A note on preliminary bedrock mapping in the Fire Lake area

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Hunt, J.A. and Murphy, D.C., 1998. A note on preliminary bedrock mapping in the Fire Lake area. *In:* Yukon Exploration and Geology 1997, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p.59-68.

ABSTRACT

New geological mapping around the Fyre Lake Cu-Co-Au deposit in Yukon-Tanana Terrane, southeastern Yukon, has established the continuity of stratigraphic units from nearby Grass Lakes map area and affirmed the stratigraphic context of the deposit. The deposit is located near the top of a regionally persistent chlorite schist and phyllite unit that is spatially associated with voluminous mafic and ultramafic intrusive rocks. As in Grass Lakes map area, chloritic schist and associated mafic and ultramafic meta-intrusive rocks in the Fire Lake area overlie a regionally persistent quartz-rich metaclastic and carbonate unit and underlie a thick carbonaceous phyllite unit with lesser marble and felsic meta-volcanic rocks.

Yukon-Tanana Terrane rocks are truncated to the east by a shear zone of mylonitic Mississippian granite that lies at the base of the Money Klippe. The klippe is composed of undeformed (except in the shear zone) Mississippian granite and granodiorite of the Simpson Range Plutonic Suite and their wall rocks and roof pendants. Wall rocks and pendants include meta-sedimentary, meta-volcanic and meta-intrusive rocks. Layered wall rocks include a lower quartz-rich metaclastic and carbonate unit and a chlorite-actinolite-epidote phyllite unit with mafic breccia, ?augite porphyry, bands of green chert, and variably thick and laterally persistent accumulations of white marble. Rocks of intrusive protolith include *ca.* 361 Ma quartz porphyry, gabbro and ultramafic rock. Most contacts are observed or inferred to be intrusive or stratigraphic and are not everywhere faulted as previously mapped. With the exception of the chert and marble in the mafic phyllite, the wall rocks bear a strong resemblance to Yukon-Tanana Terrane rocks beneath the shear zone and are tentatively correlated with them. Indeed, as the wall rock sequence is intruded by granite and granodiorite of the Simpson Range Plutonic Suite, a fundamental component of Yukon-Tanana Terrane, such a correlation seems required. Such a correlation would suggest that the basal shear zone of the klippe is a minor intra-terrane structure and not a major structure or terrane boundary as previously inferred.

INTRODUCTION

Two weeks were spent mapping the geology around the Fyre Lake volcanic-hosted massive sulphide (VMS) deposit (Yukon Minfile 105G 034) in order to better characterize the structural and stratigraphic setting of the deposit (Fig. 1). The Fire Lake area, about 160 km northwest of Watson Lake, in southeastern Yukon, provides an excellent opportunity to examine the field relationships of rock units including the Anvil and Simpson allochthons of Money Klippe (Tempelman-Kluit, 1977, 1979). Rocks of Money Klippe have been considered as parts of oceanic and arc terranes that were structurally imbricated and thrust over Yukon-Tanana Terrane (Tempelman-Kluit, 1979; Mortensen, 1992a). In this report we position the Fyre Lake deposit in the context of the revised stratigraphy established by Murphy (this volume) immediately to the northwest, and present evidence which suggests that layered rocks of Money Klippe correlate directly with Yukon-Tanana Terrane. Such a correlation implies that the basal contact of Money Klippe is a minor intra-terrane structure.

PREVIOUS WORK

The Fire Lake area was first mapped by Wheeler et al., (1960) as quartz-rich schist surrounding large bodies of quartz monzonite and granodiorite and lesser mafic and ultramafic meta-igneous rocks, southwest of the headwaters of Money Creek. Tempelman-Kluit (1977, 1979) interpreted the two igneous assemblages mapped by Wheeler et al. (1960) as distinct thrust sheets which formed a structure he called the Money Klippe. He named the felsic plutonic rocks the Simpson, and the structurally lower mafic and ultramafic meta-igneous rocks the Anvil allochthons respectively. The quartz-rich schist which hosts the Fyre Lake deposit and underlies the Anvil Allochthon was included in the Nisutlin Allochthon (Tempelman-Kluit, 1977). The maps of Tempelman-Kluit (1977, 1979) also show a composite volcanic plug of Cretaceous age which intrudes all three allochthons.

Subsequent work led to revised interpretations. Mortensen (1983) suggested that the composite plug is a component of the Anvil assemblage and included the klippe of granitic rocks in the Simpson Range plutonic suite of Yukon-Tanana Terrane. He also indicated that the gabbro unit of the Anvil assemblage has a close association with the Simpson Range plutonic suite of Yukon-Tanana Terrane based on similar U-Pb zircon ages and intrusive relationships. Erdmer (1985) included the composite plug in Simpson Allochthon. Mortensen (1992b) included the composite plug in Slide Mountain Terrane and determined a *ca.* 361 Ma U-Pb zircon age. Grant (1997) affirmed Mortensen's U-Pb age determinations and considered the composite plug and gabbro units to also belong to the Simpson Range plutonic suite based on field relationships and U-Pb zircon, geochemical and other isotopic data. Grant (1997) noted both intrusive and faulted contacts between the various meta-igneous units.

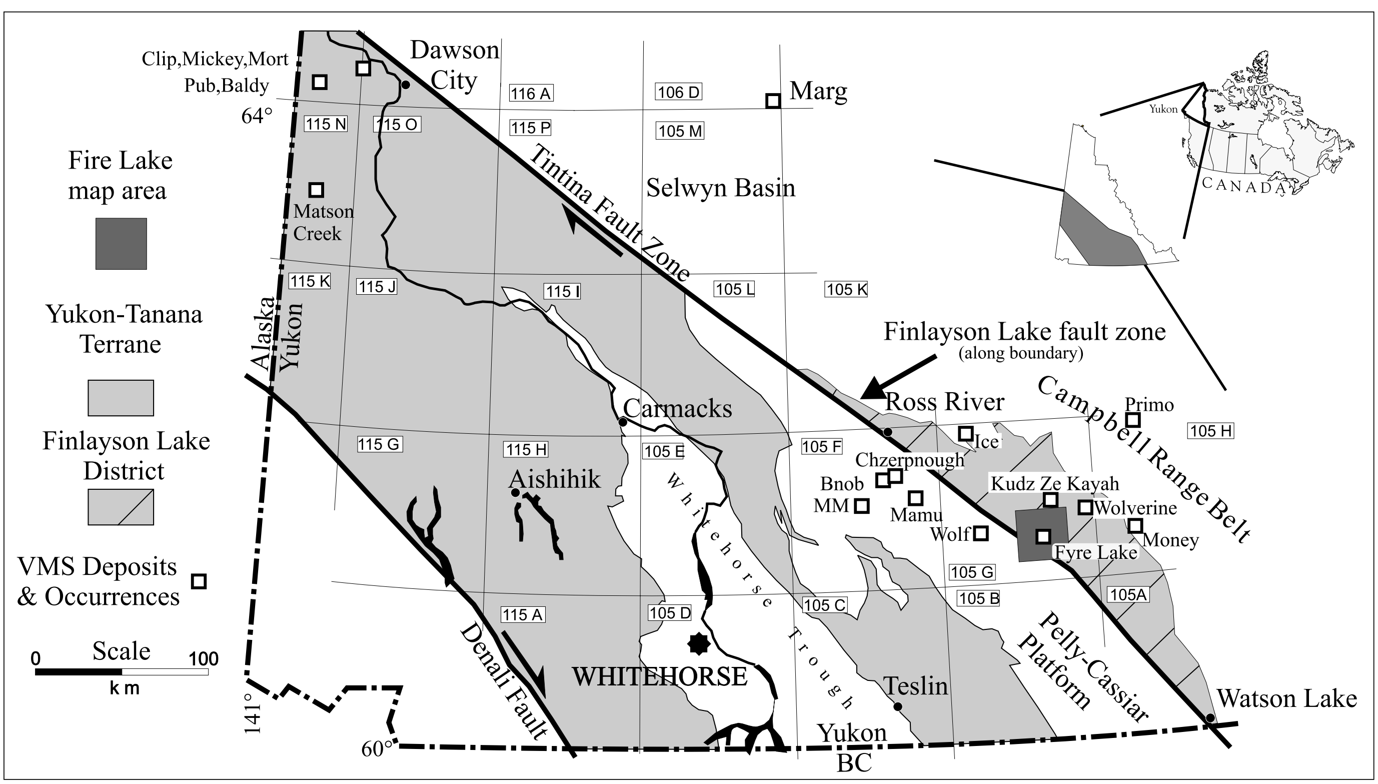


Figure 1. *Location of the Finlayson Lake district and Fire Lake map area.*

YUKON-TANANA TERRANE NORTHEAST OF FIRE LAKE

In general, layered rock units defined during mapping of Grass Lakes area (105G/7) immediately to the northwest can be traced into the area northeast of Fire Lake (Murphy, 1997; Murphy and Timmerman, 1997a,b; Murphy this volume; Fig. 2). These include unit 1, quartz-rich meta-clastic rocks, calcareous quartz psammite, marble, and minor biotite-chlorite-actinolite schist; unit 2, biotite-chlorite schist and minor meta-clastic rocks; and unit 3, consisting of siliceous carbonaceous phyllite (*3cp*) and lesser marble and felsic meta-volcanic rock (*3f*; for more detailed descriptions see Murphy, this volume).

The Fyre Lake deposit is hosted in unit 2 chlorite schist (*2m*) close to the contact with carbonaceous phyllite of unit 3 (*3cp*). Chloritic phyllite hosting the deposit overlies at least 50 m of carbonaceous phyllite indistinguishable from carbonaceous phyllite of unit *3cp* that overlies the chlorite schist. The underlying carbonaceous phyllite may either be an infold of unit *3cp* or a separate stratigraphic unit. If the latter, then its presence is evidence for local faulting that controlled sedimentation and massive sulphide deposition as proposed by Murphy (this volume).

Meta-intrusive rock units defined in the Grass Lakes area also continue into the area northeast of Fire Lake. These include unit *2um*, dun-coloured, variably serpentinized ultramafic rocks and unit *2mum*, a mixed unit of leuco-amphibolite (meta-gabbro), dark green amphibolite (meta-pyroxenite) and hornblende-biotite meta-diorite. Murphy (this volume) inferred that these units are sills intruding unit 2 fed by dykes intruding along a syn-sedimentary fault. This fault is inferred to be the northeast side of the basin in which the Fyre Lake massive sulphide deposit formed.

‘MONEY KLIPPE’

Units 2 and 3 northeast of Fire Lake are truncated to the east by a moderately east-dipping, up-to-700 m-thick zone of mylonitic granitic gneiss (*Mgs*; Fig. 2). Intensely foliated and lineated, fine-grained mylonitic quartz-potassium feldspar-muscovite gneiss and schist passes transitionally upward through increasingly coarse-grained potassium feldspar porphyroclastic mylonite into undeformed coarse-grained Early Mississippian (Grant, 1997; Mortensen, pers. comm., 1997) biotite (hornblende) granite. This shear zone lies at the base of an internally faulted domain of mafic, ultramafic and felsic intrusive rocks and lesser meta-sedimentary and mafic meta-volcanic rocks which Tempelman-Kluit (1979) termed the Money Klippe. In the ‘klippe’, coarse-grained Mississippian granitic rocks predominate with mafic meta-volcanic, mafic and ultramafic meta-intrusive rocks, felsic intrusive rocks, quartzose metaclastic rocks and carbonate occurring in a roof setting or as pendants in the granite. The meta-sedimentary, meta-volcanic and mafic meta-plutonic rocks occurring as roof pendants, and the quartz porphyry, bear a strong resemblance in rock type and sequence to those beneath the strain zone and are thought to correlate with them.

METASEDIMENTARY AND METAVOLCANIC ROCKS

Above the strain zone in the southeast corner of the map area, the lowest layered rocks are similar to unit 1 of Yukon-Tanana Terrane, comprising tan to light grey micaceous quartzite, light grey marble interbanded with calc-silicate, intervals of dark grey carbonaceous phyllite above and below the marble and minor chloritic phyllite above the marble (L. Pigage, pers. comm., 1998 and this study). The age of these rocks is not known but they must be older than the Mississippian granite by which they are intruded. Micaceous quartzite passes upward into rocks that resemble unit 2 of the Yukon-Tanana Terrane. These are made up dominantly of green chlorite-actinolite-epidote phyllite with green chert layers 1 to 5 m thick (L. Pigage, pers. comm., 1998 and this study). Towards the top of this unit, is a variably thick, laterally persistent, thick- to thin-bedded white marble intercalated with chloritic phyllite (L. Pigage, pers. comm., 1998 and this study). In the southeast corner of the map area the top of the chlorite-actinolite-epidote phyllite is a low- to moderate-angle fault contact with Mississippian granite (L. Pigage, pers. comm., 1998 and this study).

Mafic volcanic breccia ($2m_{bx;}$ Fig. 3) and ?augite porphyry (Fig. 4), also thought to belong to unit 2, are found as unstrained pendants in quartz porphyry at the west end of the ridge 5 km northeast of the headwaters of Kona Creek (e.g. Easting 422630, Northing 6792580; Fig. 2). The pendant of breccia is about 100 m-thick and approximately 500 m across.

Green and maroon weathering breccia is made up of maroon, pale green and black, angular fragments in a dark green to locally maroon matrix (Fig. 3). The fragments range from 0.5 to 3 cm across and are variably vesicular and/or amygdaloidal mafic volcanic rocks. Locally the matrix has ?augite phenocrysts. In places the entire rock is epidotized. Locally there are blebs of jasper in the breccia. Some fragments have amygdules and fractures filled by carbonate.

Augite porphyry occurs about 300 m east of the breccia in a smaller pendant about 100 m wide. The ?augite porphyry has a medium green, fine grained groundmass with about 5% augite phenocrysts 2 to 3 mm across (Fig. 4). Locally the rock is epidotized or has minor disseminated pyrite and weathers rusty.

The age of the mafic meta-volcanic rocks is not known. However, they are intruded by Devono-Mississippian (360.5±1.9 Ma, Mortensen, 1992b; 356+3.4/-4.0 Ma, Grant, 1997) quartz porphyry (see description below). If the meta-volcanic rocks are comagmatic with the mafic and ultramafic meta-plutonic rocks then the unit is likey uppermost Devonian (see below).

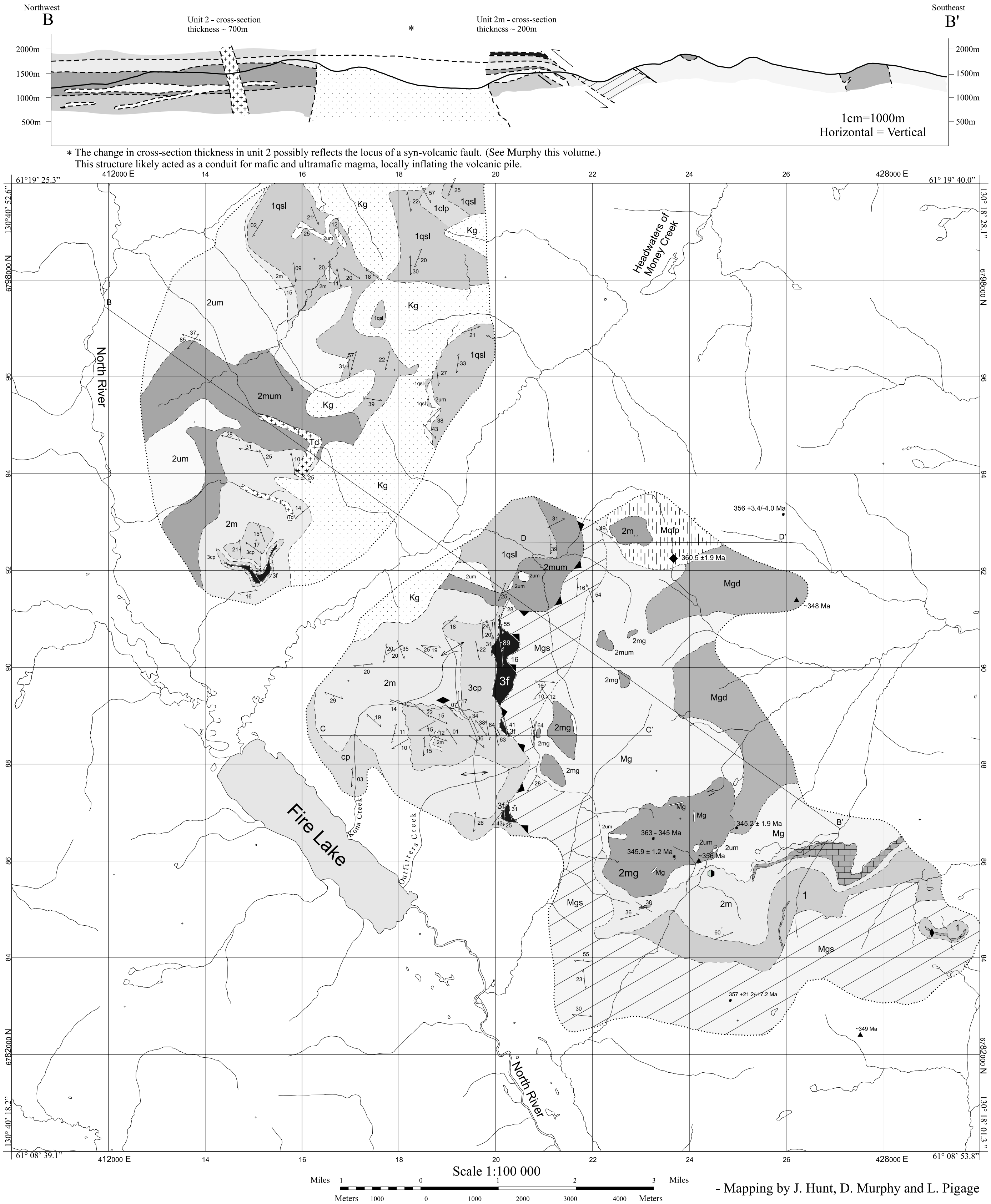


Figure 2. *Bedrock geology map of the Fire Lake area.*

Legend:

INTRUSIVE ROCKS

TERTIARY

Td North-northeast trending undeformed, brown, clay-altered feldspar porphyry dykes and light grey aphyric felsic dykes

CRETACEOUS

Kg Weakly foliated medium- to coarse-grained biotite-muscovite granite, generally equigranular [1]

MISSISSIPPIAN

Mgs Medium to coarse grained granite variably strained

Mg Medium to coarse grained granite, unstrained

Mgd Medium grained granodiorite, unstrained

Mqfp Quartz-feldspar porphyry, variably foliated, mineralized and oxidized

2mbx Mafic volcanic breccia and augite porphyry

2mg Fine to coarse grained gabbro

2mum Biotite-actinolite-plagioclase amphibolite (meta-gabbro) and actinolite amphibolite (meta-pyroxenite)

Age unknown

2um Massive to layered metamorphosed ultramafic rocks including dunite and pyroxenite, locally serpentinized on fractures

Ultra mafic rock

LAYERED METAMORPHIC ROCKS

Unit 3

3f Light grey, tan to white platy quartz-muscovite schist, locally with mm-scale quartz and feldspar augen (at least in part felsic metavolcanic rocks)

3cp Medium to dark grey carbonaceous muscovite-quartz schist or phyllite, quartzite, uncommon light grey marble

cp Lithologically similar to 3cp, but stratigraphic position is unclear (may underlie unit 2)

Unit 2

2m Massive calcareous actinolite-plagioclase-chlorite-biotite schist, subtly layered plagioclase-actinolite-chlorite schist, and lesser carbonaceous phyllite and quartzite

White marble

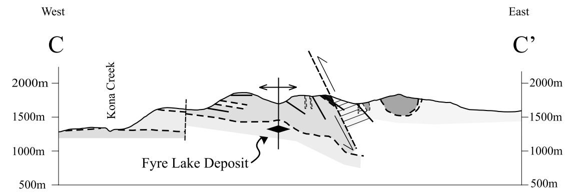
Unit 1

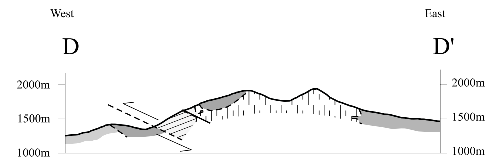
1clp Calcareous quartz psammite, marble, calcareous chlorite-biotite schist and epidote-biotite-calcite-garnet calcsilicate schist; stratigraphically equivalent to Unit 1cls

1qsl Lower quartzose metaclastic unit: biotite-quartz-muscovite schist and lesser biotite-muscovite quartz schist and plagioclase-quartz-chlorite-biotite schist

1 Undifferentiated unit one with bands of calc-silicate

1 112 Ma U-Pb determinations reported from this and similar bodies elsewhere in the Pelly Mountains (Mortensen, 1992 and personal communication, 1996).





Scale 1:100 000
1cm = 1000m
Horizontal = Vertical

SYMBOLS

Geological contact (defined, approximate, assumed and/or covered)......................

Fault ....

Thrust fault, teeth on hanging wall...

Limit of outcrop..

Line of cross-section... A A'

Age dates...
- * U- Pb age determination from Grant (1997)
- ▲ U- Pb age determination from J.K. Mortensen (personal communication, 1997)
- ◆ U- Pb age determination from Mortensen (1992b)

Foliation.. 60

Anticlinal fold axis..

Survey point.. +

MINERAL OCCURRENCES

Yukon Minfile 105G 034			
	◆	Fyre Lake	Cu - Co - Au
		Shutout	Base metal occurrence
	♦	Bell's Showing	Skarn

Unit descriptions modified from Murphy (this volume).

INTRUSIVE ROCKS

Mafic and ultramafic rocks (2mg, 2mum, 2um)

The suite of mafic igneous rocks in the Fire Lake area is heterogeneous, comprising dark green and white gabbro and dun-coloured ultramafic rocks (part of the Anvil Allochthon of Tempelman-Kluit, 1977, 1979). Massive, unstrained, fine- to very coarse-grained gabbro (*2mg*), mixed gabbro and ultramafic (*2mum*), and ultramafic rocks (*2um*) underlie about 15 percent of the area northeast of Fire Lake (Fig. 2).

The gabbro (*2mg*) is preserved as pendants and inclusions within granite in the southern two thirds of the map area (Fig. 5). The pendants are irregularly shaped and range from about 100 m to 1 km across. Irregular-shaped bodies of mixed gabbro and ultramafic rocks (*2mum*) occur in two main locations: in the northwest corner of the map area and in the southeast corner. Dun-brown weathering ultramafic rocks (*2um*) occur primarily in the northwest corner of the map area, in 105G/7 and have been described by Murphy (this volume).

Unit *2mg* is made up primarily of dark green to black weathering gabbro comprised of white feldspar and dark green to black pyroxene and/or amphibole (Fig. 6). Excellent exposures of very coarse- to fine-grained gabbro, preserved as an unstrained pendant in Mississippian granite, occur about 2 km east of the head of Kona Creek (UTM zone 9, Easting 421200, Northing 6789060). Locally, the contacts of the pendants have strong epidote, potassium feldspar and hematite alteration or are bleached. In places the granite is brecciated along the contacts with the gabbro. Locally the gabbro intrudes ultramafic rock. In the southeast corner of the map area unit *2mg* is in low-angle fault contact with unit *2m* chlorite schist.

Unit *2mum* is made up of gabbro (as above) and dun-brown weathering ultramafic rock as described by Murphy (this volume).

Fine- to medium-grained plagiogranite occurs as small irregular bodies in gradational contact with the gabbro, and as narrow crosscutting dykes. The plagiogranite is interpreted to be a late differentiate from the mafic magma (Mortensen, 1983). Mortensen, (pers. comm. 1997) determined a 356 ± 1Ma U-Pb age for the gabbro; a similar though less precise age was determined by Grant (1997).

Quartz Porphyry (Mqfp)

Quartz porphyry (*Mqfp*) occurs on the ridge at the northeastern edge of the map area (e.g. UTM zone 9, Easting 422330, Northing 6792550; in this area strained granite gradually changes over about 200 m to medium-grained unstrained granite which is in sharp intrusive contact with quartz porphyry). Here there are excellent exposures of essentially undeformed white- to cream-weathering porphyry, characterized by a fine-grained, cream-coloured groundmass and grey quartz phenocrysts about 2 mm in diameter (Fig. 7). Close to the contact the porphyry is crowded with quartz phenocrysts; these decrease in abundance away from the contact. The quartz porphyry is easily distinguishable from the granite and granodiorite which intrude it.

The quartz porphyry locally contains pendants of mafic volcanic breccia ($2m_{bx}$) and ?augite porphyry (Figs. 3, 4). The pendants vary from several hundred metres to 1 km across (Fig 2). These pendants, like those in the granite, are unstrained and are correlated with unit 2. The porphyry is cut by a white quartz vein about 1 m wide with malachite staining. A sample of the vein returned values of 2760 ppm Cu, 582 ppm Zn, 1725 ppm Pb and 29.8 ppm Ag.

U-Pb zircon age determinations from the quartz porphyry are 360.5 ±1.9 Ma (Mortensen, 1992b) and 356 +3.4/-4.0 Ma (Grant, 1997).

Figure 3. *Mafic volcanic breccia. This sample is from a pendant in quartz porphyry. Location: 105G/1; UTM zone 9, Easting 422630, Northing 6792580 (JH97-162).*

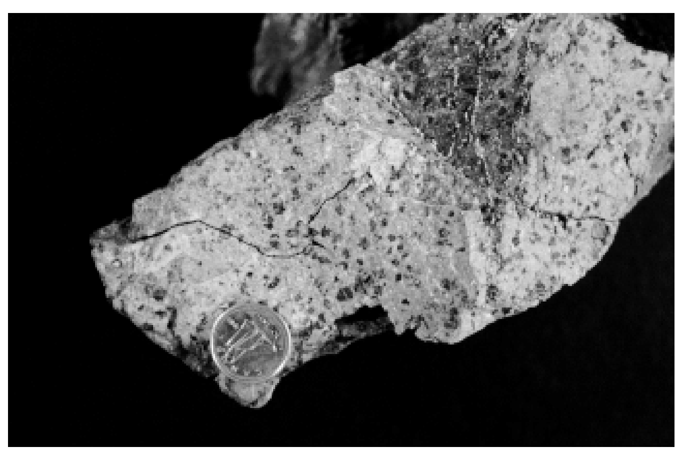


Figure 4. *Augite porphyry occurs as a pendant in quartz porphyry. Location: UTM zone 9, Easting 423690, Northing 6792530 (JH97-164).*

Figure 5. *Gabbro (unit 2 ?) intruded by lighter coloured granite of the Simpson Range plutonic suite. Location: 105G/1; UTM zone 9, Easting 423360, Northing 6787640. (JH97-108).*

Figure 6. *Coarse- to fine-grained gabbro with mafic inclusions. Location: 105G/1; UTM zone 9, Easting 422750; Northing 6789700 (JH97-48).*

Granite, Strained Granite and Granodiorite (Mg, Mgs, Mgd)

Mississippian granite and granodiorite (part of Simpson Allochthon of Tempelman-Kluit, 1977, 1979) and the Simpson Range Plutonic Suite of Yukon-Tanana Terrane of Mortensen (1983) underlie about 30 percent of the Fire Lake area, forming several large bodies east of Fire Lake, southwest of the head waters of Money Creek (Fig. 2). Plutons are irregularly shaped, 1 to 5 km wide and up to 9 km long. The intrusions are blocky jointed, locally inclusion-bearing and distinctive in their lack of deformation. Pink granite (*Mg*) occurs east of the Fyre Lake deposit and forms the largest pluton in the Fire Lake area. White to pale pink granodiorite (*Mgd*) occurs on the eastern edge of the map area and locally appears transitional with the granite. The plutons are generally massive, except in the strain zone 2.5 km east of Fire Lake where the granite can be traced from undeformed granite to fine-grained mylonitic schist (*Mgs*) across a zone 0.3 to 1.0 km thick (Fig. 2).

Granite (*Mg*) is well exposed about 4 km east of the head of Kona Creek (UTM zone 9, Easting 423750; Northing 6789950). Here there are excellent exposures of pink-weathering, coarse-grained granite, easily distinguishable from the granodiorite which is white-weathering and medium-grained (Figs. 8, 9). The granite is made up of 30 to 40% quartz, 25 to 30% potassium feldspar, 25 to 30% plagioclase, and 5 to 10% biotite and hornblende. The granite varies from coarse- to medium-grained and in places is difficult to distinguish from the granodioritic phase. It is possible that there is a continuum between the two phases as they have similar U-Pb zircon ages (Grant, 1997; J.K. Mortensen, pers. comm., 1997). However, locally the granite does intrude into the granodiorite and therefore must, in places, be slightly younger (this study; Mortensen, 1983).

Locally the granite is cut by numerous quartz veinlets and has epidote, chlorite and potassium feldspar alteration, especially close to the contact with the granodiorite. Near the contact with the granodiorite are several quartz veins about 2 cm wide with malachite, galena, pyrite, chalcopyrite, bornite and native copper. Grab samples of the vein contain up to 6750 ppm Cu, 2730 ppm Zn, 324 ppm Pb and 22.5 ppm Cd.

In addition to intruding quartz porphyry, the granite intrudes chlorite schist of unit 2 (*2m and 2mum*), ultramafic rocks (*2um*) and mafic rocks (*2mg and 2mum;* Fig. 5) some of which occur as undeformed pendants and inclusions of fine and coarse-grained gabbro, diorite and pyroxenite that vary from centimetre-sized up to 1 km across.

Granodiorite (*Mgd*) is well exposed about 4 km east of the head of Kona Creek (UTM zone 9, Easting 423800; Northing 6789850). Here there are excellent exposures of white weathering, medium-grained granodiorite easily distinguishable from the granite (Figs. 8, 9). The granodiorite is made up of 10 to 15% quartz, 50 to 70% plagioclase, 5% potassium feldspar, 10 to 15% hornblende (minor biotite) and is essentially undeformed (Fig. 9). In places the granodiorite is intruded by the granite. Locally, however, it appears to be transitional, over a distance of 1 km, with the granite especially at the southeastern edge of the map area near the Shutout property (Fig. 2).

Strained granite (*Mgs*) is well exposed in the valley northeast of the head of Kona Creek (e.g. UTM zone 9, Easting 421790, Northing 6791550). Here there is a strain zone at least 1 km wide (map view) where the granite can be traced from unstrained in the east to foliated and finally to muscovite schist in the west (see cross-section B-B’, Figs. 2, 10). The strain zone is believed to be the edge of the granitic intrusion which took up strain during deformation, leaving the remainder of the pluton virtually undeformed.

Weakly deformed, *strained granite* is similar in appearance to undeformed granite but has flattened pink feldspar grains. As

Figure 7. *Quartz porphyry (composite plug) of unit 3. Location: 105G/1; UTM zone 9, Easting 422330, Northing 6792550 (JH97-160).*

the degree of strain increased quartz grains became flattened and the rock gained a distinct foliation. Closer to the edge of the intrusion the rock loses its granitic appearance and is increasingly foliated until it becomes green, well foliated muscovite schist with large blebs of white mica on the foliation planes.

The ages of the granite and granodiorite are 345.9±1.2 Ma and 345.2±1.9 respectively (Grant, 1997). Similar U-Pb age dates have been determined by J.K. Mortensen (pers. comm., 1997). Strained granite was dated by Grant (1997) and zircons returned an imprecise U-Pb date of 357+21.1/-17.2 Ma; the imprecise nature of this date probably reflects modification of the U-Pb systematics during deformation.

CRETACEOUS GRANITE

Medium-grained, weakly foliated biotite-muscovite granite (*Kg*) also underlies a part of the area northeast of Fire Lake. This is the southern end of a large Cretaceous stock that underlies much of the southeastern corner of Grass Lakes map area (Fig. 2).

DISCUSSION

The Fyre Lake massive sulphide deposit is hosted in unit *2m* mafic meta-volcanic rocks in an area where there are subtle indications of sub-basin development and syn-volcanic faulting and intrusion. Unit 2 in this area is spatially associated with mafic and ultramafic meta-plutonic rocks with sill-like characteristics (Murphy, this volume). In southern Grass Lakes map area, the meta-plutonic bodies are stratabound within unit *2m* and increase in thickness toward the east from zero to more than 500 m along strike to the north from the Fyre Lake deposit. Further across strike to the east, the total thickness of unit *2m* and the sill-like meta-plutonic rocks decreases to less than 100 m, coincident with the occurrence of ultramafic rocks in unit 1 and an anomalous juxtaposition of different stratigraphic levels of unit 1 (see Murphy, this volume). Taken together, these observations suggest the presence of a syn-magmatic fault which controlled the intrusion of the mafic and ultramafic bodies and the thickness of meta-volcanic rocks, and possibly acted as a conduit for mineralizing hydrothermal solutions. The occurrence of an additional unit of carbonaceous phyllite beneath unit 2 chlorite schist near the Fyre Lake deposit suggests that the fault may have bounded a local sub-basin.

Unlike previous workers, our impression is that **all** the rocks of Money Klippe, including the layered metasedimentary and mafic metavolcanic rocks and the quartz porphyry should be correlated with Yukon-Tanana Terrane. This conclusion is based primarily on the strong resemblance in rock type and sequence

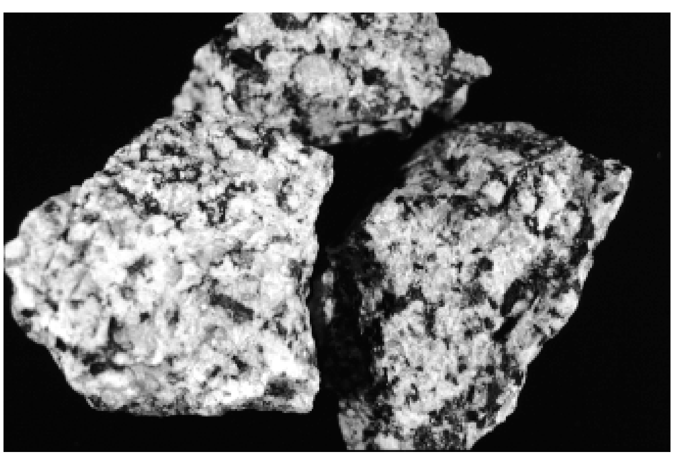


Figure 8. *Granite of the Simpson Range plutonic suite. Location:105G/1; UTM zone 9, Easting 423750; Northing 6789950 (JH97-40).*

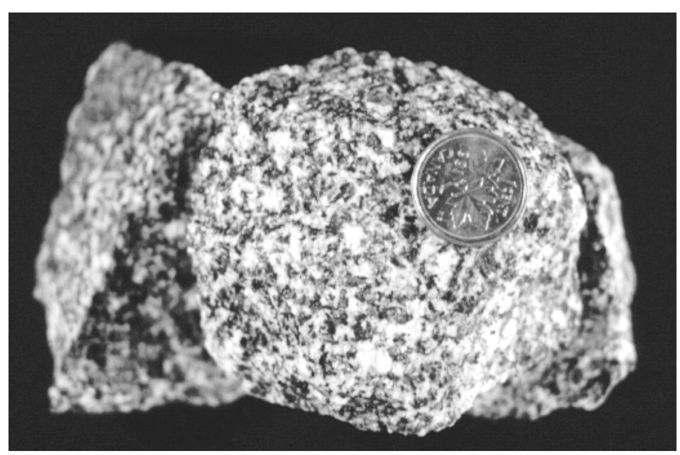


Figure 9. *Granodiorite of the Simpson Range plutonic suite. Location: 105G/1; UTM zone 9, Easting 423800; Northing 6789850 (JH97-44).*

of the layered rocks with Yukon-Tanana Terrane stratigraphy beneath the klippe, the common association of mafic meta-volcanic rocks with mafic and ultramafic meta-plutonic rock, and the similarity in U-Pb ages between the quartz porphyry and felsic meta-volcanic rocks of Yukon-Tanana Terrane. In addition, this correlation is almost required by the observed intrusive relationships between all the rock units and granite of the Simpson Range plutonic suite — which is already considered by Mortensen (1983, 1992a) to be a fundamental part of Yukon-Tanana Terrane.

That being said, we acknowledge some significant differences between the layered rock of the klippe and the Yukon-Tanana Terrane stratigraphy beneath the shear zone. Firstly, chlorite schist in the klippe is intercalated with significant amounts of green chert and white marble, neither of which have yet been observed in unit *2m* beneath the klippe. Secondly, although there are subtle indications of porphyritic textures in the highly deformed unit *2m* beneath the klippe, unequivocal ?augite meta-porphyries haven't been observed in Yukon-Tanana Terrane beneath the klippe. Although we acknowledge these differences, the first-order similarity of the rocks within the klippe with Yukon-Tanana Terrane is apparent.

If the rocks within the klippe correlate with Yukon-Tanana Terrane as proposed, then the shear zone at the base of the klippe need not be a major structure. Previous workers have included the rocks of Money Klippe with the Anvil and Simpson allochthons (Tempelman-Kluit, 1977, 1979) or Slide Mountain terrane (Mortensen, 1992a,b). These previous correlations imply that the shear zone at the base of the klippe is a terrane boundary possibly accommodating orogen-scale displacements. In contrast, our interpretation is far more conservative. Although we cannot yet directly determine a displacement across this structure as mylonitic Mississippian granite is juxtaposed against units 2 and 3 along a footwall ramp, the nearby occurrence of roof pendants of unit 2 in the granite implies that the stratigraphic separation cannot be very large.

Our impression of the internal structure of the klippe also differs from that of previous workers. Tempelman-Kluit (1979) and Erdmer (1985) inferred that all contacts in the klippe are structural and documented low-angle faults. Although low-angle faults do occur locally, most contacts have intrusive characteristics. The prominent low-angle faults documented by previous workers are likely splays off the basal shear zone; the occurrence of unit 2 metavolcanic and meta-plutonic rocks and Mississippian granite both above and below the faults suggests small displacement.

The proposed correlation of rocks of Money Klippe with Yukon-Tanana Terrane increases their prospectivity for VMS deposits. If the mafic schist unit within the klippe is indeed unit *2m* of Yukon-Tanana Terrane, then it is prospective for Fyre Lake-type deposits and indeed is locally characterized by massive pyrite lenses and anomalous cobalt soil geochemistry as at Expatriate Resources' Shutout claims. If the quartz porphyry is coeval with unit 3, then it has potential to host Kudz Ze Kayah- and Wolverine Lake-type VMS deposits.

SUMMARY

New geological mapping around the Fyre Lake Cu-Co-Au deposit has established the stratigraphic position of the deposit within Yukon-Tanana Terrane stratigraphy defined in neighbouring Grass Lakes map area (Murphy, 1997, this volume). In addition, examination of the rocks and contact relationships within Money Klippe has shown that rocks of the klippe previously correlated with Slide Mountain Terrane (Anvil assemblage) likely correlate with Yukon-Tanana Terrane.

The correlation of rocks of Money Klippe with Yukon-Tanana Terrane has implications for mineral exploration. The new

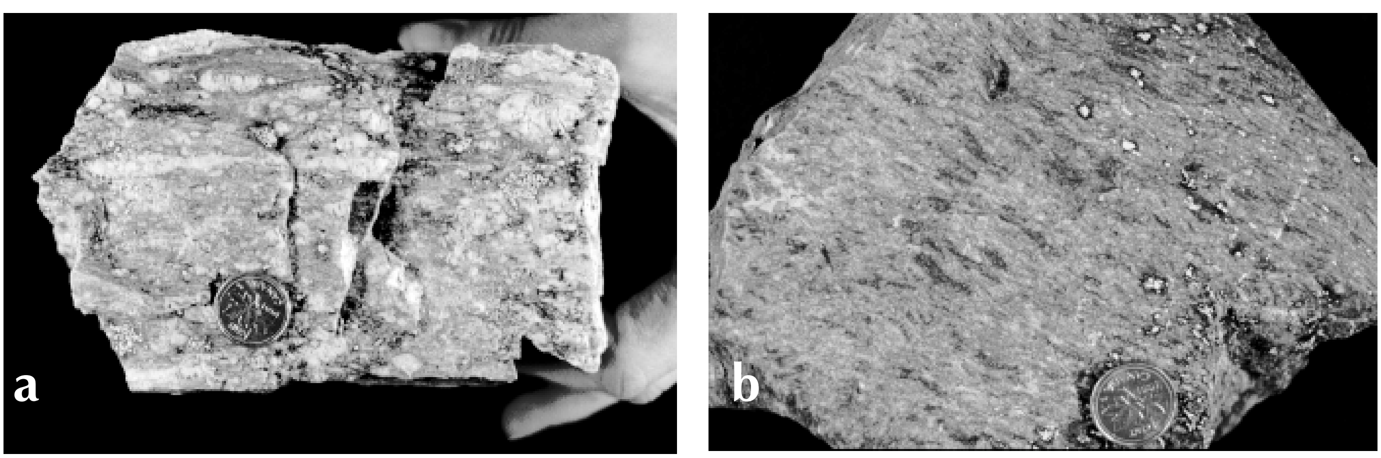


Figure 10. *Strain variations in granite (*Mgs*) of the Simpson Range plutonic suite. Sample 10b has undergone greater strain than sample 10a. Location: 105G/1; UTM zone 9, Easting 421790, Northing 6791550 (JH97-89).*

mapping shows that the Fyre Lake deposit occurs within mafic schists of unit *2m* near the fault-controlled margin of a syn-volcanic basin. The proposed correlation implies that the mafic meta-volcanic unit of the klippe is the same unit that hosts the Fyre Lake deposit and is therefore prospective for deposits of that type. As coarse-grained quartz-rich porphyritic rocks are associated with VMS mineralization at Kudz Ze Kayah and Wolverine Lake, the area around the Money Klippe quartz porphyry should be considered prospective for that type of deposit.

ACKNOWLEDGMENTS

Thanks and appreciation are extended to all the companies and individuals working in the Finlayson Lake district and Yukon-Tanana Terrane for their cooperation and support during the 1997 field season. In particular, we thank Ian Foreman and John Deighton of Columbia Gold for hospitality during visits to the Fyre Lake camp and for sharing knowledge of the Fyre Lake deposit and surrounding geology. Special thanks are extended to Lee Pigage for his mapping in the southeast corner of the Fire Lake area and for subsequent discussions of the geology; to Jason Adams for drafting the figures; and to Charlie Roots for editing this paper.

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