and genetically related to this larger metaplutonic unit. The dykes vary texturally from massive and homogeneous to plagioclase-porphyritic; primary plagioclase crystal forms are preserved in many amphibolite-facies dykes but less so (except for phenocrysts) in the granulite-facies rocks. The mineral assemblage in dykes along the eastern part of map sheet 14D/3 is mainly hornblende and plagioclase, reflecting the amphibolite-facies metamorphic conditions of the surrounding rocks, but orthopyroxene and clinopyroxene are locally present. In the western part of the map sheet the dykes comprise varying volumes of plagioclase, hornblende, and ortho- and clinopyroxene, mirroring the granulite-facies conditions of their gneissic hosts; rare examples have granular pyroxene+ plagioclase-rich blotches that are reminiscent of garnet decompression. Dykes in the gneisses proximal to the Mistastin Lake intrusion are overwhelmingly anhydrous, having only minor modal volumes of hornblende and biotite. In many cases the relative age relationship between the narrow mafic units and the migmatitic host is unequivocally demonstrated by oblique contacts against pre-existing penetrative mineral foliations, gneissic layering and folds. Where the dykes are parallel to the gneissosity of the host, either as a primary geometry or a result of subsequent deformation, they are distinguished from mafic rocks that are part of the older gneisses by their nonmigmatized aspect (although in some cases, especially at granulite-facies, there may be irregular, quartzofeldspathic "melt pods" developed). In some cases, the dykes are cross-cut by pegmatitic granitic dykes, locally having orthopyroxene. A granitic pegmatite dyke that cross-cuts a large mafic dyke intruded into metaleucogabbro north of Long Pond has yielded a crystallization age of 1854+/-1, thus demonstrating the "early" time of intrusion for these mafic dykes (see Geochronological Notes for map sheet 14D/3, sample 14D/3(3)).

Second generation dykes: This double-tick symbol designates narrow, fresh to slight altered, gabbro and olivine+Ti-augite gabbro dykes, likely of Mesoproterozoic age, that transect the area. They are generally centimetre-scale to metre-scale examples of larger dykes designated as Unit M2:Dm.

NOTE ON THE SUBDIVISION OF GRANULITE-FACIES AND AMPHIBOLITE-FACIES GNEISSES ON MAP SHEETS 14D/3,4,5, AND 6

The contacts drawn on the maps between biotite- and hornblende-bearing quartzofeldspathic (granitic, tonalitic, granodioritic, quartz dioritic) gneisses at amphibolite-facies (Units AP:CAd, AP:CQh) and similar rocks at granulite-facies (Unit AP:CQo) are, for the most part, generalized boundaries that define the dominance of one metamorphic assemblage over the other. The change from amphibolite-facies (orthopyroxene-free) to granulite-facies (orthopyroxene-bearing), based on thin sections from proximal outcrops, is quite abrupt in some places, and the contact between the two could be tectonic (for example,"early" shear juxtaposition following the peak of metamorphism or a "late" fault). Overall, there is very little difference between the mesoscopic character of these units, in which biotite and hornblende, or biotite alone, are the predominant mafic minerals. The subdivision boundaries have been constructed both on the basis of field observations and petrographic studies, and they are mimicked in many cases by the contrast in the regional aeromagnetic expression of the rocks - a change in signature from "high" rocks at granulite facies to "low" rocks at amphibolite facies. Field impressions are not always supported by the thin section assemblages; thus, areas exhibiting the lower-grade metamorphic assemblage may be present in the high-grade terrane, and vice versa. For the granulite-facies units, the maps are largely - but not exclusively - biased towards the field character of the rocks: orthopyroxene has been observed in neosomal granitic "sweats" and migmatitic veins but is generally absent from thin sections of the paleosomal material. However, where the paleosome seems to lack orthopyroxene over large areas, and there is a lack of thin section data to support a granulite-facies imprint, the unit is demarcated, perhaps erroneously, as being part of the amphibolite-facies terrane. The latter condition applies especially to leucocratic, biotite-bearing but hornblende-deficient gneisses, which may indicate that subtle compositional differences govern the development of the pyroxene within the felsic rocks. Thin sections of mafic material from such "amphibolite-facies" gneisses may indicate, however, that the most melanocratic rocks have assemblages consistent with granulite-facies metamorphism. Such "metamorphically ambiguous" regions of gneiss probably represent a transitional zone from amphibolite- to granulite-facies conditions. Regions where this mesoscopic versus microscopic aspect of the gneisses has been a compilation problem are the western half of map sheet 14D/3 and eastern half of map sheet 14D/4, the central part of the boundary of map sheets 14D/5 and 14D/6, and the northwestern and southwestern corners of map sheet 14D/6.

It appears that the granulite-facies/amphibolite-facies boundary for the quartzofeldspathic gneisses of the region is a prograde metamorphic feature rather than a retrograde one. Orthopyroxene may not be present in all rocks assigned to the granulite-facies terrane because sufficiently anhydrous conditions were not attained. Similarly, orthopyroxene may be present in parts of the amphibolite-facies terrane because of localized attainment of granulite-facies conditions. The gneisses in both terranes share many common microscopic attributes. The main differences, other than some variations in weathering colour, are that the orthopyroxene-free gneisses seem to have more microcline than the orthopyroxene-bearing ones, and they also have titanite and allanite as widely distributed accessory components. Although there is local replacement of orthopyroxene by a symplectic intergrowth of biotite+quartz, rock textures indicate that orthopyroxene stably co-exists with the biotite and hornblende in the granulite-facies terrane. In some of the laminar-banded, granulite facies, mylonitic, quartzofeldspathic rocks of the Moon-base mylonite (shear) zone the orthopyroxene is locally overgrown and replaced by a bluish-green hornblende (+/- colourless amphibole).

There is a patchy development of a greenschist-facies overprint on earlier assemblages across the whole area. This is manifested in the growth of epidote, the chloritization of biotite, the sericitization of plagioclase; prehnite and scapolite veins in some rocks may be also a manifestation of this alteration event. Similar low-grade alteration is evident in some of the Mesoproterozoic olivine-gabbro dykes, implying that "late" alteration is Mesoproterozoic or younger.

NOTE ON THE MYLONITIC GNEISSES AND SHEAR ZONES ON MAP SHEETS 14D/3,4,5, AND 6

Rocks having a weak to intense mylonitic aspect, including ultramylonite, are locally present throughout the whole area. Many outcrops and outcrop areas which exhibit this feature are shown by a red line overprint symbol on the maps. Such rocks are characterized by quartz having high aspect ratios, by the recrystallization and reduction in size of the feldspars, by porphyroclasts of feldspars or quartz-feldspar remnants of dismembered pegmatites, and by the laminar "straight gneiss" aspect of many of the rocks so affected. They are especially widespread in a linear belt along the eastern one-third of map sheet 14D/3, termed the *Mistastin River mylonite (shear) zone*, and in a similar belt transecting the western one-third of map sheet 14D/6 and adjacent northeastern quadrant of map sheet 14D/5, termed the *Moon-base mylonite (shear) zone.* The mylonitic foliation overprints layering of the migmatitic regional gneisses and younger granitoid rocks. In areas of weak re-foliation, the mylonitic fabric is more easily detected in the neosomal component of the gneisses than in the paleosome. It is especially evident in the pink aplitic and pegmatitic leucogranitic sheets within the grey gneisses along the eastern side of map sheet 14D/3. In some cases the mylonitic fabric is developed along the steep limbs of gently-plunging, upright to slightly overturned, folds. In many outcrops on map sheets 14D/5 and 6, the mylonitic fabric is of L>S type, and is the most dominant feature on horizontal outcrop surfaces where the older gneissic layering is, in fact, gently dipping to horizontal (e.g central part of map sheet 14D/5). Where the overprinting fabric is pervasive and well developed parallel to the pre-existing regional gneissic layering, the resulting rock is one with a regular parallel-laminated aspect - a "straight gneiss". Many of the mylonitic rocks display a recrystallization microstructure, and can be categorized as blasomylonites. Pseudotachylite, post-dating the mylonite fabric, is present in some of the granulite-facies rocks of map sheet 14D/5.

The *Mistastin River mylonite (shear) zone* of map sheet 14D/4 was impressed upon a terrane of predominantly amphibolite-facies gneisses, and is itself at amphibolite facies; the emplacement of the pink granitic sheets, locally folded, within the Mistastin River zone may have been concomitant with the mylonitic event. The *Moon-base mylonite (shear) zone* of the northeastern part of map sheet 14D/5 and the western part of map sheet 14D/6 was impressed upon gneisses that were largely at granulite-facies, and it exhibits mostly granulite-facies assemblages (although there is local retrogression of the orthopyroxene to a bluish-green hornblende); laminar layering is especially well-displayed by these higher grade rocks. It is possible that the two zones are of equivalent age and origin, but represent differing crustal levels.

NOTE ON THE USE OF THE "AUGEN TEXTURE" OVERPRINT SYMBOL ON THE MAPS

There is a widespread development of augen textures in rocks of the area. These textures, however, are not confined to a single map unit, nor are they the result of a common deformational event. (i) The granulite- and amphibolite-facies migmatitic gneisses (Units AP:CQo, AP:CAd) locally have augen structure in the paleosome, which in some cases reflects an original porphyritic protolith, but in other cases could be produced by the dismemberment of pre- to syntectonic granitic veins and dykes. The development of these textures pre-dates or is concomitant with the regional migmatization, for it is absent from the neosomal granitoid component except where a younger mylonitic overprint affects both. (ii) There is one extensive map unit (A:CQa) along the eastern margin of map-sheet 14D/6 in which augen texture is characteristic. This unit is derived largely from a porphyritic (megacrystic) granodiorite, which was emplaced into older grey migmatitic rocks, paragneisses and mafic gneisses. For the most part, the deformational fabric of this rock is a simple one, but there is ample field evidence that this unit, too, has been polydeformed and migmatized. (iii) The pink granitoid rocks of Unit AP:CQgp also exhibit augen textures, especially where the coarse-grained and pegmatoidal variants are strongly deformed; this foliation seems to be a result of a single deformation event following their emplacement into the older gneissic rocks. (iv) Augen textures are characteristic of gneisses in parts of both the Moon-base and Mistastin River mylonite (shear) zones. In this setting they comprise feldspar porphyroclasts embedded in a strongly foliated host, and are undoubtedly derived, in some instances, by the attenuation and dismemberment of pink granitic pegmatites originally present within the, now highly-strained and mylonitized, gneisses.

GEOCHRONOLOGICAL NOTES FOR MAP SHEET 14D/6

The following are additional details pertinent to the interpretation of the ages indicated on this map:

14D/6(1): Amphibolite-facies, migmatitic gneiss comprising a grey hornblende - biotite tonalitic paleosome and a white mafic-deficient tonalitic neosome. Narrow mafic lenses, probably derived from boudinaged "early" dykes, are parallel to the migmatitic layering, and are likewise migmatized. Open folds in outcrop plunge gently north and south, and re-fold earlier isoclinal structures. Both the paleosomal gneiss and the leucocratic neosome yielded large volumes of subhedral to rounded zircons. No point data from these zircons overlaps concordia. The combined data from all populations give an upper intercept age of 2657+/-18 Ma when "pinned" to monazite data derived from a nearby rock (see sample below). Zircon data alone imply re-setting and growth at ca. 1975 Ma, with the neosomal component plotting farther down the discordia line than paleosome. (Age determination by T. Krogh and G. Oliver, 1990.)

14D/6(2): A pink to grey, biotite-rich, augen-textured gneiss having lenticles of quartz and feldspar, as well as discrete feldspar augen, between polyphase folia of biotite - sillimanite - muscovite; transposition structures indicate the fabric is composite. This rock seems to be part of a paragneiss sequence here, but subhedral potassium feldspar phenocrysts among the augen within the fabric imply a plutonic parentage. The zircons and monazites derived from this rock comprise simple populations, and plot at the upper and lower ends, respectively, of a line that intersects concordia at 2574+/-8 Ma and 1824 Ma. If the former represents the crystallization age of the rock, then clearly this is an Archean intrusion, with the monazite data reflecting the Paleoproterozoic metamorphism. A Paleoproterozoic age of intrusion, based on the monazite data, is doubtful because it is unlikely that all inherited zircon would be as tightly clustered near concordia as those in this rock unless they were all fortuitously derived from a common source. Although it is probable that Paleoproterozoic metasedimentary gneisses are present in the region, the isotopic data and the field setting of this rock are strong indications that at this location the proximal paragneisses are Archean. (Age determination by T. Krogh and G. Oliver, 1990.)

(Field data collected by Bruce Ryan, Louise Corrivieau, and Daniel Lee in 1986; compiled and interpreted by Bruce Ryan. The map patterns portrayed may be revised or modified; differing interpretations of the data are encouraged.)

Geological cartography by Tony Paltanavage

Recommended Citation:
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2003: Geology of the Khongnekh Lake map sheet (NTS 14D/6), Newfoundland-Labrador, scale 1: 50 000. Geological Survey, Newfoundland and Labrador Department of Mines and Energy, St. John's, Map 2003-10, Open File 014D/06/0288

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