GS-7 Stratigraphy of the McLeod Road–Birch Lake thrust panel, Snow Lake, west-central Manitoba (parts of NTS 63K16 and 63J13)

by K.E. Rubingh[1]

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Summary

During the 2011 field season, lithostratigraphic mapping was undertaken within the McLeod Road–Birch Lake thrust panel near the town of Snow Lake, Manitoba. The objective of the 2011 field season was to outline and define early regional structure through the repetition of structure by folding or thrusting, which would have implications on the understanding of gold mineralization at the New Britannia mine. Stratigraphy was defined across the upper portion of the thrust panel, which was then correlated across three transects to the east of Snow Lake. The transects covered a strike length of 3 km and no repetition of units was observed. This work suggests that the upper portion of the McLeod Road–Birch Lake thrust panel represents a homoclinal sequence that consistently youngs to the north.

Introduction

The McLeod Road–Birch Lake thrust panel is a fault-bounded package of mafic and felsic volcanic and volcaniclastic rocks, which is host to three gold deposits in the vicinity of the town of Snow Lake including the Nor-Acme (New Britannia) deposit, which produced 43 694 kg (1 404 950 oz.) gold over the lifetime of the mine. These deposits are located in the hangingwall of the McLeod Road Thrust, at the contact between lithological units. Rocks from the McLeod Road–Birch Lake thrust panel are geochemically similar to those of the Snow Lake arc assemblage (Bailes and Schledewitz, 1998), which contains several volcanogenic massive sulphide (VMS) deposits. The upper panel, as described in this paper, is the part of the thrust panel, which is north of Bud Lake. The goal of this paper is to provide a detailed description of each of the lithofacies through the upper part of the thrust panel without interpretation of paleoenvironment.

The structural controls on gold mineralization in the area are not well understood, although several studies have been conducted to classify the style and setting of the gold and the nature of the structures controlling the mineralization within the McLeod Road–Birch Lake thrust panel and more specifically the New Britannia deposit (Harrison, 1949; Hogg, 1957; Galley et al., 1986; Galley et al., 1988; Galley et al., 1991; Gale, 1997; Schledewitz, 1997; Schledewitz, 1998; Fieldhouse, 1999; Fulton, 1999; Gale, 2002; Beaumont-Smith and Lavigne, 2008). The gold mineralization is hosted by quartz and quartz carbonate replacements and veins in both mafic and felsic volcaniclastic and volcanic rocks. Fieldhouse (1999) and Galley et al. (1991) proposed that the New Britannia gold mineralization was associated with early structures that predate peak metamorphic conditions. Galley et al. (1991) associated the gold mineralization with the intersection of fluid-bearing faults with a secondary structure (i.e., a fold hinge), which allowed a sudden pressure release and in situ brecciation of the wallrocks and flooding of the zone containing the mineralizing fluids. Previous work on the mineralization at the New Britannia mine considered the possibility that the gold had a syngenetic origin and was later remobilized (Froese and Moore, 1980).

The fieldwork initiated in 2011 is part of a multiyear project, which is supported by the Manitoba Geological Survey and Alexis Minerals Corporation as a research project conducted at Laurentian University. The study is multidisciplinary and will use lithostratigraphy, geochemistry, structural geology and geochronology, with the main goal being to investigate the geological controls on gold mineralization at the New Britannia mine, Snow Lake. The focus of this first field season was to establish a detailed lithostratigraphy of the McLeod Road–Birch Lake thrust panel to test for the presence of structurally repeated lithofacies.

An improved understanding of the geometry of lithological units and a complete lithostratigraphy will aid in determining the internal geometry of the McLeod Road–Birch Lake thrust panel and in defining the structural controls on gold mineralization.

Regional geology

The Flin Flon–Snow Lake greenstone belt (Figure GS-7-1) is in the internides of the Trans-Hudson Orogen. It is bounded to the east by the Superior Boundary Zone, to the west by the Wollaston fold belt, to the north by metaturbidite and sandstone of the Kisseynew basin and to the south it is buried beneath a Paleozoic basin. The belt consists of an amalgamation of several tectonic domains that are distinct in terms of geochemistry, metamorphism and structural history (Lucas et al., 1996; Syme et al., 1996).

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***Figure GS-7-1**: Geology of the Flin Flon–Snow Lake greenstone belt in west-central Manitoba, showing the location of Figure GS-7-2. Abbreviations: BL, Birch Lake; BLC, Batty Lake complex; FI, Fourmile Island; HGD, Herblet gneiss dome; LHF, Loonhead Lake Fault; PGD, Pulver gneiss dome; SB, Sandy Bay; SHC, Sherridon–Hutchinson Lake complex.*

In the Snow Lake area, the deformation was determined to be that of a fold and thrust belt (Connors et al., 1996; Kraus, 1998; Zwanzig, 1999), producing a tectonically imbricated package of volcanic (ca. 1.89 Ga) and metasedimentary rocks (ca. 1.84–1.86 Ga; Syme et al., 1995; Kraus and Williams, 1999). The main panel of volcanic rocks, located south of Snow Lake, forms a 6 km thick succession referred to as the Snow Lake assemblage. This assemblage is subdivided into three sequences based on their unique geochemistry and lithological variation (Bailes and Galley, 1996, 1999, 2007). This geochemical variation reflects the evolution of the Snow Lake assemblage from a primitive arc (e.g., Anderson sequence: mafic and felsic flows), to a mature arc (e.g., Chisel sequence: mafic volcaniclastic rocks with minor felsic volcanic and volcaniclastic rocks), to an evolved arc rift environment (e.g., Snow Creek sequence: mafic flows and pillows). The McLeod Road–Birch Lake thrust panel was attributed to D_2 regional deformation, whereby D_2 thrust faults imbricate thrust slices of the volcanic rocks with younger Burntwood and Missi sedimentary rocks, which were then folded by the large-scale D_3 Threehouse synform (Beaumont-Smith and Lavigne, 2008; Gagné, 2009).

Stratigraphy

The McLeod Road–Birch Lake thrust panel is defined as a north-dipping homoclinal sequence of mafic and felsic volcanic and volcaniclastic rocks. The sequence is bounded by the McLeod Road Thrust to the south and the Birch Lake Fault to the north. Both of these faults are considered to be thrusts. The McLeod Road Thrust moves the older Snow Lake Arc rocks (Bailes and Galley, 2007) on top of the younger Burntwood Group turbidite. The Birch Lake Fault, which juxtaposes younger Missi Group sedimentary rocks on top of older Snow Lake assemblage volcanic rocks, is also interpreted as a thrust fault (Beaumont-Smith and Lavigne, 2008).

Lithostratigraphic mapping was conducted within the McLeod Road–Birch Lake thrust panel at a scale of 1:500 for stratigraphic logs and 1:1000 for outcrop mapping along three measured sections (T1, T2 and T3; Figure GS-7-2), which were then used to correlate

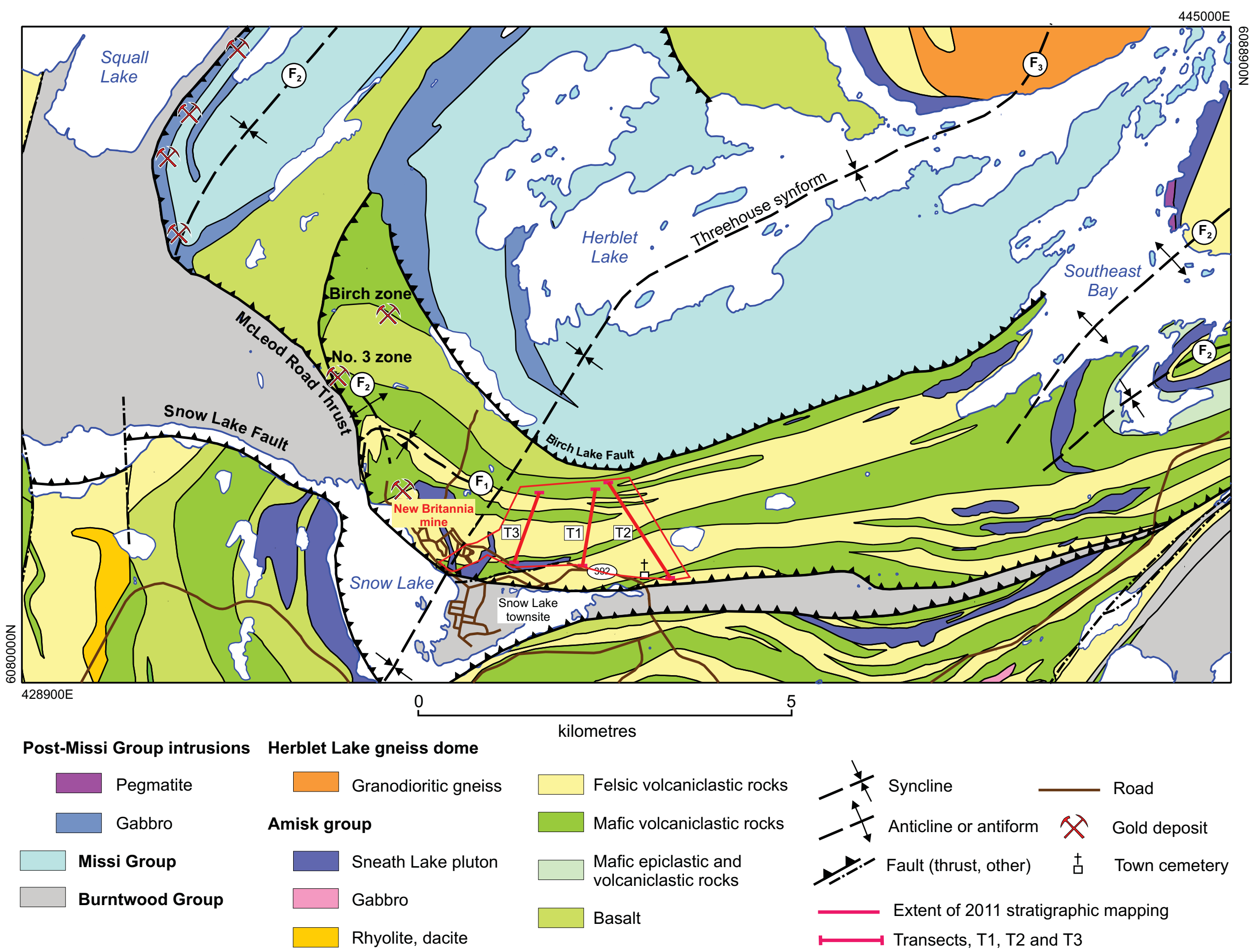

Figure GS-7-2: *Geology of the McLeod Road–Birch Lake thrust panel (modified from Gagné, 2009). The 2011 lithostratigraphic mapping is overlain to show the locations of each transect and the location of stratigraphic units across the upper part of the thrust.*

the stratigraphy from the town cemetery to the town centre of Snow Lake (Figure GS-7-3). The sections were chosen for the best outcrop exposure and thus two transects run parallel to the main power lines to the east of Snow Lake. Along each stratigraphic section, detailed mapping of surface outcrops, sampling of the hostrock for lithogeochemistry and relogging of drillcore was performed. The purpose of the fieldwork was to collect a set of representative samples from each lithofacies for detailed textural and geochemical analyses, to correlate the lithofacies from each transect and to form the basis for the geological context of the mineralization.

The following section provides a detailed description, from oldest to youngest, of each lithofacies within the stratigraphy defined for the upper panel of the McLeod Road–Birch Lake thrust panel (Figure GS-7-4). Each lithofacies has been grouped into units that represent lithofacies that share common characteristics; some of the units described comprise several lithofacies, whereas others contain only one. In the descriptions that follow, all primary pyroxene phenocrysts have been pseudomorphed by hornblende due to peak amphibolite facies metamorphism; therefore, the pyroxene phenocrysts described refer only to relict pyroxene.

Unit 1: Mafic flows and volcaniclastic rocks

This unit can be correlated along a strike length of more than 3 km. The most distinctive lithofacies within this unit are the plagioclase-phyric pillows and scoriaceous volcaniclastic rocks. The entire package ranges in thickness from 150 to 200 m thick and can be subdivided into the following six lithofacies. No repetition of facies has been observed through unit 1 and a consistent north-younging direction was determined.

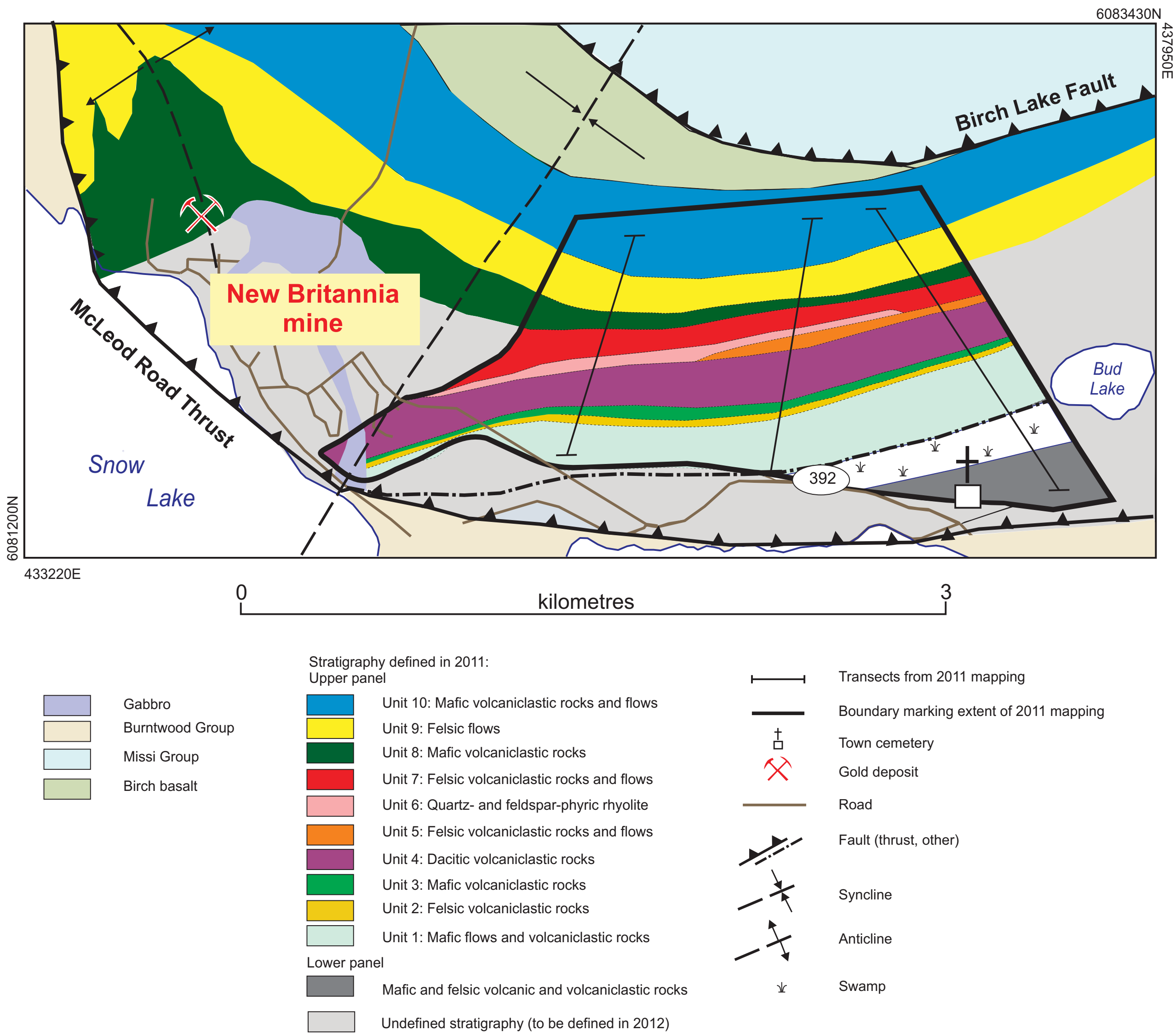

Figure GS-7-3: *Lithostratigraphic mapping from 2011 showing the stratigraphic units across the upper panel of the McLeod Road–Birch Lake thrust panel.*

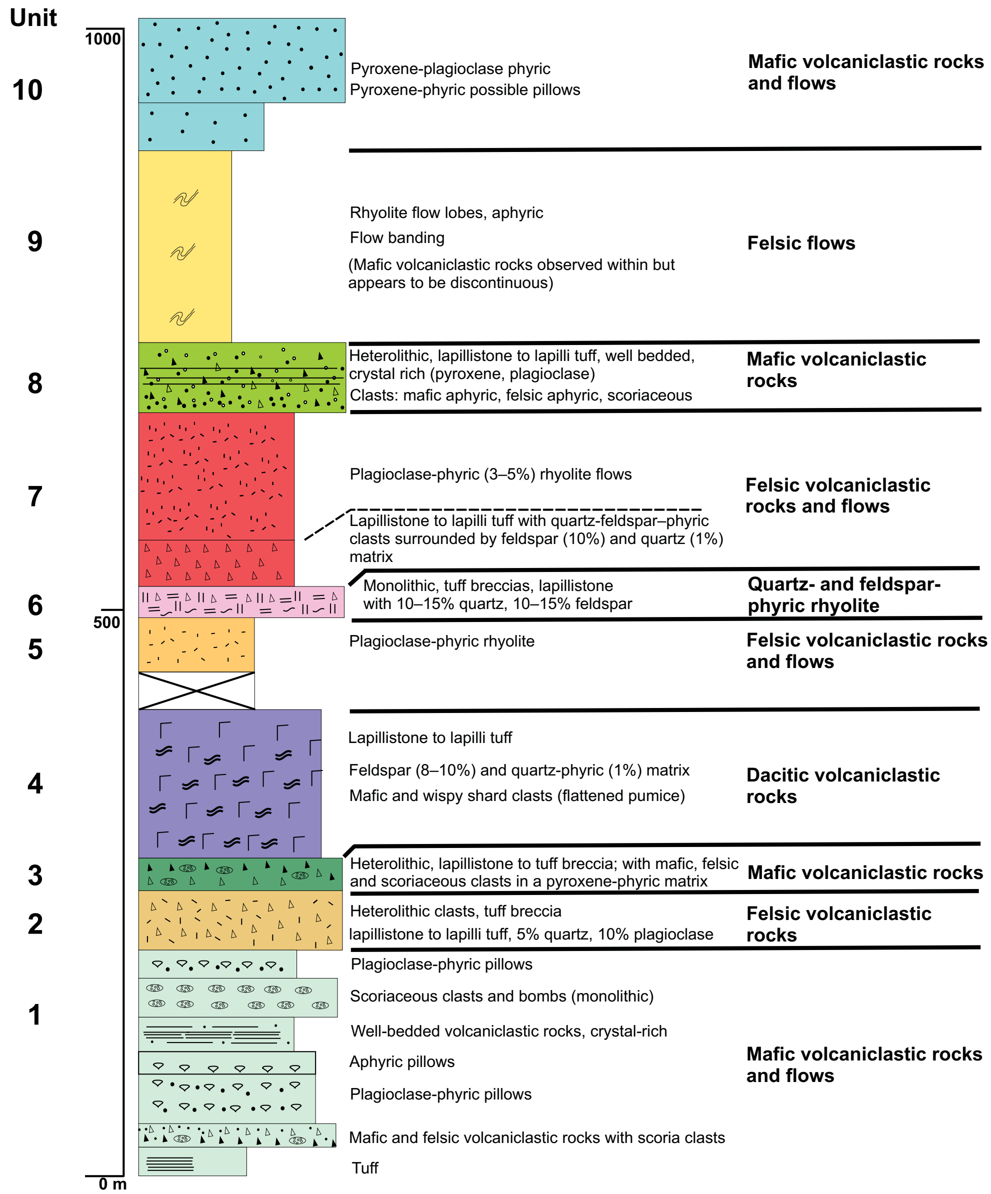

Figure GS-7-4*: Stratigraphy of the upper panel of the McLeod Road–Birch Lake thrust panel as defined from the 2011 fieldwork.*

1) Mafic tuff

The mafic tuff lithofacies varies from 2 to 25 m in thickness; it is finely laminated to thinly bedded and is interbedded with felsic tuff. The mineralogy includes hornblende, biotite, plagioclase and garnet. A strong foliation, defined by hornblende and plagioclase, is pervasive throughout the facies. Hornblende also defines a well-developed mineral lineation. Garnet grains are flattened parallel to foliation and preferential growth occurs parallel to the lineation and within the foliation surfaces. The contact is sharp with the overlying lithofacies and a narrow tuff bed is observed at the contact. Alteration is low to moderate, early patchy hornblende alteration is observed throughout and late hematite staining and K-feldspar alteration occur locally.

2) Mafic and felsic volcaniclastic rocks with scoriaceous clasts

This lithofacies is 5–45 m thick and is present on all three transects. It is well bedded and comprises heterolithic felsic and mafic volcaniclastic rocks with lesser mafic scoriaceous clasts (Figure GS-7-5a), and is commonly intruded by basaltic dikes. Rocks from this lithofacies typically are framework- to matrix-supported breccia with subangular to subrounded clasts of rhyolite (aphyric to feldspar phyric) and subrounded mafic scoriaceous clasts in a finer tuff-sized mafic matrix. Clasts range from 3 cm to 25 cm in diameter, which would place the rocks in the lapillistone to tuff breccia range. The stretching ratio of clasts is approximately 6:1. The breccia is both massive and well bedded in the lapilli tuff beds. Individual beds

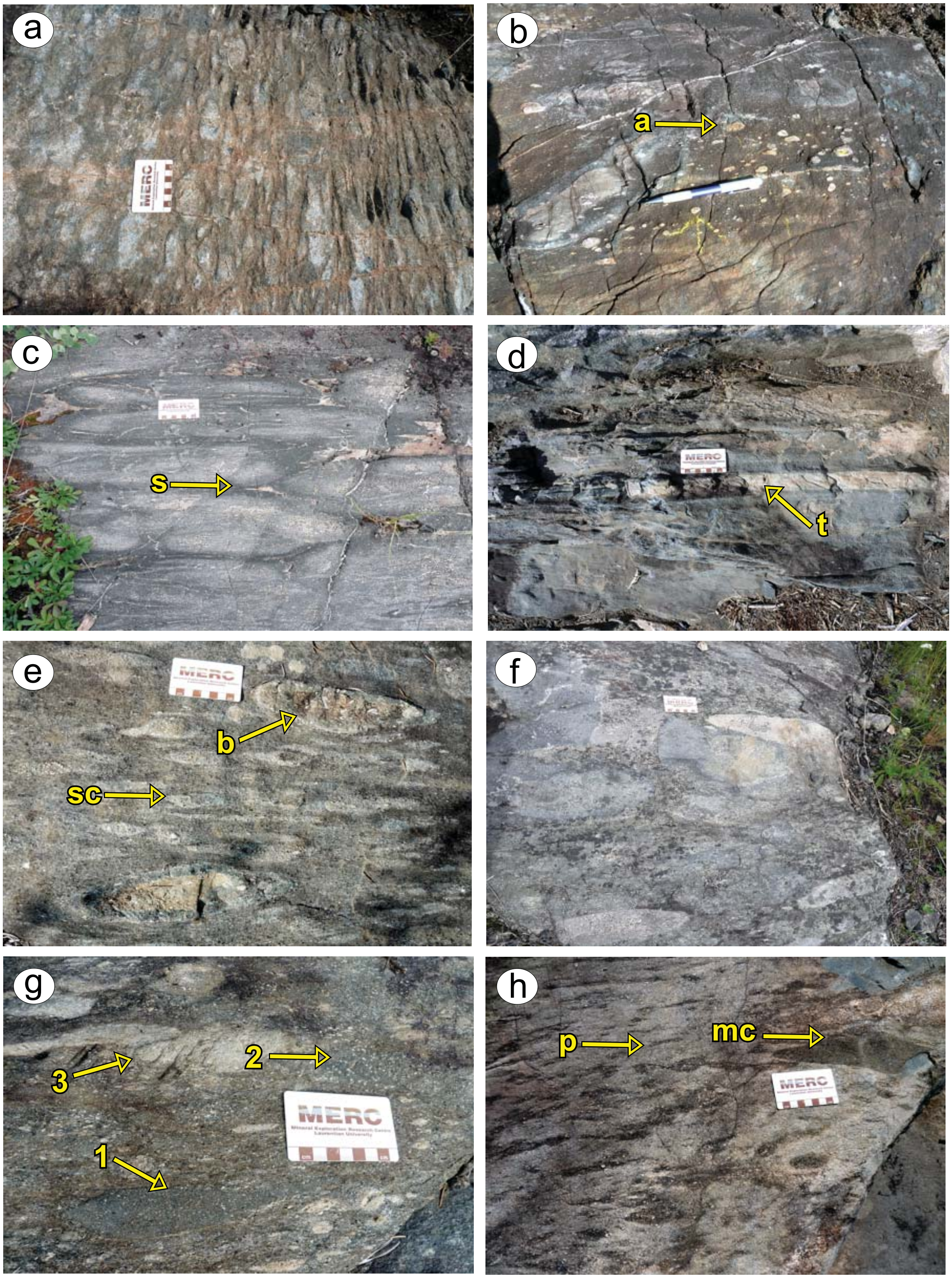

***Figure GS-7-5**: Volcanic rocks of the McLeod Road–Birch Lake thrust panel: **a)** unit 1, heterolithic tuff breccia of the well-bedded volcaniclastic lithofacies; **b)** unit 1, plagioclase-phyric pillow lithofacies showing quartz-filled amygdules (a); **c)** unit 1, plagioclase-phyric pillows with selvages (s); **d)** unit 1, crystal-rich, well-bedded volcaniclastic lithofacies with tuff beds (t); **e)** unit 1, scoriaceous clasts and bomb lithofacies (Abbreviations: b, bomb with intact chilled contact; sc, scoriaceous clast); **f)** unit 2, heterolithic felsic volcaniclastic rocks; **g)** unit 3, heterolithic mafic volcaniclastic breccia (1, plagioclase-phyric basalt; 2, scoria; 3, rhyolite); **h)** unit 4, dacitic volcaniclastic with wispy flattened pumice (p) and mafic clasts (mc) with intact chilled contact.*

range in thickness from 8 to 50 cm. Bedding is defined by abrupt changes in clast size, which are typically observed within the lapillistone to lapilli tuff beds. Normal grading is observed and is younging to the north. A sharp contact is observed with the overlying plagioclase-phyric pillow lithofacies.

3) Plagioclase-phyric pillows

The plagioclase-phyric pillow lithofacies is 3–55 m thick and is continuous across all three transects. This lithofacies consists of densely packed pillows, with narrow thin aphanitic selvages, pillow breccia and bombs (Figure GS-7-5b, c). The pillowed unit is plagioclase phyric (10%) and pyroxene phyric (10%). Amygdules are located in the centres to the tops of the pillows and they range in diameter from 0.3 to 1.5 cm and in abundance from <1% to 25%. A gradational contact is observed with the overlying aphyric pillow lithofacies.

4) Aphyric pillows

The aphyric pillow lithofacies, which may also be pyroxene phyric with rare amygdules, is less densely packed than the plagioclase-phyric lithofacies because its pillows are larger and were observed up to 2.5–3.0 m in length. The pillows are elongated, with an aspect ratio of approximately 5:1, with an average width of 0.5 m. This lithofacies is observed up to 4 m thick and is only observed on transect 1. The lower contact with the plagioclase-phyric pillow lithofacies is gradational and the upper contact with the overlying lithofacies is sharp.

5) Well-bedded, crystal-rich mafic volcaniclastic rocks

The crystal-rich mafic volcaniclastic rocks consist of well-bedded pyroxene-phyric tuff. The thickness of the lithofacies varies from 5 to 24 m and is continuous across all three transects. Normal grading is observed in beds ranging in thickness from 0.3 to 1.5 m. Moderately good indicators for a north-younging direction were interpreted based on moderately defined bed contacts. Beds vary in composition from dominantly quartz amygdaloidal to beds that are pyroxene rich. Fine felsic tuff beds separate individual mafic volcaniclastic beds (Figure GS-7-5d) and grading is observed within tuff layers. In addition, tuff beds are observed to scour into underlying beds, defining good younging indicators. The contact with the overlying lithofacies is sharp and defined by a tuff bed. The contact with the underlying lithofacies is also sharp.

6) Monolithic scoriaceous clasts and bombs

The framework- to matrix-supported monolithic scoria breccia lithofacies was identified on two easternmost transects. Where present, the thickness of this lithofacies varies from 4 to 10 m. The lithofacies is monolithic and comprises subrounded mafic scoriaceous clasts and bombs (5% abundance) with a crystal-rich matrix (Figure GS-7-5e). The scoriaceous clasts contain quartz and feldspar amygdules, which are evenly distributed throughout the clasts. The clasts and bombs have chilled margins, which remain intact (Figure GS-7-5e). The beds are locally reverse graded, which was determined by the concentration of bombs. Narrow, 15 cm thick tuffaceous beds with sharp contacts are intermittent through this lithofacies. The contact with the plagioclase-phyric pillows above is sharp.

Unit 2: Felsic volcaniclastic rocks

Unit 2 comprises a single lithofacies. The dominantly felsic volcaniclastic unit is 6–10 m in thickness; it is framework to matrix supported and contains subangular to subrounded heterolithic clasts of plagioclase-phyric rhyolite, mafic scoriaceous and rare basaltic clasts in a crystal-rich, pyroxene-phyric matrix. Rhyolite clasts dominate and some subangular clasts exhibit jigsaw fit fractures (Figure GS-7-5f), possibly due to autoclastic fragmentation. Clasts range from 2 to 40 cm in diameter (i.e., lapilli tuff, lapillistone to tuff breccia). The composition of this unit is primarily rhyolite clasts, including 5% quartz-filled amygdules, 10% plagioclase; mafic clasts (aphyric basalt and mafic scoria) comprise 3–5% of the clast population. The clasts have a strong lineation and L>>S. Epidotized rounded alteration patches up to 5 cm in diameter are observed locally throughout this unit. Bombs are 5% in abundance with intact chilled margins and are up to 30 cm in length. The unit was determined to be moderately graded with beds defined by variations in clast size; bed thickness varies from 0.5 to 2 m and overall the beds showed normal grading. The contact is sharp with the underlying plagioclase-phyric pillows of unit 1, but it is gradational with the overlying mafic volcaniclastic rocks (unit 3), as the percentage of felsic rhyolite clasts decreases and the percentage of mafic clasts increases.

Unit 3: Mafic volcaniclastic rocks

This unit comprises a single lithofacies. Heterolithic, dominantly mafic clasts, which are framework to matrix supported and subrounded, are surrounded by a pyroxene-phyric matrix. This unit was identified on all three transects and its thickness varies from 8 to 25 m. The clast population composition includes basaltic fine-grained clasts, both plagioclase-phyric and aphyric, mafic scoriaceous clasts and aphyric to plagioclase-phyric rhyolite clasts, which are surrounded by a pyroxene-phyric matrix (Figure GS-7-5g). There is an average of 15% felsic clasts in the total clast population. The unit is graded with beds defined by variations in clast size; bed thickness varies from 1 to 2 m. The lower contact is gradational with the dominantly felsic volcaniclastic unit and the upper contact is intruded by an aphyric rhyolite sill, which is observed on the adjacent transect and is continuous over 1 km. The contact is otherwise gradational with the dacitic volcaniclastic rocks of unit 4.

Unit 4: Dacitic volcaniclastic rocks

The dacitic volcaniclastic unit comprises a single lithofacies. This unit is a distinct marker horizon, which can be traced continuously across 4 km in strike length; its thickness ranges from 130 to 165 m. The composition is consistent: 8–10% feldspar and quartz phyric with 1% matrix and rare blue quartz eyes were observed. It is moderately well bedded and clast size varies from lapillistone to lapilli tuff with locally observed mafic and wispy shard fragments, which are interpreted to be flattened pumice fragments (Figure GS-7-5h). These flattened pumice fragments have irregular margins and are up to 20 cm in length. Rare isoclinal folds were observed in this unit and overall the foliation is well developed and defined by biotite. Epidotized rounded alteration patches are observed locally throughout this unit. Reverse grading is observed due to the fine ash and pumice settling to the top of the beds. The unit varies laterally across its strike length with some beds containing distinct flattened shards and other beds containing none. The lower contact is gradational with the mafic heterolithic volcaniclastic rocks of unit 3, but the upper contact with the overlying rhyolite is not observed due to lack of outcrop.

Unit 5: Felsic volcaniclastic rocks and flows

This unit comprises two lithofacies, a plagioclase-phyric rhyolite flow and volcaniclastic rocks. The plagioclase-phyric rhyolite unit is not continuous along strike, but is observed on two transects and where present, it is up to 30 m thick. Its composition includes 5% plagioclase and 1–2% quartz in lapilli tuff to lapillistone beds. The grading of the beds was not determined conclusively, but it appears to be weakly defined to the north. Monolithic plagioclase-phyric rhyolite clasts are of similar composition to the matrix. A well-developed foliation is present and is defined by biotite alignment and a moderately well-developed stretching lineation, which is defined by elongation of the clasts. The lower contact is not observed because there is no outcrop and the upper contact, where observed, is gradational.

Unit 6: Quartz- and feldspar-phyric rhyolite

Unit 6 consists of a single lithofacies. It is a framework-supported, angular to subangular monolithic quartz- and feldspar-phyric rhyolitic breccia (Figure GS-7-6a). Unit 6 is observed on the two westernmost transects; where present, its thickness varies from 20 to 45 m. The composition of the clasts includes 10–15% quartz and 10–15% plagioclase feldspar and crystal size ranges from 2 to 10 mm in diameter, with an average of 5 mm. This quartz-feldspar–phyric volcaniclastic unit is well bedded with clasts up to 0.6 m in diameter (i.e., lapillistone to tuff breccia) and locally the clasts display in situ brecciation. The contact with the underlying unit is gradational, but the upper contact with the felsic volcaniclastic rocks and flows (unit 7) is sharp and the quartz-feldspar–phyric unit appears intermittently within unit 7.

Unit 7: Felsic volcaniclastic rocks and flows

This rhyolite unit comprises two lithofacies: aphyric to plagioclase-phyric flows and volcaniclastic rocks. It is observed on all three transects and the thickness of the unit varies from 80 to 110 m. It comprises plagioclase-phyric (3%) to aphyric rhyolite flows and volcaniclastic rocks. The rhyolite flows display flow banding (Figure GS-7-6d), and there is evidence for in situ brecciated hyaloclastite lapilli tuff at the contact with unit 6 (Figure GS-7-6b). There is a sharp lower contact with unit 6 marked by a tuffaceous finely laminated bed. Clast diameter varies from 2 to 5 cm (i.e., lapillistone to lapilli tuff; Figure GS-7-6c) and it is matrix supported. The clasts are quartz feldspar phyric and of the same composition as unit 6, but the matrix composition includes 10% feldspar with no quartz. The upper contact of unit 7 with the mafic volcaniclastic rocks of unit 8 is sharp and highly strained.

Unit 8: Mafic volcaniclastic rocks

Unit 8 comprises a single lithofacies of well bedded, matrix supported, heterolithic mafic volcaniclastic rocks with subrounded to rounded clasts and a crystal-rich pyroxene- and plagioclase-phyric matrix. This unit is continuous across all three transects and is part of the mine horizon package; the total thickness of the unit varies from 40 to 60 m. Heterolithic clasts comprise aphyric rhyolite, fine-grained basalt and mafic feldspar-filled amygdaloidal scoriaceous clasts (Figure GS-7-6e, f). Clasts range in size from 0.5 to 5 cm in diameter (i.e., lapilli tuff to lapillistone). The bedding was determined on sharp contacts and a decrease in crystal size in the mafic pyroxene-phyric beds. Beds range in thickness from 2 to 8 m. Younging was observed to the north, which was consistent with facing directions in the previous units. The mafic volcaniclastic rocks contain a well-developed foliation defined by biotite alignment and a stretching lineation defined by clast elongation. The lower contact with the felsic volcaniclastic rocks and flows (unit 7) and the upper contact with the rhyolite flows (unit 9) are both sharp and highly strained.

Unit 9: Felsic flows

Unit 9 comprises two lithofacies: an aphyric aphanitic rhyolite flow (Figure GS-7-6g) and minor felsic volcaniclastic rocks. It is a continuous unit that forms a thick rhyolite flow package stretching across the three transects and ranging in thickness from 110 to 155 m. The unit displays flow banding and quartz-filled amygdules, which range from 2 to 5 mm in diameter, are locally observed. The foliation is well developed as spaced disjunctive cleavage defined by biotite. Mineral stretching lineation, defined by quartz, feldspar and garnet, is well

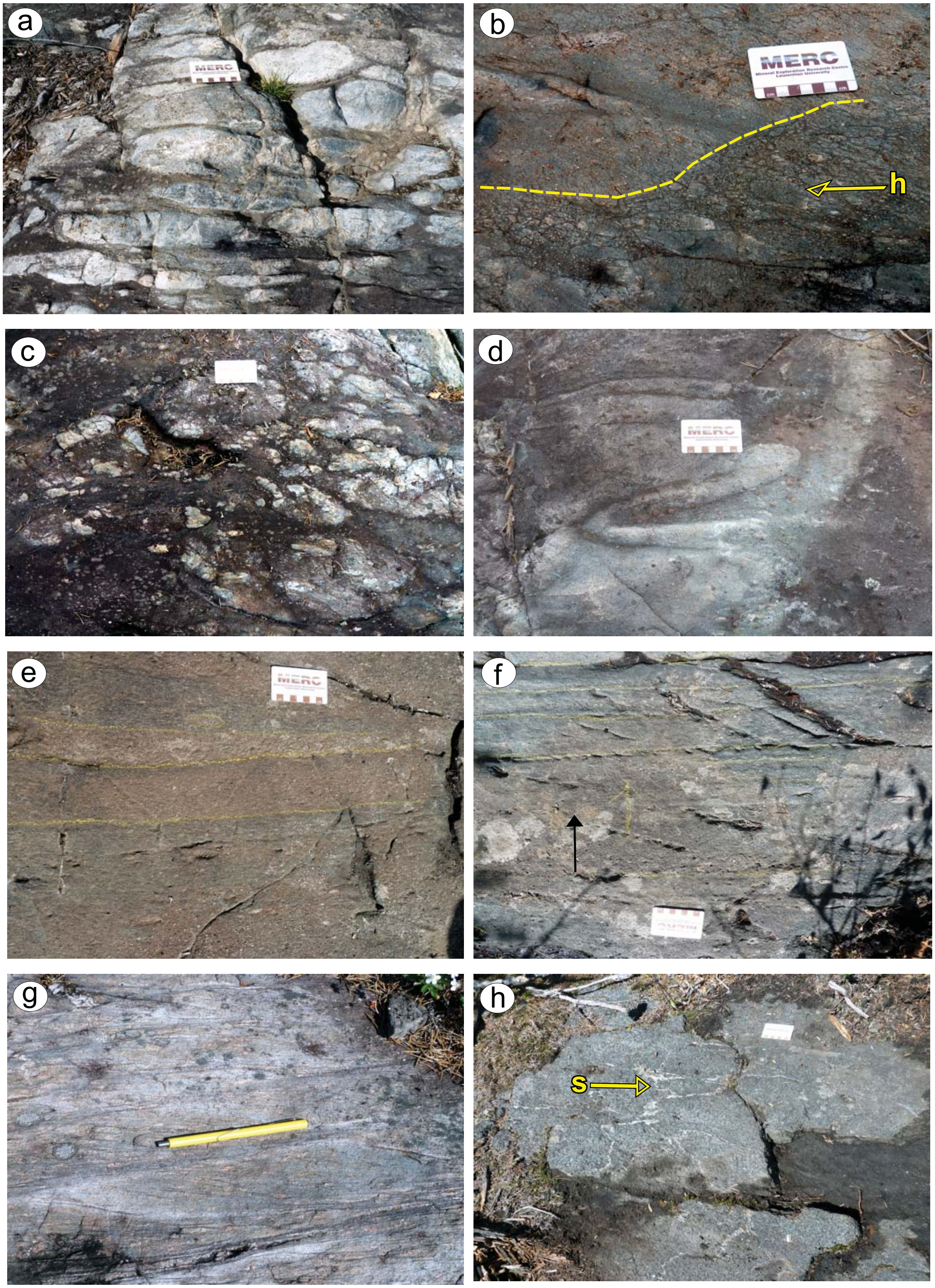

Figure GS-7-6*: Volcanic rocks of the McLeod Road–Birch Lake thrust panel:* ***a)*** *unit 6, quartz-feldspar–phyric monolithic tuff breccia;* ***b)*** *unit 7, plagioclase-phyric rhyolite with hyaloclastite (h) in flow contact breccia, the dashed line marks the boundary between the two lithofacies;* ***c)*** *unit 7, plagioclase-phyric rhyolite flow breccia;* ***d)*** *unit 7, plagioclase-phyric rhyolite displaying a flow lobe;* ***e)*** *unit 8, well-bedded, heterolithic mafic volcaniclastic rocks;* ***f)*** *unit 8, graded beds in well-bedded heterolithic mafic volcaniclastic rocks, arrow shows younging direction to the north;* ***g)*** *unit 9, aphyric rhyolite;* ***h)*** *unit 10, pyroxene-plagioclase–phyric pillows with thin selvages (s).*

developed. Rare felsic volcaniclastic rocks are observed within this otherwise dominantly massive rhyolite flow unit. The clasts are monolithic aphyric rhyolite fragments, subrounded and framework to matrix supported. The clasts range from 3 to 6 cm in diameter (i.e., lapillistone to lapilli tuff). No internal bedding is defined. The lower and upper contacts with the mafic volcaniclastic rocks of unit 8 and unit 10, respectively, are both sharp and highly strained.

Unit 10: Mafic volcaniclastic rocks and flows

This unit comprises two lithofacies: mafic volcaniclastic rocks and flows. It ranges in thickness from 45 to 90 m. The unit thins towards the west, but is present on all three transects as the uppermost horizon besides the Birch basalt. The mafic volcaniclastic rocks have a pyroxene-plagioclase–phyric crystal matrix, monolithic aphyric rhyolite clasts and a mafic flow lithofacies, comprising massive and pillowed pyroxene-phyric pillows defined by thin selvedges (Figure GS-7-6h). The pyroxene crystals range from 0.5 to 1 cm in diameter and clasts are up to 3 cm in diameter (i.e., lapillistone to lapilli tuff). Graded beds were not determined within this lithofacies. The mafic pyroxene-plagioclase–phyric volcaniclastic lithofacies occurs stratigraphically below the pyroxene-plagioclase–phyric mafic flows.The lower contact is sharp and highly strained with the underlying rhyolite flows (unit 9).

Discussion

The objective of the 2011 field season was to test for repetition of lithostratigraphic units once a stratigraphy was defined. The stratigraphic section defined a consistent stratigraphy for the upper 1000 m of the McLeod Road–Birch Lake thrust panel across a strike distance of more than 3 km (Figure GS-7-2). Stratigraphic mapping determined that no apparent repetition of stratigraphic units exists within the project area to the east of Snow Lake and that the rocks form a moderately to steeply north-dipping homoclinal sequence, as previously discussed by Bailes and Schledewitz (1998).

The absence of stratigraphic repetition and polarity reversal within the studied sequence invalidates the earlier hypothesis that a large-scale F_1 fold is present within this sequence. The stratigraphy documented during the 2011 fieldwork will be used to delineate the main structural features of the mine horizon during subsequent field seasons. The newly acquired stratigraphic information will aid in testing for any potential repetition south of Bud Lake.

Economic considerations

Gold mineralization is spatially associated at lithological contacts; however, the controls and timing of gold mineralization at the New Britannia mine are not well understood. Therefore, to focus exploration efforts within the mine and target new potential horizons within the thrust panel, the main objective of this study is to improve the understanding of the controls on gold mineralization. To achieve this, a multiyear project was established and the initial objective during the 2011 field season was to complete lithostratigraphic mapping across the thrust panel, to refine the stratigraphy within the McLeod Road–Birch Lake thrust panel, and to test for early structures through the repetition of lithological units. Stratigraphy of the upper portion of the McLeod Road–Birch Lake thrust panel was established during the 2011 field season and no repetition of lithostratigraphic units was identified. In the subsequent field seasons, the lower portion of the McLeod Road–Birch Lake thrust panel will be tested, which lies from the McLeod Road Thrust to the swamp south of Bud Lake. There is, therefore, still the potential for repetition in this lower panel and this could prove a useful exploration target if repetition of the mine horizon units is observed.

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