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DESCRIPTIVE NOTES

INTRODUCTION

This map is one of a set of two bedrock geological maps which present results of 1:100 000 scale mapping by the Geological Survey of Canada (GSC) and the Canada-Nunavut Geoscience Office (C-NGO), with logistical support provided by the Polar Continental Shelf Project, in the Clyde River (OF 4432) and Blanchfield Lake (OF 4433) map areas, central Baffin Island (Fig. 1). An overview of the principal Archean and Paleoproterozoic plutonic and supracrustal units mapped during the three-year (2000–2002) partnered field project are presented in Corrigan et al. (2001) and Scott et al. (2002a, 2003). Field work in 2002 led to the completion of bedrock mapping in NTS 27 C (west half) and 37 D (east half) and completes the area of central Baffin Island documented on GSC bedrock maps released in 2001, 2002, and 2003 (St-Onge et al, 2001a, b; 2002a, b, c). From north to south, the open file maps provide a continuous, wide transect across the southeastern margin of the Archean Rae craton, the Paleoproterozoic Piling Group, and the northern margin of the Paleoproterozoic arc complexes of south-central Baffin Island including the ca. 1.86–1.85 Ga Cumberland batholith.

The first systematic mapping of the area was undertaken at reconnaissance scale between 1965 and 1970 (Jackson, 1969, 1978, 1984, 2000; Jackson and Taylor, 1972), and in 1974 and 1975 (Morgan et al., 1975, 1976; Jackson and Morgan, 1978; Morgan, 1983). More detailed work was subsequently initiated in the southeastern portion of the project area, in parts of map sheets NTS 37 A, 27 B, 27 C, and 27 D (Tippett, 1980, 1984; Henderson et al., 1988, 1989; Henderson and Henderson, 1994). The most recent work in proximity to the current project area consists of bedrock mapping and U-Pb geochronology of Archean rocks in the Eque Bay area (Bethune and Scammell, 1997), and a lake sediment and water regional geochemical survey southwest of the Barnes Ice Cap (Cameron, 1986; Friske et al., 1998).

Results of recent Quaternary mapping are reported in Dredge (2002), electromagnetic work in Evans et al. (2003), teleseismic monitoring in Snyder (2003), petrological studies in Allan and Pattison (2003), and petro-stratigraphic studies in Stacey and Pattison (2003).

The work presented below is based on systematic bedrock foot and helicopter traverses with approximately three kilometres spacing.

GEOLOGICAL SETTING

The Central Baffin Project area (Fig. 1) is centered on the northern margin of the eastern segment of the ca. 1.8 Ga Trans-Hudson Orogen (Hoffman, 1988; Lewry and Collerson, 1990), a Himalayan-scale collisional mountain belt that is exposed from Greenland in the east, across Baffin Island and beneath Hudson Bay, to Manitoba and Saskatchewan in the west. The northern part of the area (St-Onge et al., 2001a, b, 2002d) (OF 4432, OF 4433) comprises various orthogneisses, metamorphosed sedimentary and minor volcanic rocks of the Mary River Group, and younger felsic plutonic rocks, all of Archean age and ascribed to the Rae craton (Jackson, 1969, 2000; Bethune and Scammell, 1997, in press; Corrigan et al., 2001; Scott et al., 2002a). The central part of the study area is underlain by siliciclastic, carbonate, and mafic volcanic rocks of the Paleoproterozoic Piling Group (Morgan et al., 1975, 1976; Scott et al., 2002a and references therein), a succession that has recently been described in more detail (St-Onge et al., 2002a, b, c; Scott et al., 2002a). Various felsic plutonic rocks, ranging in age from 1.90–1.85 Ga and including the Cumberland batholith (Wodicka et al., 2002), are exposed in the southern part of the area (St-Onge et al., 2002a, b, c). Collectively, this assemblage of rocks is thought to represent a Paleoproterozoic continental margin succession (Morgan et al., 1975) originally deposited on the southern flank of the Archean Rae craton and subsequently deformed during Trans-Hudson orogenesis (see Corrigan et al., 2001, Scott et al., 2002a, and references therein).

The nature of the contact between metasedimentary rocks of the Piling Group and the Archean basement rocks varies across the project area. A primary unconformable relationship is preserved along much of the northern margin of the belt, however, where exposed in southern domal structural culminations (Fig. 2), the unconformity is strongly deformed. Northeast of Nauja Bay (Fig. 2), Archean orthogneisses are locally thrust onto Piling Group rocks, apparently in association with late, thick-skinned folding.

The primary distribution of rock types within the Piling Group varies dramatically across the strike of the belt: carbonate strata are extensively exposed on the northern margin, whereas mafic volcanic rocks are exposed on the southern margin (Scott et al., 2002a; Fig. 1). Regional metamorphic grade increases outward from the central portion of the belt, from sub-greenschist facies to incipient granulite facies that is manifest by partial melting of Piling Group rocks (St-Onge et al., 2002d). In the following sections, the rocks are described from lowest to highest structural levels, based on the results of new 1:100 000-scale mapping on NTS map sheets 27 C (west half) and 37 D (east half), as well as targeted re-examination of key areas across the entire project area.

ARCHEAN RAE CRATON (units Agn–Agb)

The rocks of the Rae craton in the Clyde River (OF 4432) and Blanchfield Lake (OF 4433) map areas comprise dominantly banded granodioritic to monzogranitic orthogneiss, various granodioritic to monzogranitic and rare tonalitic plutons, and siliciclastic and minor mafic volcanic rocks of the Mary River Group.

ORTHOGNEISS (unit Agn)

The most common component of the orthogneiss (unit Agn) is biotite ± hornblende granodiorite to monzogranite, with individual layers varying in thickness from several centimetres to several metres (Fig. 3). Biotite ± hornblende tonalite layers are present locally; rare mafic layers range in composition from hornblende ± biotite diorite to clinopyroxenite. A sample collected from a relatively homogeneous biotite monzogranite layer of orthogneiss in the vicinity of Dewar Lakes (Fig. 2) yielded a U-Pb crystallization age of 2827 + 8/-7 Ma (Wodicka et al., 2002). Similar ages have been reported from the southern margin of the Rae craton west of the map area (Bethune and Scammell, 1997, in press, and references therein), supporting the assertion that the southern domal, structural culminations in the Dewar Lakes area represent erosional windows that expose the southernmost extent of the Rae craton (Scott et al., 2002a; St-Onge et al., 2002c).

PLUTONIC ROCKS (units Atn, Agr–Agb)

The layering in the orthogneiss (unit Agn) is truncated in numerous localities by weakly- to moderately foliated plutonic rocks that range in composition from rare syenogranite to biotite monzogranite to less common tonalite. South of Generator Lake (OF 4432), a hornblende biotite mafic tonalite (unit Atn) is exposed structurally below an extensive panel of Mary River Group metasedimentary rocks (see below). Several hundred metres away from the supracrustal rocks, the tonalite is medium-grained and massive to weakly foliated (Fig. 20). Near the base of the metasedimentary rocks, the tonalite is an L-S tectonite characterized by a strong down-dip hornblende mineral lineation and abundant muscovite (Fig. 5). Immediately below the panel of Mary River Group rocks, the muscovite-defined fabric is most strongly developed, and is parallel to that developed in the overlying metasedimentary rocks. The progressive increase in the muscovite content of the tonalite may result from potassium metasomatism in proximity to the supracrustal rocks, in which case the tonalite could be viewed as the structural basement to the Mary River Group in this location. Alternatively, the muscovite-rich zone may represent a paleo-weathering horizon, suggesting that the contact with the overlying metasedimentary rocks may originally have been an unconformable depositional surface, and that the tonalite represents the stratigraphic basement to the Mary River Group. The highly strained nature of the rocks at the tonalite/supracrustal contact precludes an unequivocal choice between these two hypotheses. A sample of the mafic tonalite has been collected for U-Pb geochronology.

A variety of monzogranite plutons are present throughout the map area (Fig. 2). A sample of biotite allanite monzogranite (unit Agr) has been dated at 2738 + 25/-21 Ma, and a potassium feldspar megacrystic monzogranite (unit Agk) has an age of 2719 ± 4 Ma (Wodicka et al., 2002). Combined with U-Pb results presented by previous workers (Jackson et al., 1990; see Wodicka et al., 2002 for a compilation of results), the interval 2.74–2.72 Ga is emerging as a period of extensive felsic plutonism in the southern Rae craton.

Dykes of hornblende-biotite ± clinopyroxene gabbro (unit Agb) crosscut the biotite monzogranite (unit Agr) west of Blanchfield Lake (OF 4433). A similar dyke in the Eque Bay area has yielded an age of 2717 + 16/-13 Ma (Bethune and Scammel, 1997).

MARY RIVER GROUP (units Ama–AMp)

Archean siliciclastic and volcanic rocks in the map area are assigned to the Mary River Group (Jackson, 1969, 2000; Bethune and Scammell, 1997, in press), a succession of rocks that are found throughout northern Baffin Island and correlated with similar rocks (the Prince Albert Group) along strike to the southwest on the Melville Peninsula (Frisch, 1982).

The most common siliciclastic rock type is brown-weathering psammite, with subordinate quartzite, semipelite and pelite (unit Amp). Development of coarse mica is ubiquitous, imparting a strong schistosity to all units. Coarse knots of sillimanite (± quartz) are commonly developed in beds with more pelitic compositions (Fig. 6). Exposures of these rocks are commonly rust-stained, due to the oxidation of widespread, fine-grained disseminated pyrite. The brown weathering colour, coarse mica and generally rusty nature of these rocks readily distinguishes them from the siliciclastic rocks of the Piling Group (described below).

Mafic rocks of the Mary River Group are relatively rare in the map area, in contrast with the area along strike to the west (Bethune and Scammell, 1997, in press). Most are generally massive to moderately foliated amphibolite (unit AMa), and characterized by hornblende + biotite; clinopyroxene was only rarely observed. At several localities, irregular chloritic banding suggestive of pillow selvedges was observed; well-preserved pillows have been described along strike by Bethune and Scammell (1997, in press).

PALEOPROTEROZOIC PILING GROUP (units PPD–PPLs)

Rocks of the Paleoproterozoic Piling Group are part of an extensive package (Jackson and Taylor, 1972) that is exposed as far east as the coast of West Greenland (Karrat Group; Taylor, 1982) and southwestward onto the Melville Peninsula (Penrhyn Group; Henderson, 1983). Because detailed descriptions of the constituent units and references to previous work have been previously presented (Scott et al., 2002a; St-Onge et al., 2002d), we focus here on newly recognized relationships.

DEWAR LAKES FORMATION (unit PPD)

The stratigraphically lowest unit of the Dewar Lakes Formation (unit PPD) in the project area comprises white- to grey-weathering quartzite and feldspathic quartzite, locally interbedded with psammite and pelite. The unconformable nature of the basal contact along much of the northern margin of the belt, as well as a three-part subdivision of the Dewar Lakes Formation, are described below.

Of paramount importance to the understanding of the tectonic evolution and significance of the Piling Group is the recognition of its primary relationship to the underlying Rae craton. At numerous, widely spaced localities along the northern margin of the central belt (Fig. 2), clean exposures of the contact were identified and examined (Fig. 7). In each case, the basal contact of the Dewar Lakes Formation truncates lithological and structural elements in the underlying basement orthogneiss, but is conformable with overlying clastic material (commonly fine- to medium-grained quartzite). Clear primary sedimentary features, such as planar bedding, were commonly observed, suggesting that the overall degree of strain at the contact is negligible. Consequently, we propose that much of the northern contact of the Piling Group against the underlying contiguous Archean rocks (Fig. 2) is an undisturbed unconformity. Recognition of this relationship clearly ties deposition of the Piling Group rocks to the Rae craton, supporting earlier assertions (Morgan et al., 1975; Scott et al., 2002a) that these rocks collectively represent a Paleoproterozoic continental margin succession.

The lowest member of the Dewar Lakes Formation comprises thinly bedded quartzite, which is commonly rich in coarse muscovite and, grey- to pink-weathering psammite (Fig. 8); the thickest exposures of this member are up to ~50 metres. Overlying the lowest member are medium to thickly bedded quartzite (Fig. 9) with sillimanite and rare mica. This middle member of the Dewar Lakes Formation is by far the most widespread; exposures of tens to hundreds of metres in thickness are common. The upper member of the Dewar Lakes Formation is characterized by thin beds of quartzite to psammite and rusty semipelite to pelite (Fig. 10). The relatively higher proportion of pelitic material in the upper member is consistent with a postulated deeper, more distal(?) depositional setting (Scott et al., 2002a).

Significant variations in overall thickness of the Dewar Lakes Formation have been identified throughout the project area (Fig. 2). At localities north of Flint Lake, the total thickness of the formation ranges from less than a metre to several tens of metres. In striking contrast, in excess of ~1000 m of quartzite is exposed at the west end of Flint Lake, and similar or greater thicknesses occur south of the McBeth River. In light of the recognition of an unconformity at the base of the formation, these variations need not be structural in nature, and are consequently interpreted as preserved primary features. One possible explanation is that the areas west of Flint Lake and south of the McBeth River were primary sedimentary depocentres, possibly deltas located at the mouths of rivers flowing off of the Rae craton.

Detrital zircons from a quartzite sample from this formation have a bimodal age distribution: one population is Neoarchean, the other is 2.18–2.16 Ga (Henderson and Parrish, 1992). The Archean detritus is similar in age to known felsic plutonic rocks that form extensive parts of the adjacent Rae craton (Bethune and Scammell, 1997; Wodicka et al., 2002) and constitute the depositional basement to the Piling Group. The younger grain population brackets the timing of deposition of the entire Piling succession to younger than 2.16 Ga; the source of this detritus is enigmatic, as extensive exposures of rocks of this age are not known in northeast Laurentia (cf. Scott et al., 2002b, and references therein). Detrital zircons from additional samples of the Dewar Lakes Formation will be analysed by SHRIMP II ion microprobe (N. Wodicka, pers. comm. 2002) to further delineate the age and provenance of these rocks.

FLINT LAKE FORMATION (unit PPF)

White to grey weathering dolostone, marble (Fig. 11) and calcsilicate units of the Flint Lake Formation (unit PPF) are interlayered with minor to rare siliciclastic material (Corrigan et al., 2001; Scott et al., 2002a). The exposed stratigraphic thickness of this formation varies considerably across the project area (Fig. 2). The thickest exposures (500–1000m), near the west end of Flint Lake, thin toward both the east and west. In the central part of the area, exposures are commonly less than several tens of meters, but can be traced along strike for hundreds of metres. Relatively thick exposures are found in the northeast part of the area (OF 4432), where thicknesses of tens to hundreds of metres are preserved.

The southernmost exposures, typically thin calc-silicate and marble beds collectively only several metres thick, are no farther than ~40–50 km from the northern exposures of continuous Rae craton. We suggest that the Flint Lake Formation originally formed a relatively narrow belt (75–100 km) adjacent and parallel to the southern edge of the Rae craton, with significant along-strike variation in primary thickness.

BRAVO LAKE FORMATION (unit PPBm)

In the southern part of the map area (Fig. 2), mafic volcanic rocks as well as mafic and ultramafic sills interbedded with sedimentary rocks are assigned to the Bravo Lake Formation (see also Stacey and Pattison, 2003). The stratigraphic base of the formation occurs below the mafic volcanic rocks that conformably overlie quartzite, psammite and rusty semipelite of the upper Dewar Lakes Formation (Scott et al., 2002a; St-Onge et al., 2002b, c). In the northeastern part of the map area (OF 4432), the northernmost exposures of the Bravo Lake Formation (unit PPBm) are relatively thin sequences (< 100 m) of thin flows (or sills) interbedded with (or intruded into) siliciclastic rocks of the upper member of the Dewar Lakes Formation.

Because rocks of both the Flint Lake and Bravo Lake formations conformably overlie the siliciclastic rocks of the upper Dewar Lakes Formation, we suggest that these lithologically distinct formations occupy the same stratigraphic position in the overall Piling Group succession. This is further supported by observations (see next paragraph) that both the carbonate and mafic volcanic rocks are directly overlain by rusty-weathering graphitic pelite and semipelite ascribed to the Astarte River Formation.

ASTARTE RIVER FORMATION (unit PPA)

This formation (unit PPA) comprises dark, rusty-weathering graphitic pelite and semipelite with minor sulphide-facies iron-formation (Fig. 12). Disseminated to locally massive seams of pyrite with minor pyrrhotite are common throughout. Biotite and graphite are characteristic in the lowest metamorphic grade rocks, whereas sillimanite and muscovite are present in the highest-grade rocks. The maximum overall thickness of this formation is estimated to be on the order of 500 m in the northern part of the map area, and pinching out in the vicinity of Dewar Lakes (Fig. 2) in the south (Scott et al., 2002a; St-Onge et al., 2002d).

In the vicinity of Flint Lake (Fig. 2), rusty graphitic pelites of the Astarte River Formation are in sharp, conformable contact with the underlying marbles of the Flint Lake Formation (Scott et al., 2002a). Further south (east of Foley Island: Fig. 2) and to the east and southeast (OF 4432), the Astarte River rocks are deposited directly on psammite and rusty semipelite of the upper member of the Dewar Lakes formation (Fig. 13). In the southernmost parts of the area, the rusty graphitic pelites overlie mafic volcanic rocks of the Bravo Lakes Formation (Scott et al., 2002a). The dramatic change in the nature of the stratigraphic units underlying the Astarte River Formation further emphasizes the across-strike variation in the paleogeographic distribution of the lowest units of the Piling Group.

LONGSTAFF BLUFF FORMATION (units PPLa–PPLs)

The Longstaff Bluff Formation (units PPLa–PPLs) comprises a relatively homogeneous package of distinctly feldspathic psammite, subordinate semipelite and rare pelite turbidites (Scott et al., 2002a). Bedding thickness is typically 10 to 50 cm, but can be as thick as 2 to 3 metres in extreme cases. Graded bedding is commonly preserved in the thinner beds (Fig. 14); the majority of such observations indicate that the succession is upright, with overturned beds found only on oversteepened fold limbs (St-Onge et al., 2002d) (OF 4432, OF 4433). Calcsilicate pods, up to several tens of centimetres in diameter, are ubiquitous throughout the psammitic beds of this formation and interpreted as metamorphosed carbonate concretions (Fig. 15). Elongate undulose features on bedding planes that are interpreted as ripple marks (Fig. 16) have been observed at only a few locations and are typically oriented roughly east-west.

The Longstaff Bluff Formation turbidites abruptly overlie the Astarte River Formation in the north (Fig. 17), the Bravo Lake Formation in the south-central part of the area, and the Dewar Lakes formation quartzites in the south (Fig. 2). Neodymium isotopic analysis (Johns, 2002) has demonstrated that these rocks have a distinctly younger provenance than those of the Dewar Lakes formation. Detrital zircons from samples of this formation will be analysed by SHRIMP II ion microprobe (N. Wodicka, pers. comm. 2002) to characterize the provenance of and bracket the timing of deposition. We tentatively interpret the rocks of the Longstaff Bluff formation as a molasse derived through orogenic uplift and erosion.

PALEOPROTEROZOIC GRANITES (unit Pgr)

Plutonic rocks intrusive both into the Paleoproterozoic Piling Group (Fig. 18) and units of the Archean Rae craton, comprise syenogranite to monzogranite dykes, sills and irregularly-shaped plutonic masses (OF 4432, OF 4433) that commonly contain muscovite, garnet and biotite (unit Pgr). The granites are weakly to non-foliated, pink to white and coarse-grained to pegmatitic. These intrusions occur throughout the map area, and were emplaced over a time interval ranging from the thermal peak of metamorphism to the latest thick-skinned folding events (N. Wodicka, pers. comm. 2003).

NEOPROTEROZOIC DIABASE DYKES (unit NFdb)

Fresh, undeformed diabase dykes (unit NFdb) of the northwest-trending 723 + 4/-2 Ma (Heaman et al, 1992) Franklin swarm are widespread across the map area. These vertical dykes range in width from several metres to hundreds of metres; the thickest dykes can be traced for tens of kilometres. Locally they anastomose. Dykelets a few metres in width are locally observed branching from the larger intrusions. The dykes generally exhibit a brown-weathered surface and the larger ones, a rectangular joint pattern.

DEFORMATION AND METAMORPHISM

The Archean tectonothermal history of the Rae craton has been described in detail by Bethune and Scammell (1997, in press) based on work in the Eque Bay area which is immediately to the west of the current project area. Overviews of the area north of Flint Lake have recently been presented (Corrigan et al., 2001; St-Onge et al., 2001a, b).

Tight, intrafolial isoclinal folds of bedding in siliciclastic rocks of the Dewar Lakes Formation represent evidence of the earliest Paleoproterozoic deformation in the map area (D_{1P}). In the vicinity of Dewar Lakes (Fig. 2), the contact between the Archean orthogneisses and overlying quartzites is highly strained, and commonly a well-developed, northwest-trending mineral lineation is present (St-Onge et al., 2002c). The underlying orthogneisses are generally recrystallized, with planar, contact-parallel fabric development increasing toward the contact with the overlying quartzites. Shear-sense indicators are rare, making it difficult to systematically document the sense of displacement. Tectonic imbrication of the lowest formations of the Piling Group in the Flint Lake area (St-Onge et al., 2001b) and, structural juxtaposition of rocks of the Dewar Lakes and Bravo Lake formations onto Longstaff Bluff Formation turbidites in the southern part of the area (St-Onge et al., 2002b, c; Fig. 2), are both interpreted to have occurred during (D_{1P}) (Scott et al., 2002a). Macroscopic, east-northeast-trending folds of Piling Group strata, often transected by a steep cleavage striking 10 degrees clockwise from the strike of bedding, are also ascribed to D_{1P}. The axes of these folds typically have shallow plunges, and axial surfaces that vary from upright to slightly inclined. The fold closures are typically tight and angular (Fig. 19).

Map-scale, northeast-trending folds of Piling Group rocks and underlying basement units occur throughout the central Baffin Island area (Fig. 2) and have been ascribed to D_{2P}. At several localities, orthogneisses of assumed Archean age have been overthrust northward onto rocks of the lower Piling group (Fig. 4) and interpreted as a consequence of overtightening of D_{2P} folds. The basement-involved, thick-skinned D_{2P} folds are refolded (D_{3P}) by northwest- to northeast-trending upright cross folds that generate the overall dome-and-basin geometry of the map area (Fig. 2) and are responsible for the basement-cored domes that occur in the Dewar Lakes (St-Onge et al., 2002c), McBeth River (OF 4432) and Blanchfield Lake (OF 4433) areas.

Mapping in the eastern part of the map area has allowed documentation of the closure of metamorphic mineral zones, essentially outlining a "thermal trough" roughly centered on the belt of Piling group rocks (OF 4432). Mineral assemblages in pelitic rocks progressively increase in metamorphic grade in a broadly concentric pattern (St-Onge et al., 2002d) (OF 4432, OF 4433). As illustrated by rocks of pelitic composition, assemblages progress from chlorite - muscovite, biotite muscovite, biotite muscovite cordierite ± andalusite (Fig. 21), locally muscovite-sillimanite, then K-feldspar sillimanite melt, and ultimately garnet cordierite K-feldspar melt (in the southern portion of the project area). The present, complex geometry of the mineral zones is interpreted as a consequence of the interference between the D_{2P} and D_{3P} fold events.

ECONOMIC GEOLOGY

The Paleoproterozoic rocks of the project area hold elevated potential for a variety of mineral deposit types. These include Mississippi Valley-type Zn in the relatively thick carbonate units (Flint Lake Formation), and sedimentary-exhalative (SEDEX) base metal deposits in the overlying graphitic pelite (Astarte River Formation). The mafic and ultramafic rocks of the Bravo Lake Formation are exploration targets for Ni-Cu-PGE magmatic sulphide deposits. Upper-amphibolite facies siliciclastic rocks of the upper Dewar Lakes Formation have potential for Broken Hill-type Pb-Zn-Ag deposits. In the northeastern part of the area, syenogranitic pegmatites that intrude the lower part of the Longstaff Bluff formation have potential for Sn-Ta mineralization.

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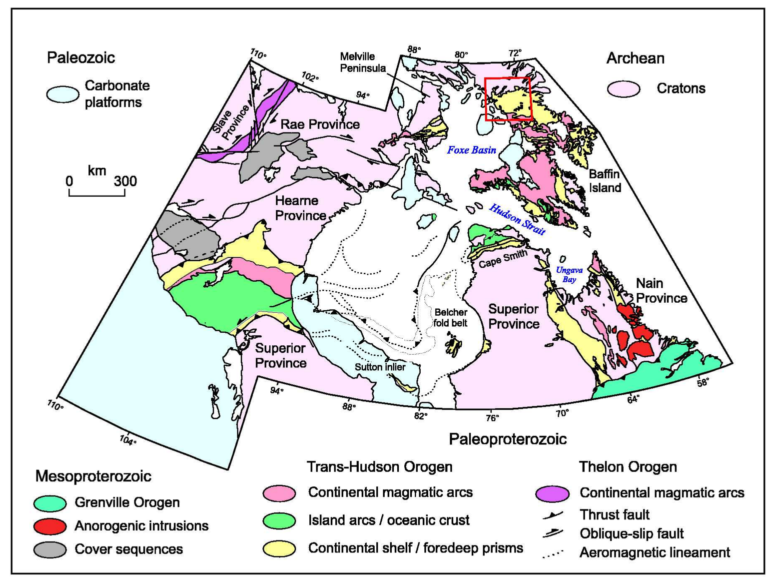

Figure 1. Geological map of northeastern Canada modified after Wheeler et al. (1996) outlining the surface extent of the Trans-Hudson Orogen. Red box outlines location and surface extent of 2000–2002 mapping project in central Baffin Island.

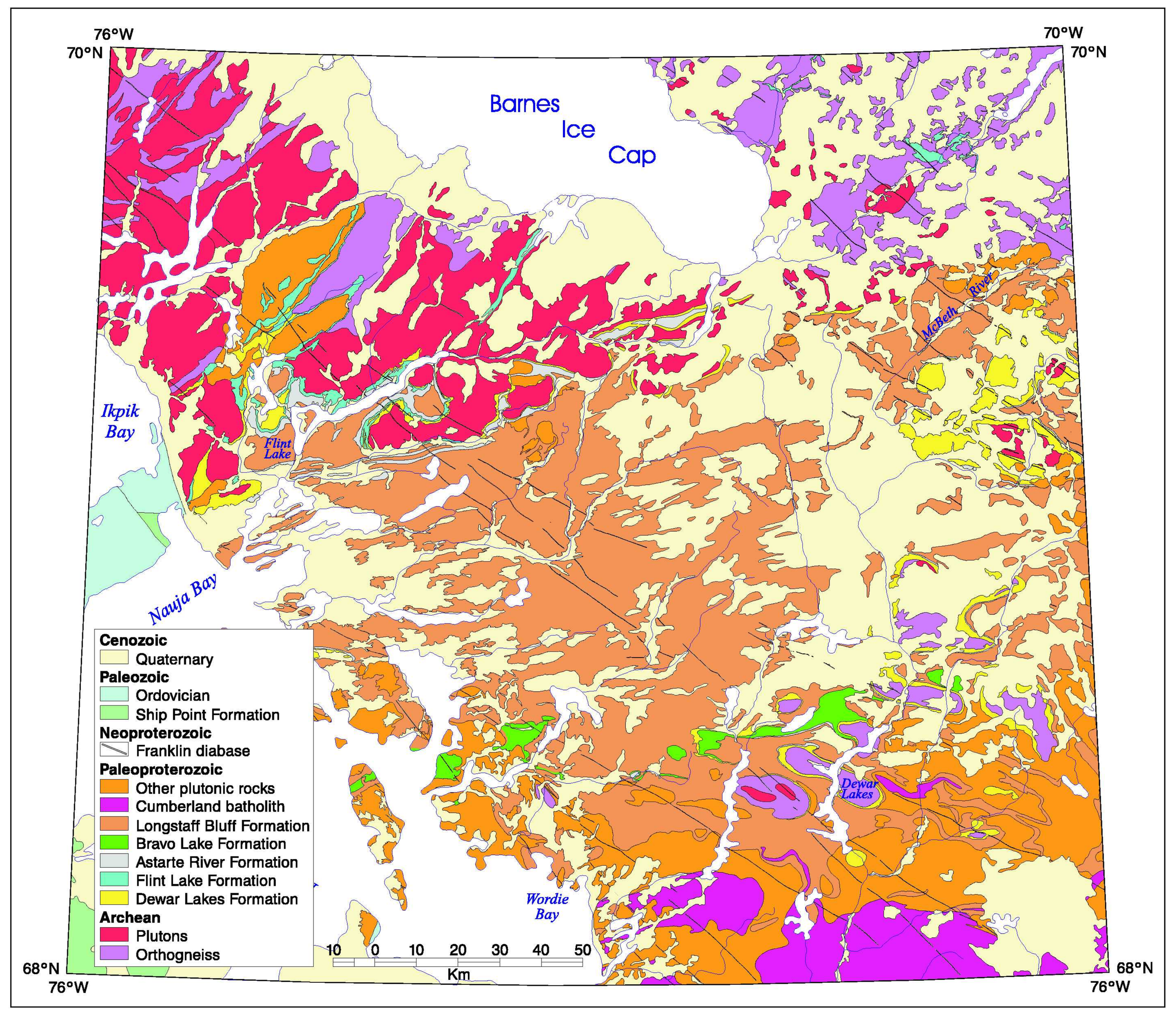

Figure 2: Generalized bedrock geology of the project area, compiled from St-Onge et al. (2001a, b; 2002a, b, c), OF 4432 and OF 4433.

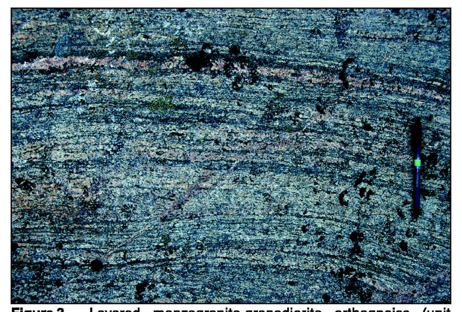

Figure 3. Layered monzogranite-granodiorite orthogneiss (unit Agn), McBeth River area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-794).

Figure 4. Layered monzogranite granodiorite orthogneiss (dark coloured background) (unit Agn) thrust onto marble of the Flint Lake Formation (light coloured foreground) (unit PPF), Clyde River area. Height of hill is 300 metres. Location shown on OF 4432. (GSC 2002-810).

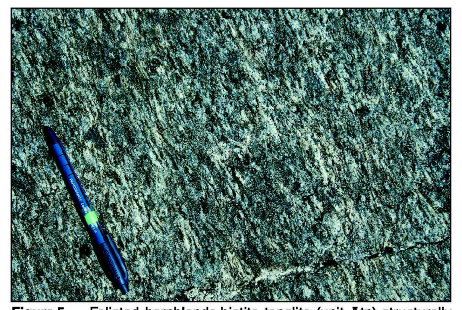

Figure 5. Foliated hornblende-biotite tonalite (unit Atn) structurally below metasedimentary rocks of the Mary River Group (unit AMp), Generator Lake area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-792).

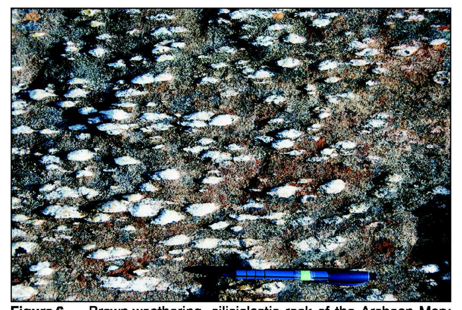

Figure 6. Brown-weathering, siliciclastic rock of the Archean Mary River Group (unit AMp) with "knots" of sillimanite, Generator Lake area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-793).

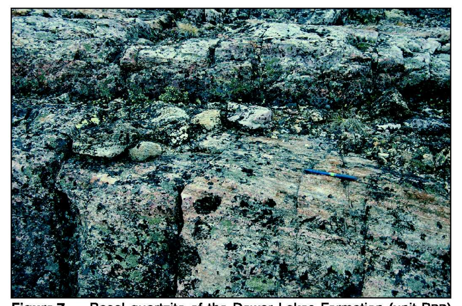

Figure 7. Basal quartzite of the Dewar Lakes Formation (unit PPD) unconformably overlying layered monzogranite-granodiorite orthogneiss (unit Agn) in foreground, Clyde River area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-795).

Figure 8. Thinly bedded psammite and quartzite, lower member of the Dewar Lakes Formation (unit PPD), southeast end of Flint Lake. Hammer is 35 cm long. Location shown on OF 4433. (GSC 2002-796).

Figure 9. Thick-bedded quartzite, middle member of the Dewar Lakes Formation (unit PPD), Dewar Lakes area (St-Onge et al., 2002c). Hammer (location indicated by arrow) is 35 cm long. (GSC 2001-378RR).

Figure 10. Rusty, thinly bedded psammite-semipelite turbidites, upper member of the Dewar Lakes Formation (unit PPD), south-east of the McBeth River. Hammer is 35 cm long. Location shown on OF 4432. (GSC 2002-798).

Figure 11. Shallowly-dipping calcareous marble, Flint Lake Formation (unit PPF), Clyde River area. Front of 206-L4 helicopter for scale. Location shown on OF 4432. (GSC 2002-799).

Figure 12. Rusty, thinly bedded semipelite and pelite of the Astarte River Formation (unit PPA), southeast end of Flint Lake. Person is 2 metres tall. Location shown on OF 4433. (GSC 2002-801).

Figure 13. Shallow-dipping Astarte River Formation (unit PPA) in foreground, overlying the upper member of the Dewar Lakes Formation (unit PPD) in background, southeast of the McBeth River. Distance to snow banks is 100 metres. Location shown on OF 4432. (GSC 2002-800).

Figure 14. Thin sandy turbidite beds preserving quartz- and feldspar-rich bases (light coloured) grading to more aluminous tops (dark coloured), Longstaff Bluff Formation (unit PPLc), McBeth River area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-805).

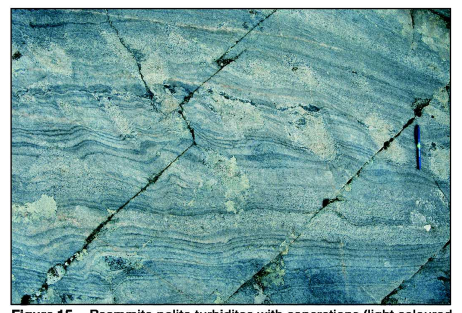

Figure 15. Psammite-pelite turbidites with concretions (light coloured oblate domains), Longstaff Bluff Formation (unit PPLs), southeast of the McBeth River. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-807).

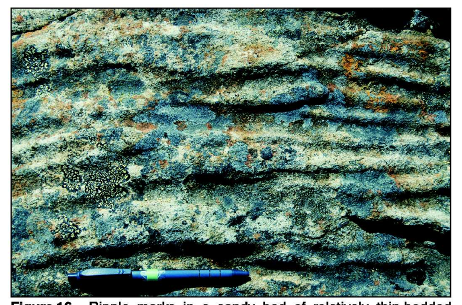

Figure 16. Ripple marks in a sandy bed of relatively thin-bedded turbidites, Longstaff Bluff Formation (unit PPLc), McBeth River area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-806).

Figure 17. Ledge-forming psammite semipelite turbidites (left) of the Longstaff Bluff Formation (unit PPLs) overlying rusty pelite of the Astarte River Formation (unit PPA), southeast of the McBeth River. Backpack is 55 cm tall. View to the northeast. Location shown on OF 4432. (GSC 2002-802).

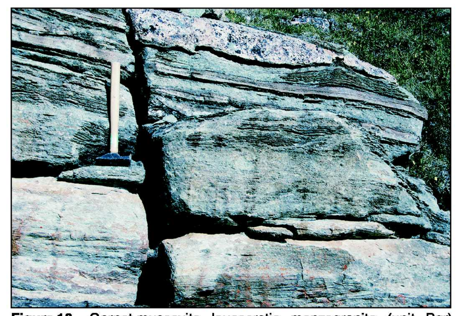

Figure 18. Garnet-muscovite leucocratic monzogranite (unit Pgr) intrusive into calcareous marble of the Flint Lake Formation (unit PPF), MacDonald River area. Hammer is 35 cm long. Location shown on OF 4433. (GSC 2002-811).

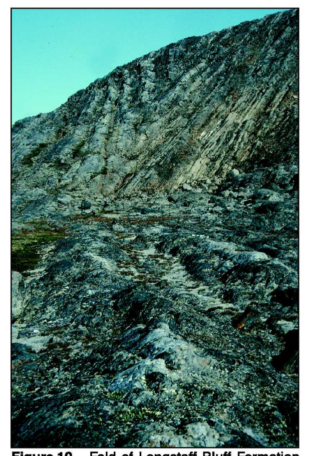

Figure 19. Fold of Longstaff Bluff Formation turbidites (unit PPLc) showing upright- to shallowly overturned fold axial surface, McBeth River area. Height of cliff is 50 metres. View to the east. Location shown on OF 4432. (GSC 2002-803).

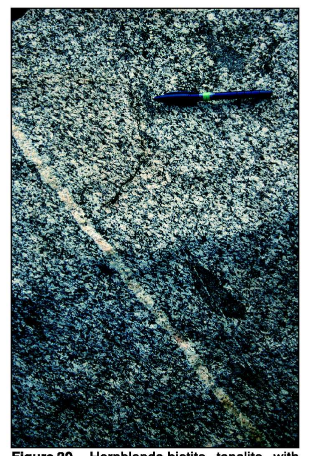

Figure 20. Hornblende-biotite tonalite with minor diorite inclusions cut by a monzogranite vein (unit Atn), Generator Lake area. Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-791).

Figure 21. Muscovite-biotite-cordierite-andalusite-sillimanite-plagioclase-quartz bearing Longstaff Bluff Formation pelite (unit PPLs). Pen is 14 cm long. Location shown on OF 4432. (GSC 2002-808).

LEGEND

This legend is common to maps OF 4432 and OF 4433. All units and symbols may not appear on this map. The prefix 'meta' applies to all lithologies in units Agn to PPLs

CENOZOIC

QUATERNARY
PLEISTOCENE–RECENT

- **Q** — *Unconsolidated glacial drift with associated marine, lacustrine, fluvial, and bog deposits. Chiefly marine muds on coastal areas. Includes extensive felsenmeer in proximity to Barnes Ice Cap.*

unconformity

- **NFdb** — *FRANKLIN INTRUSIONS: tholeiitic diabase dykes; medium-grained with ophitic texture; narrow chilled margins.*

intrusive contact

PROTEROZOIC

PALEOPROTEROZOIC

- **Pum** — *Ultramafic rocks; serpentinized peridotite and hornblendite; foliated to schistose; dark green or brown weathering.*
- **Pgr** — *Biotite-allanite±hornblende monzogranite, granodiorite; commonly grades into biotite-allanite±hornblende syenogranite; massive, fine- to coarse-grained, pink to white; abundant crosscutting veins and sheets of associated biotite-muscovite-garnet ±tourmaline pegmatite; locally contains inclusions of layered orthogneiss (unit Agn), quartz diorite, and psammite (unit PPD); local weak foliation.*

PILING GROUP (units PPD–PPLs)
Upper Sequence

LONGSTAFF BLUFF FORMATION: (metamorphic mineral units PPLb–PPLs)

- **PPLs** — *Psammite, semipelite, pelite, arkosic- and lithic-wacke; interbedded; thin- to thick-bedded, light- to dark-grey; graded beds; minor hornblende-bearing calcsilicate beds and concretions; biotite-sillimanite-K-feldspar±melt pod metamorphic assemblages; locally includes bodies of biotite-allanite±hornblende monzogranite, granodiorite, syenogranite or biotite-garnet±muscovite±sillimanite (fibrolite)±cordierite monzogranite, and associated biotite-muscovite-garnet ±tourmaline pegmatite.*

mineral isograd

- **PPLc** — *Psammite, semipelite, pelite, arkosic- and lithic-wacke; interbedded; thin- to thick-bedded, light- to dark-grey; graded beds including inverse metamorphic grading; minor hornblende-bearing calcsilicate beds and concretions; biotite-muscovite-cordierite±andalusite metamorphic assemblages; locally includes bodies of biotite-allanite±hornblende monzogranite, granodiorite, syenogranite or biotite-garnet±muscovite±sillimanite (fibrolite)±cordierite monzogranite, and associated biotite-muscovite-garnet±tourmaline pegmatite.*

mineral isograd

- **PPLb** — *Psammite, semipelite, pelite, arkosic- and lithic-wacke; interbedded; thin- to thick-bedded, light- to dark-grey; graded beds; minor hornblende-bearing calcsilicate beds and concretions; biotite-muscovite±garnet metamorphic assemblages.*
- **PPLa** — *LONGSTAFF BLUFF FORMATION: Arkosic- and lithic-wacke; interbedded with psammite, semipelite, pelite; thin- to thick-bedded, white, gritty surface; graded beds; minor hornblende-bearing calcsilicate beds and concretions.*
- **PPA** — *ASTARTE RIVER FORMATION: sulphidic schist; rusty-weathering; graphitic, pyrrhotite-pyrite schist and slate; sulphide-facies iron-formation.*

Lower Sequence

- **PPBm** — *BRAVO LAKE FORMATION: dominantly basalt; pillowed, fragmental and massive flows; light- to dark-green; mafic and ultramafic cumulates; metre-scale layers, dark green to brown; minor volcaniclastic sedimentary beds; millimetre- to centimetre-scale laminations, dark grey to white; minor quartzite, semipelite, iron-formation; gabbro; peridotite; layered peridotite-gabbro sills.*
- **PPF** — *FLINT LAKE FORMATION: marble, dolomite and calcsilicate; chiefly white to grey or buff weathering; may include semipelite, pelite, quartzite and carbonate facies iron-formation; locally includes bodies of biotite-allanite±hornblende monzogranite, granodiorite, syenogranite and associated biotite-muscovite-garnet±tourmaline pegmatite.*
- **PPD** — *DEWAR LAKES FORMATION: quartzite and feldspathic quartzite, semipelite; grey, white, and black; laminated, bedded, and massive, locally crossbedded; may include magnetite rich laminae; locally includes iron-formation; chiefly oxide facies with silicate facies; metallic grey; fine- to coarse-grained; laminated to bedded; may include marble, dolomite and calcsilicate; locally includes bodies of biotite-allanite±hornblende monzogranite, granodiorite, syenogranite or biotite-garnet±muscovite±sillimanite (fibrolite)±cordierite monzogranite, and associated biotite-muscovite-garnet±tourmaline pegmatite.*

unconformity

ARCHEAN

NEOARCHEAN

- **Agk** — *Biotite±hornblende K-feldspar megacrystic monzogranite, granodiorite; pink to buff; K-feldspar megacrysts in a finer-grained matrix of plagioclase, quartz, biotite±hornblende; varies from weakly to strongly foliated, locally an L-tectonite; gradational into granitic and granodioritic rocks lacking megacrysts.*
- **Agr** — *Biotite±hornblende monzogranite, syenogranite; pink, fine- to medium-grained; massive to moderately foliated; locally grades into megacrystic granite.*

MARY RIVER GROUP (units AMa–AMp)

- **AMp** — *Psammite, semipelite; grey- to rusty-brown, flaggy; centimetre- to metre-scale laterally continuous layers; abundant melt pods; local interlayers of quartzite, pelite and iron-formation.*
- **AMa** — *Hornblende-biotite±clinopyroxene amphibolite; fine- to medium-grained; alternating millimetre- to centimetre-scale black and green layers; metre-scale layers of coarser-grained amphibolite, semipelite and pelite; may be derived from a volcanic protolith and associated sedimentary rocks.*
- **Atn** — *Biotite±hornblende tonalite, granodiorite; grey to tan, fine- to medium-grained; locally with diorite inclusions; varies from weakly to strongly foliated, locally an L-tectonite.*
- **Agn** — *Biotite±hornblende quartzofeldspathic orthogneiss; leucocratic gneiss of plutonic origin; granodioritic to monzogranitic; alternating grey to white, black, pink, fine- to medium-grained; moderately to well foliated, locally layered with concordant syenogranitic leucosome; locally contains amphibolite and tonalite bands, gabbro/anorthosite boudins; locally migmatitic.*

Bedrock outcrop massive
Geological contact (defined, approximate)
Form lines
D_{1P} thrust fault (defined, approximate); teeth on hanging wall
D_{2P} thrust fault (defined, approximate); teeth on hanging wall
Oblique-slip fault (defined)
Bedding (upright, tops known) 10
Bedding (overturned, tops known) 20
Bedding (tops unknown) 30
Bedding (transposed) 40
Flute casts
Ripple marks
Cleavage 50
Schistosity 60
Foliation 10
Gneissosity 20
Mineral lineation 30
Crenulation axis 40
Mesoscopic S fold axis 50
Mesoscopic M fold axis 60
Mesoscopic Z fold axis 10
Mesoscopic fold axial plane 20
Glacial striae; direction of ice movement undetermined
Syncline (upright, overturned) (arrow indicates plunge)
Syncline, inferred beneath Quaternary cover (upright, overturned) (arrow indicates plunge)
Anticline (upright, overturned) (arrow indicates plunge)
Anticline, inferred beneath Quaternary cover (upright, overturned) (arrow indicates plunge)
Synform (upright) (arrow indicates plunge)
Synform, inferred beneath Quaternary cover (upright) (arrow indicates plunge)
Antiform (upright) (arrow indicates plunge)
Cordierite±andalusite isograd (ornament on high-temperature side) (defined, approximate)
Sillimanite-K-feldspar±melt pod isograd (ornament on high-temperature side) (defined, approximate)
Location of field photograph with corresponding Figure number 2

Geology by M.R. St-Onge, D. Corrigan, M. Allan, F. Berniolles, K. Dubach, J. Gladstone, S. Johns, R. Keiser, B. Sharpe, J. Stacey, S. Gagné, N. Wodicka (2002), Geological Survey of Canada; D.J. Scott (2002), Canada-Nunavut Geoscience Office

Geological compilation by M.R. St-Onge, D.J. Scott, and D. Corrigan (2002)

Digital cartography by E. Everett, Earth Sciences Sector Information Division (ESS Info)

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Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

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2003
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FEUILLET 2 DE 2

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Sheet 2 of 2, Legend, descriptive notes, references, and figures

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