Preliminary geology of Rose Mountain, Anvil District, central Yukon (105K/05)

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ABSTRACT

A 2000 m thick succession of six metasedimentary and metavolcanic units ranging in age from Ordovician through Permian strikes northwest and dips moderately to the southwest in the Rose Mountain area (105K/05). Units 3-6 have conformable contacts exposed and form a continuous succession. Units 1, 2 and 4 are correlated with lower to middle Paleozoic regional stratigraphic units of ancestral North America. Unit 3 consists of pale green argillite with lesser chert pebble conglomerate, sandstone and shale chip breccia interbeds, and is unique to the Rose Mountain area. Unit 5 is bedded chert and is correlated with North American Mount Christie Formation. Unit 5 is also similar to chert units in Slide Mountain Terrane. Unit 6 correlates with basalts of the Slide Mountain Terrane.

Unit 4 is correlated with Earn Group and contains two stratiform barite horizons. No sulphides are visibly associated with the barite, but the unit is favourable for stratiform base metal mineralization.

All units contain one major deformation fabric. This contrasts with structural style immediately to the northeast where two major deformation fabrics occur. The Rose Mountain fabric is correlated with the older deformation fabric present to the northeast.

RÉSUMÉ

Une succession de six unités de roches métasédimentaires et métavolcaniques datant de l'Ordovicien au Permien d'une épaisseur de 2000 mètres est orientée au nord-ouest et présente un pendage modéré en direction du sud-ouest dans la région du mont Rose (105K/05). Les unités 3 à 6 présentent des contacts concordants qui sont exposés et constituent une succession continue. Les unités 1, 2 et 4 sont en corrélation avec les unités stratigraphiques régionales du Paléozoïque inférieur à moyen du protocontinent nord-américain. L'unité 3 consiste en argilite vert pâle avec de moindres interlits de conglomérat à cailloux de chert, de grès et de brèche à éclats de shale et ne se retrouve que dans la région du mont Rose. L'unité 5 présente des affinités et avec le protocontinent nord-américain et avec le terrane de Slide Mountain. L'unité 6 est en corrélation avec les basaltes du terrane de Slide Mountain.

Deux horizons de barytine stratiforme ont été documentés dans l'unité 4, qui est en corrélation avec le groupe d'Earn. Bien que la pyrite ne soit pas associée de manière visible à la barytine, la stratigraphie de l'unité 4 est favorable à la minéralisation stratiforme de métaux communs.

Une structure de déformation majeure touche toutes les unités, ce qui contraste avec le style structural présent immédiatement au nord-est qui est caractérisé par deux structures de déformation majeures. La structure du mont Rose est en corrélation avec les structures de déformation plus anciennes présentes au nord-est.

INTRODUCTION

The Anvil District (Figs. 1, 2) in central Yukon contains five known pyritic massive sulphide deposits (Faro, Grum, Vangorda, Grizzly, and Swim) with a total mineral inventory of 120.1 million tonnes averaging 9.3% combined lead and zinc, and two uneconomic pyritic sulphide occurrences (SB and Sea; Jennings and Jilson, 1986). The deposits were discovered between 1953 and 1976. Faro and Vangorda have been mined, Grum is partly mined, and Grizzly and Swim have not yet been developed.

Exploration potential in the district remains high. The Anvil Project is a new, multi-disciplinary study commissioned by the Yukon Geology Program to provide a unified geological framework for the Anvil District to assist future exploration. Projects within this integrated study include bedrock geology mapping and compilation (this report), surficial geology mapping and basal till sampling (see Bond, this volume), detailed lithogeochemistry of the immediate host rocks to the massive sulphide deposits, and a seismic reflection profile over the Grizzly deposit. These projects began in 1998.

The goal of the bedrock mapping and geological compilation of the district is to bridge the gap between detailed property-scale geology mapping of exploration companies and regional geology mapping of the Geological Survey of Canada. Geology will be presented on a series of maps at a scale of 1:25 000. A significant portion of this project will consist of re-interpretation, harmonization, and consolidation of the detailed geological information from the 45-year exploration history.

One month was spent in the field during 1998 conducting bedrock geological mapping, including eight days of traverses on the southeast and northwest flanks of Rose Mountain (Figs. 2, 3, 4 and 5). This report details the stratigraphy and structure observed on Rose Mountain. All descriptions are based on field and hand sample observations; samples have been sent for geochemical and chronological analysis.

LOCATION AND ACCESS

Rose Mountain (NTS map 105K/05) is located 19.5 km northwest of the Town of Faro and 12.5 km west of the Faro minesite in central Yukon. Rose Creek flows west into Anvil Creek on the north edge of the area, and the Pelly River flows to the northwest in Tintina Trench, a major northwest-trending physiographic feature immediately south of the area. Tree line occurs at the approximate elevation of 4500 ft (1370 m). Outcrop is extensive on ridges above tree line. Below tree line, outcrop is generally restricted to stream cuts and scattered ridge crests. Valley bottoms are typically covered with thin to thick glacial till.

Overgrown exploration roads extend to the southeastern and northern margins of Rose Mountain. Outfitting trails lead into the area for hunting. Access is most readily accomplished by helicopter. Camps during 1998 were placed using contract helicopter services out of Ross River.

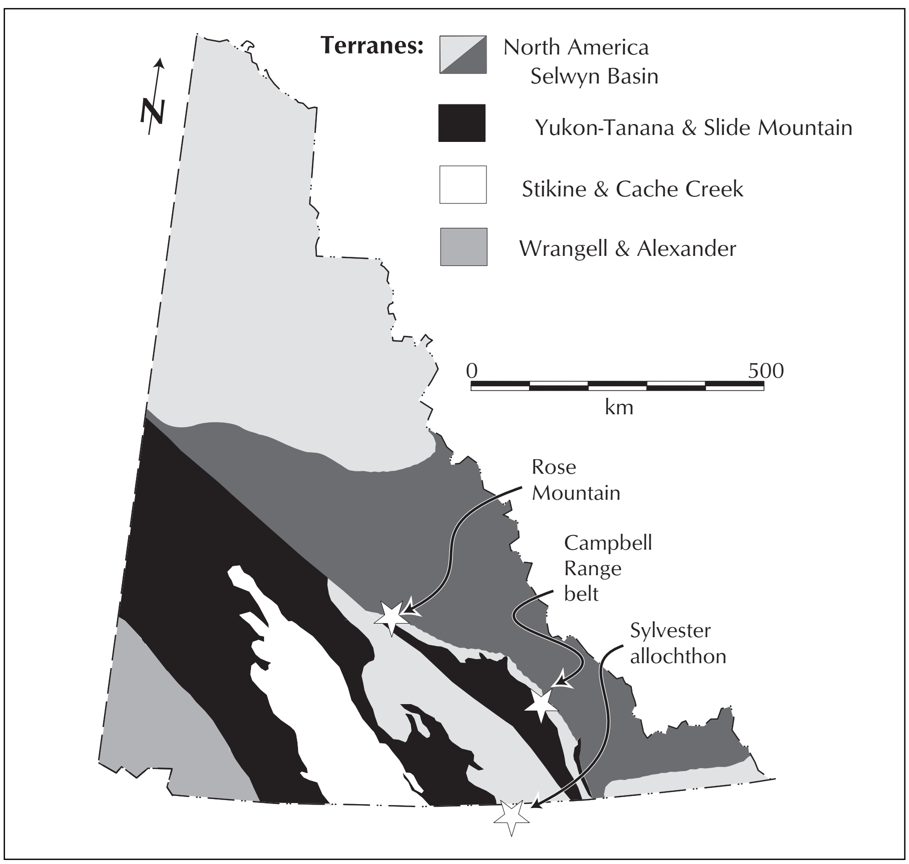

Figure 1. Locations of Rose Mountain in Anvil District (Fig. 2), Campbell Range belt, and Sylvester allochthon. Modified from Wheeler and McFeely (1987).

PREVIOUS WORK

Rose Mountain lies within Tay River map area (105K), where the regional geology was mapped by Roddick and Green (1961) and Gordey and Irwin (1987). The discovery of the massive sulphide deposits in the Anvil District led to more detailed geology studies by Tempelman-Kluit (1972) and Gordey (1990).

Early exploration activity near Rose Mountain occurred dominantly on the lower slopes of Rose Creek valley and was focussed toward lead-zinc targets because of the Faro discovery. In 1977 Cyprus Anvil Mining Corporation staked the URN claims over two barite horizons on the northeast-facing slopes of Rose Mountain.

The URN barite horizons were sampled in 1977 (Franzen, 1978) and 1981 (Read, 1982) for their industrial mineral potential. Yukon Minfile 105K 106 summarizes the URN barite exploration work.

REGIONAL GEOLOGY

Rose Mountain is located on the southwest flank of the Anvil District (Fig. 2) in central Yukon. Anvil District is part of the Cordilleran miogeocline, a prism of sedimentary rocks of Precambrian to Jurassic age deposited along the relatively stable continental margin of western North America. Cordilleran miogeocline stratigraphy is presented in Abbott et al. (1986), and more detailed stratigraphy and structure in the Anvil District is given in Jennings and Jilson (1986) and Pigage (1990).

Anvil District is immediately east of the Yukon-Tanana Terrane (Coney et al., 1980), the easternmost of the accreted suspect terranes. The Yukon-Tanana Terrane is juxtaposed against Anvil District along the Vangorda fault (Jennings and Jilson, 1986) which Mortensen and Jilson (1985) have interpreted as a transpressive suture. Deformation and metamorphism associated with accretion of the suspect terranes was initiated during the Jurassic and culminated in the Cretaceous period (Tempelman-Kluit, 1979). More recently, strike-slip faulting along the Tintina Fault zone immediately southwest of Rose Mountain resulted in 450-500 km of right lateral strike-slip displacement during late Cretaceous-early Tertiary time (Tempelman-Kluit, 1970).

Tempelman-Kluit (1972) mapped four southwest-dipping units on Rose Mountain. The two lowermost units outcrop on the lower slopes of Rose Mountain and consist of chlorite-quartz-muscovite phyllite overlain by grey slate. These units were tentatively assigned ages of Hadrynian to Ordovician, and Devonian to Mississippian, respectively. They were conformably overlain by the Anvil Range Group, a succession consisting of a lower member containing interbedded cherts and coarse clastic rocks, and an upper unit consisting of mafic volcanic rocks with lesser interbedded cherts. Fossils from the lower unit allowed an age assignment of Pennsylvanian through Permian for both units. The uppermost member of the Anvil Range Group, as defined by Tempelman-Kluit, does not occur in the Rose Mountain area. Tempelman-Kluit (1979) considered the Anvil

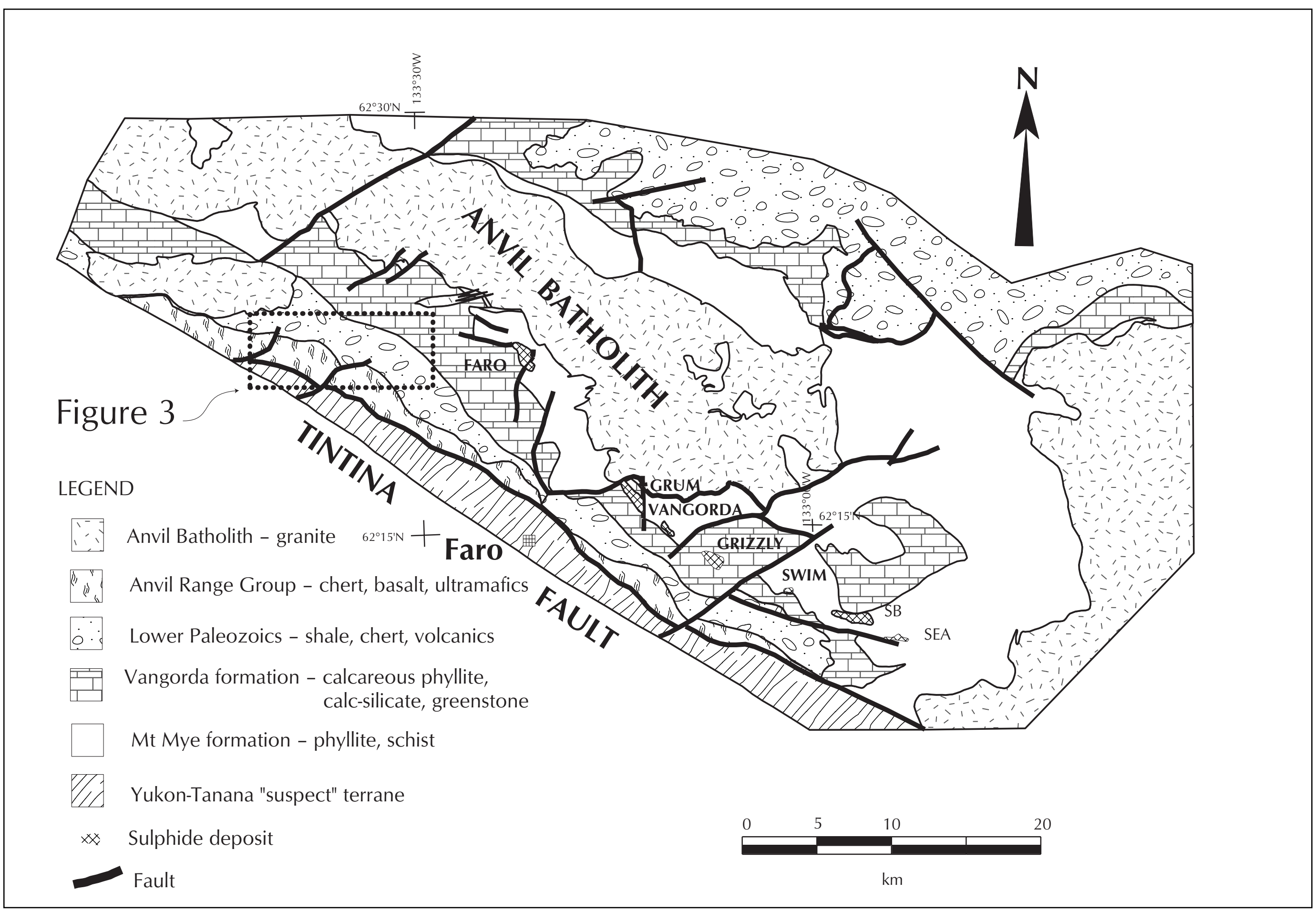

Figure 2. *Schematic geology of Anvil District, Yukon, showing the Rose Mountain area (Fig. 3). Modified from Jennings and Jilson (1986).*

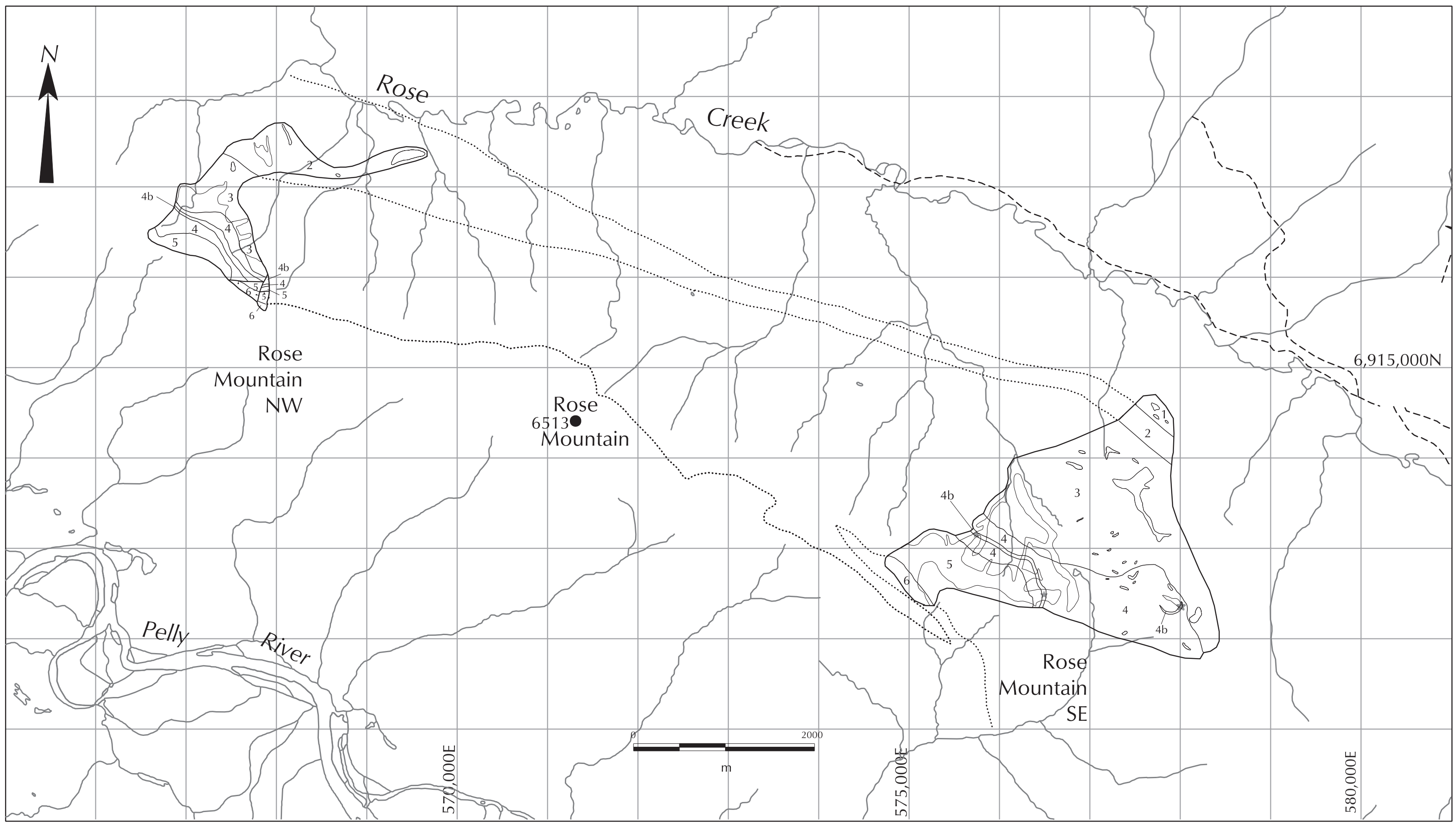

Figure 3. Areas mapped NW and SE of Rose Mountain (see Fig. 2 for location). Geological contacts between mapped areas modified from Gordey (1990).

Permian

6 Unit 6 (Anvil Range Group)
Basalt

Pennsylvanian

5 Unit 5 (Mount Christie formation)
Pale green bedded phyllitic chert
Maroon chert and argillite

Devonian-Mississippian

4 Unit 4 (Earn Group)
Black argillite, bedded chert, chert pebble conglomerate, quartzite, shale chip breccia

4b Stratiform barite and pale bedded phyllitic chert

Silurian-Devonian?

3 Unit 3
Pale green argillite, chert, bedded phyllitic chert, chert pebble conglomerate, quartzite, shale chip breccia, maroon argillite, maroon chert

Ordovician-Silurian

2 Unit 2 (Road River Group)
Black argillite with inter
limestone and siltstone

1 Unit 1 (Menzie Creek formati
Chloritic, amygdaloidal

* Barite showing
- - - - - - roads, trails
geological contacts

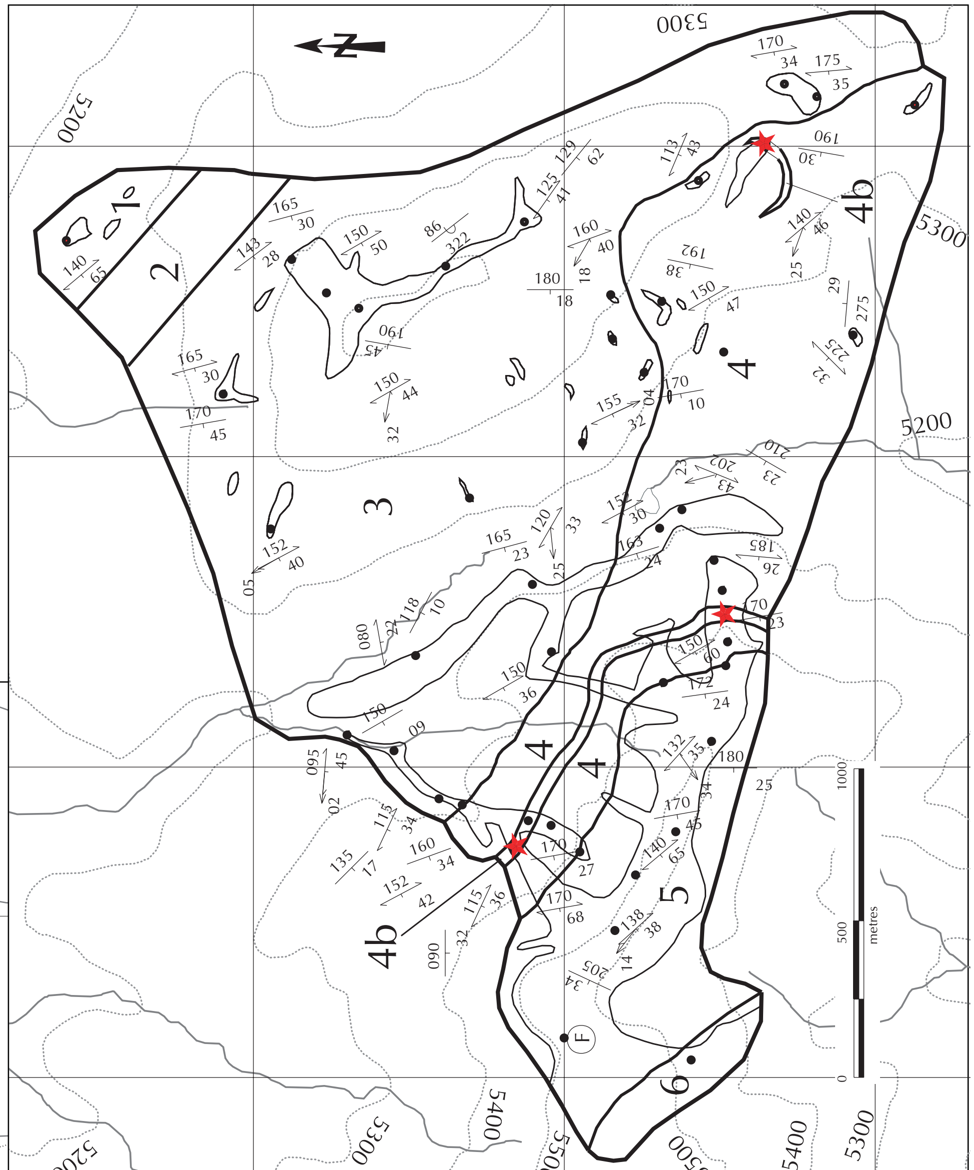

Figure 5. *Geology of Rose Mountain SE area (see legend in Fig. 3).*

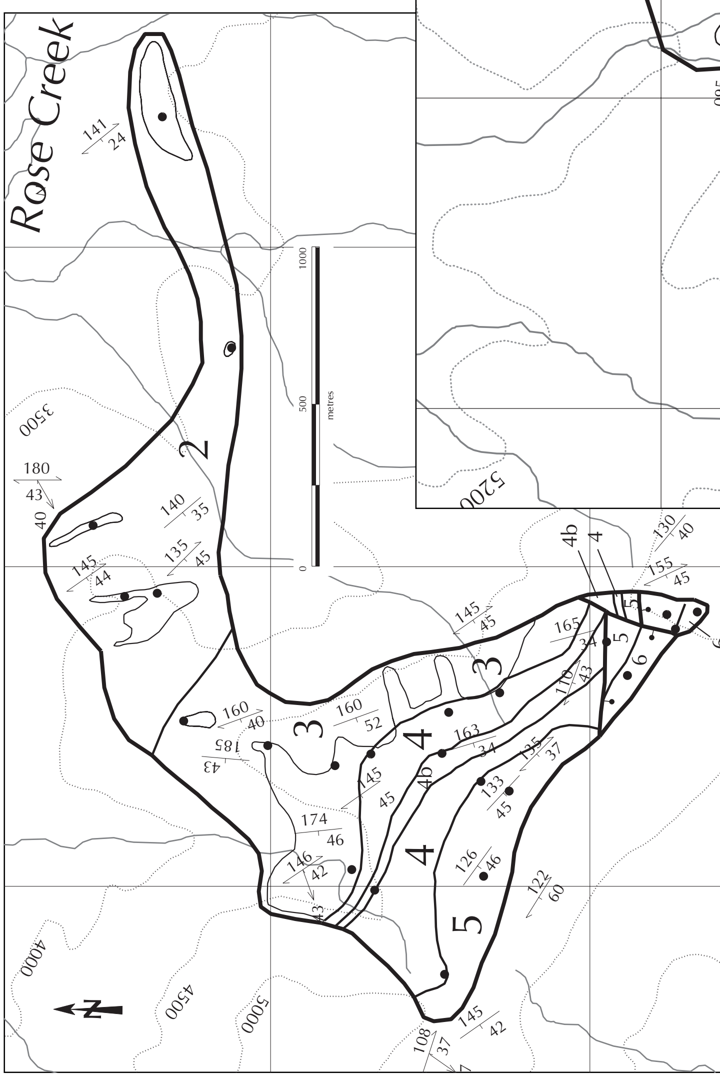

Figure 4. *Geology of Rose Mountain NW area (see legend in Fig. 3).*

Range Group as autochthonous at Rose Mountain, and suggested that it was an intact correlative unit of the major Anvil allochthonous assemblage.

Gordey (1990) correlated the units mapped by Tempelman-Kluit to regional stratigraphy mapped southwest and northeast of Rose Mountain. The two lower units were correlated with Ordovician Menzie Creek formation and Ordovician-Silurian Duo Lake Formation, respectively. These units are an integral part of the early Paleozoic North American miogeocline. In contrast, the Anvil Range Group was correlated with the Anvil allochthonous assemblage and considered to be an obducted slice of oceanic terrane emplaced on North American stratigraphy during Mesozoic accretion of suspect terranes to North America.

Geologists working for Cyprus Anvil Mining Corporation suggested that at least part of the Anvil Range Group had North American affinities and was autochthonous (Jennings and Jilson, 1986). They were unable to identify a location for the required thrust fault flooring an obducted sequence (G. Jilson, pers. comm., 1998).

The 1998 traverses suggest that the Rose Mountain stratigraphy represents a structurally concordant succession of stratigraphic units. Several of these units can be correlated with regional North American stratigraphic units, implying that the entire Rose Mountain stratigraphy has North American affinities. At the same time the two uppermost units previously mapped as Anvil Range Group are similar to correlative units in Campbell Range belt and Sylvester allochthon (Fig. 1). In these latter areas, the correlative units have been mapped and interpreted as Slide Mountain Terrane. Further work is needed to clarify the similarity of Anvil Range Group lithologies to successions in both North American and Slide Mountain Terranes.

ROSE MOUNTAIN GEOLOGY

INTRODUCTION

Figure 3 shows geological mapping completed during 1998 on the southeast and northwest ends of Rose Mountain. The two areas are located approximately 10 km apart but have similar

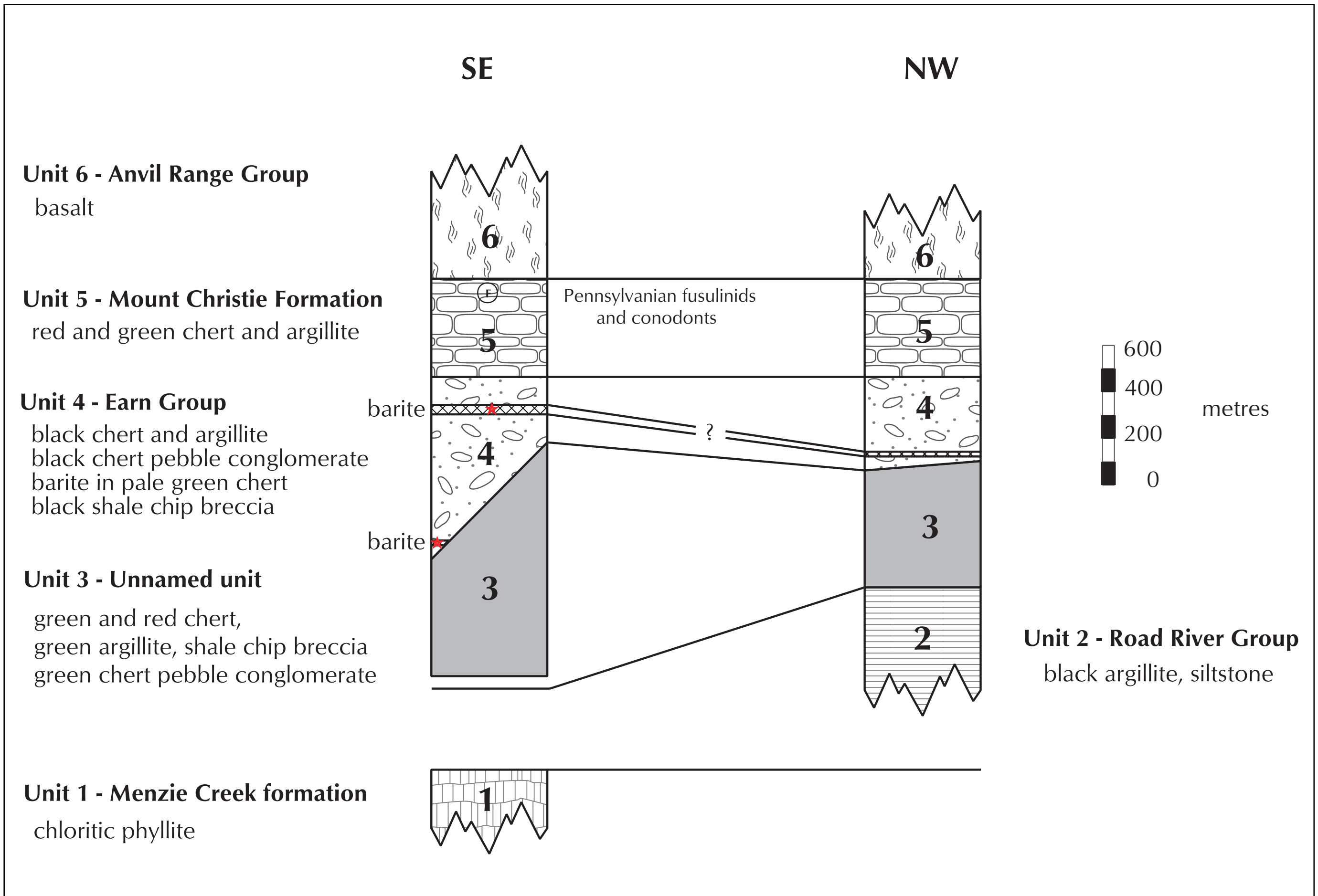

__Figure 6.__ Stratigraphic columns for mapped areas on Rose Mountain.

stratigraphy. Figures 4 and 5 are detailed geology maps for the areas, and Figure 6 presents a combined stratigraphic column based on the geology maps.

Six northwest-trending stratigraphic units form a 2000 m thick succession that uniformly dips moderately to the southwest, with an average orientation of 164°/32°SW. The succession overlies Hadrynian-Cambrian pelites and calcareous pelites of the North American miogeocline. West of the uppermost unit, the succession is bounded by mafic and ultramafic units constituting the Vangorda fault zone (Jennings and Jilson, 1986; Gordey, 1990).

All units contain a single deformation foliation (S_1) consisting of either a slaty cleavage (argillite) or a spaced fracture cleavage (chert). The S_1 foliation also trends northwest and dips southwest (average orientation 147°/37°SW) more steeply than the S_0 bedding. Stratigraphic thicknesses are a minimum because of the pervasive S_1 foliation. The entire sequence is interpreted to be structurally upright with northeast vergence. Stratigraphic tops from rare graded beds are consistent with this structural interpretation. Scattered outcrops with overturned S_0 bedding denote local macroscopic parasitic folds within the generally upright succession. Minor folds were not observed.

To the northeast, closer to the Anvil Batholith, metasedimentary and metavolcanic rocks contain two pervasive deformation foliations (Jennings and Jilson, 1986). This contrasts with the one foliation present in the Rose Mountain area. Detailed studies have demonstrated that the second foliation developed concurrently with emplacement of the Anvil Batholith during Cretaceous time (Pigage and Anderson, 1985; Jennings and Jilson, 1986; Smith and Erdmer, 1990). These studies also showed that the second deformation fabric decreased rapidly in intensity laterally away from the batholith. The timing of development of the first foliation is loosely constrained to be post upper Paleozoic (Jennings and Jilson, 1986). Based on orientation and distance from the Anvil Batholith, the pervasive Rose Mountain foliation is correlated with the earlier foliation adjacent to the batholith.

The Rose Mountain area is within the muscovite-chlorite zone of greenschist facies metamorphism. Qualitatively, individual mica and chlorite grains are not readily visible, even with a hand lens.

STRATIGRAPHY

UNIT 1 - MENZIE CREEK FORMATION

Medium green, pervasively foliated, noncalcareous to slightly calcareous chloritic phyllite is exposed SE of Rose Mountain. The unit commonly contains pale tan to white calcite amygdules up to 1 cm across. Epidote locally forms irregular apple green patches. Dark green streaks are locally visible on the S_1 foliation surface. Although primary structures have been largely destroyed by deformation, Unit 1 is interpreted as an amygdaloidal volcanic basalt unit.

Jennings and Jilson (1986) and Gordey (1990) mapped a continuous northwest-trending band of this unit along the lower slopes of Rose Creek valley. It conformably overlies calcareous phyllites and calc-silicate rocks of the informal Cambrian-Ordovician Vangorda formation (Jennings and Jilson, 1986) and is conformably overlain by black phyllites correlated with Road River Group. Both contacts have been mapped regionally as interbedded with an interval of alternating pelitic phyllite and chloritic phyllite. The upper contact with the overlying unit is not exposed in the SE area, and the lower contact is outside of the map limit in both areas.

Unit 1 is similar in both lithology and stratigraphic position to the lesser deformed Menzie Creek formation (Jennings and Jilson, 1986; Gordey, 1990) which occurs on the northeast side of the Anvil Batholith. These northeastern volcanic rocks are interlayered with black phyllites containing Ordovician graptolites (Tempelman-Kluit, 1972; Gordey, 1983). On the basis of this similarity, Unit 1 is correlated with the informal Menzie Creek formation of Jennings and Jilson (1986). Similar volcanic rocks have been described in several localities in the northern Cordillera (Goodfellow et al., 1995).

UNIT 2 - ROAD RIVER GROUP (DUO LAKE FORMATION)

Unit 2 consists of black, carbonaceous, silty argillites with subordinate siltstones, sandstones, and limestones. It is exposed in the NW area (Fig. 4); the expected location of Unit 2 in the SE area does not contain any outcrop (Fig. 5).

The carbonaceous argillites (Fig. 7) are indistinctly bedded on a scale of 15 to 30 cm. They weather with a patchy deep orange-brown surface coating, although locally the weathered surface has a slight bluish grey tinge. Medium grey, tan weathering, noncalcareous siltstone to fine sandstone is interbedded with

Figure 7. *Black argillite of Unit 2, Duo Lake Formation, Road River Group.*

Figure 8. *Pale green argillite of Unit 3.*

the carbonaceous argillites on a scale of centimetres to tens of metres. Thick siltstone beds are more prominent near the top of Unit 2. Locally, the siltstones contain thin calcareous intervals. In places they contain a fine millimetre-scale colour pinstriping between light and dark grey. Unit 2 also locally contains silty, dark grey, argillaceous limestone interbeds up to 10 m thick.

The argillites contain a pervasive S_1 deformation foliation which forms a slightly irregular surface. They break on both the S_0 bedding and S_1 foliation surfaces.

Unit 2 is approximately 440 m thick in the NW area. The upper contact with Unit 3 is not exposed, and the lower contact with Unit 1 is outside the map limit. Unit 2 is similar in lithology and in stratigraphic position to the Duo Lake Formation (Cecile, 1982) as mapped by Gordey (1990) on the northeast side of Anvil Batholith. Middle Ordovician to early Silurian graptolites have been found in the Duo Lake Formation northeast of the batholith (Tempelman-Kluit, 1972; Gordey, 1983).

UNIT 3

Overlying the carbonaceous argillites is a mixed unit consisting dominantly of pale silvery grey-green, noncalcareous, silty argillite with lesser amounts of grey sandstone, pale green bedded and massive cherts, maroon chert and argillite, pale green chert pebble conglomerate, and pale green shale chip breccia. These lesser lithologies are interbedded with the green argillite on a scale ranging from a few centimetres to tens of metres. Sandstones, conglomerates, and breccias are much more common in the SE area where they constitute up to 50% of the unit. In contrast, the NW area contains largely the pale green argillite. Maroon rocks are restricted to exposures in the SE area and occur largely at the top and bottom of the unit. Bedded cherts occur dominantly near the top of the unit; massive cherts are scattered in minor amounts through the entire unit as beds up to 1 m thick.

The predominant argillite (Fig. 8) is soft and weathers with a patchy, medium brown surface coating. Bedding is locally marked by subtle centimetre-scale colour banding caused by thin pale grey to tan siltstone interbeds. It is pervasively foliated with a smooth S_1 foliation surface. Chert pebble conglomerates (Fig. 9) contain matrix-supported, subangular to angular clasts of pale green to white chert, light greenish grey siltstone, and minor dark grey to black chert or argillite in a silty to sandy matrix. Clasts up to 3 cm across are strongly flattened in the plane of the foliation with aspect ratios ranging from 2:1 to 8:1. Sandstone interbeds within the argillite are generally medium to dark greenish grey and have an indistinct bedding defined by variations in shades of grey. Locally, the bedding has a pinstriped appearance. Shale-chip breccias contain numerous siltstone and shale clasts which are visible on the slightly irregular S_1 foliation surface. Crude, large-scale graded bedding can be seen locally with conglomerate passing upwards to sandstone and then siltstone. Bedded cherts are rhythmically bedded with 15-20 cm pale cream to green chert alternating with thin pale green argillite interbeds.

Unit 3 ranges in thickness from 500 m to 1000 m. The thickest section occurs in the SE area and contains abundant sandstone, chert pebble conglomerate, and shale-chip breccia interbedded with argillite. The lower contact with Unit 2 is not exposed in the NW area. In the SE area a 200 m covered interval separates exposures of Unit 3 from Unit 1; Unit 2 is assumed to occur in this covered interval.

The upper contact of Unit 3 with Unit 4 is transitional with interbedding of pale green and dark grey lithologies, and mixing of pale green and dark grey to black clasts within the sandstones and conglomerates of both Units 3 and 4. The thickness of Unit 3 is inversely proportional to the thickness of Unit 4 in the SE area.

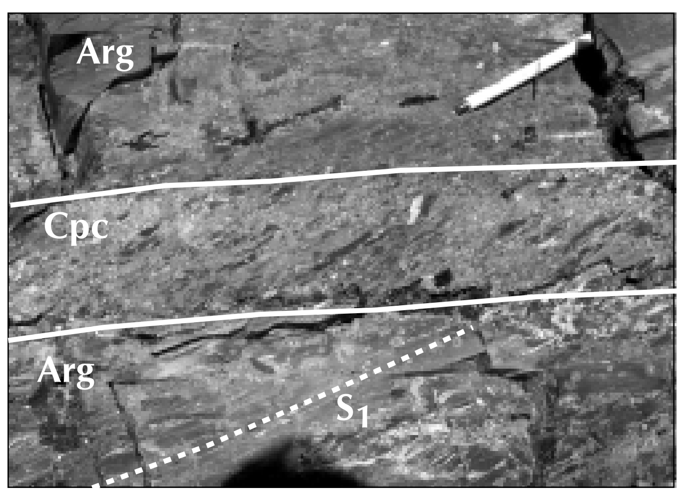

Figure 9. *Chert pebble conglomerate (cpc) interval in argillite (arg) of Unit 3. Foliation (S_1) crosses from lower left to upper right.*

Unit 3 does not readily correlate with known Lower Paleozoic regional stratigraphy of the North America Cordilleran miogeocline (Abbott et al., 1986; Gordey and Anderson, 1993). Strata similar to Unit 3 were not described from the northeast side of Anvil Batholith (Jennings and Jilson, 1986; Gordey, 1990). Roddick and Green (1961), however, mentioned minor green, pink, and red chert within a Road River succession in the Sheldon Lake map area (105J), 100 km northeast of Rose Mountain. Unit 3 could possibly correlate with bioturbated, pale grey siltstones of the Silurian Steel Formation (Gordey and Anderson, 1993).

It is possible, however, that Unit 3 is part of the Devonian-Mississippian Earn Group (Gordey et al., 1982) succession which unconformably overlies the Lower Paleozoic miogeocline succession. Although the pale green and maroon colours in Unit 3 are not characteristic of Earn Group, the coarse clastic component of Unit 3 lithologically resembles Earn Group rocks. Older strata with similar colours in the miogeocline occur in the latest Precambrian to Cambrian Narchilla Formation of the Hyland Group (Gordey and Anderson, 1993). Gordey and Anderson (1993) identified an area in northeast Tay River map area (105K) approximately 100 km northeast of Rose Mountain, where Earn Group rests unconformably on Hyland Group strata. The Hyland and overlying Road River strata would be a reasonable source for the material constituting Unit 3. The suggested southwest transport direction, however, does not correspond to sparse paleocurrent indicators from Earn Group in the Nahanni map area (105I) which indicate a general southeast transport direction for Earn Group conglomerates and sandstones.

***Figure 10**. Chert pebble conglomerate in Unit 4 – Earn Group.*

Unit 3 also cannot be readily correlated with stratigraphy in Yukon-Tanana Terrane (cf. Mortensen, 1992; Murphy, 1998), Sylvester allochthon (Nelson and Bradford, 1993), or Campbell Range belt (Plint and Gordon, 1997), all of which have at various times been considered possible extensions of the Anvil allochthonous rocks.

UNIT 4 - EARN GROUP

A dark grey to black, mixed unit consisting of interbedded noncalcareous silty argillite, sandstone, shale chip breccia, chert pebble conglomerate, phyllitic bedded chert, pale green phyllitic bedded chert, and stratiform barite constitutes Unit 4. These rock types are interbedded on a scale of centimetres to tens of metres. Proportions of the different lithologies within Unit 4 vary greatly both laterally and vertically. The unit is readily recognized from a distance because the various carbonaceous rock types weather with a characteristic pale grey to bluish grey surface coating.

Black, silty argillite with lesser black bedded chert is the dominant rock type. Bedded cherts are rhythmically bedded with 5-20 cm thick black chert bands alternating with thin dark grey to black argillite interbeds. The NW area consists almost entirely of argillite and/or bedded chert. The lower part of Unit 4 in one exposure in the NW area consists of a 60 m interval with black siliceous argillite alternating with medium to dark grey, finely laminated limestone; individual beds range up to 30 cm in thickness. The limestones have been sampled for possible microfossils.

Chert pebble conglomerate successions, interbedded with thin argillite intervals, range up to 50 m in thickness. Typically the conglomerates contain predominantly dark grey to black chert, light to dark grey siltstone, and lesser pale grey to white chert clasts in a sandy to silty matrix (Fig. 10). Clasts are flattened within the S_1 foliation and may range up to 10 cm in length, although 1-2 cm lengths are most common. Thick conglomerate beds are restricted to the lower half of Unit 4 in the SE area; thin conglomerate beds occur through the entire unit in the SE area. Only one 2 m thick conglomerate was noted in the NW area. Commonly the conglomerates are interbedded with shale chip breccias which contain dark to light grey flattened siltstone clasts in a silty argillite matrix. At the base of Unit 4 in the SE area, the conglomerate and shale chip breccia include pale green argillite and/or chert clasts and are interbedded with pale green argillite, chert, and shale chip breccia. Exposures of dark grey quartzite up to 3 m high also occur in the basal part of Unit 4 in the SE area.

In the SE area, Unit 4 contains two stratiform to nodular barite horizons (Yukon Minfile 105K 106, URN) separated by a stratigraphic interval of approximately 600 m. Both barite horizons occur within pale cream to silvery green phyllitic bedded chert intervals ranging up to 40 m in thickness. No pyrite is visibly associated with the barite. The barites contain the same pervasive S_1 deformation foliation as the enclosing cherts and argillites (Fig. 11). Both horizons have previously been sampled for possible use in drilling mud (Franzen, 1978; Read, 1982). The major gangue mineral with the barite is quartz, and the barite would have to be concentrated for industrial drilling mud use. The barite occurrences have been sampled for sulphur isotopic analysis.

In the Rose Mountain area, Unit 4 ranges in thickness from 300 to 900 m. The upper contact with the overlying Unit 5 is conformable. In the SE area the contact is sharp, and in the NW area the contact is transitional with interbedding of lithologies for a 20 m interval. The contact is placed at the top of the last dark grey to black bed. The lower contact is transitional in both the NW and SE areas with interbedding of lithologies for an interval ranging up to 20 m in thickness. The contact is placed at the lowermost interval with argillite and/or the silty matrix in conglomerate being dark grey to black.

Unit 4 is correlated with the middle Devonian to Mississippian Earn Group (Gordey et al., 1982) on the basis of lithologic similarity and stratigraphic position. The pale grey weathering colours, coarse clastic lithologies, and presence of stratiform barite are typical. The same unit as described by Gordey (1990) and Jennings and Jilson (1986) is also present on the northeast side of the Anvil Batholith. Previously, Tempelman-Kluit (1972) and Gordey (1990) included the rocks here assigned to Unit 4 in the Anvil Range Group.

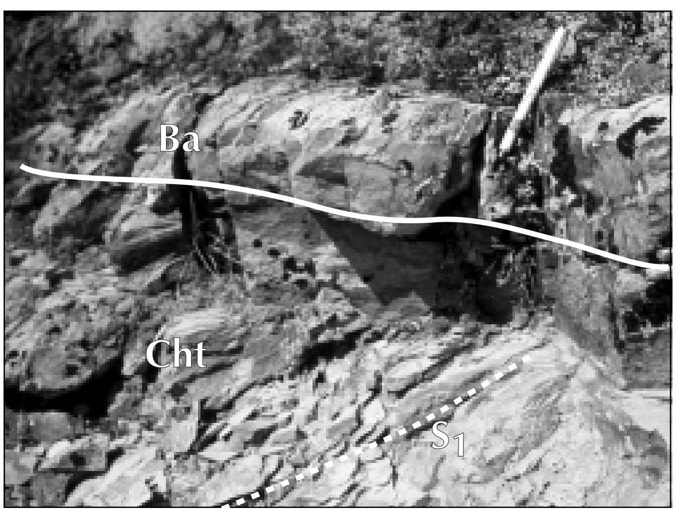

Figure 11. *Lower barite horizon in Unit 4 – Earn Group. Ba is barite, and cht is chert. Foliation (S_1) is shown by the dashed line.*

UNIT 5 - MOUNT CHRISTIE FORMATION

Pale green, noncalcareous, bedded, phyllitic cherts constitute Unit 5. The chert beds are 5 to 15 cm thick and alternate with pale green argillite interbeds (Fig. 12). Unit 5 typically weathers orange brown; locally it contains an intense dark brown manganese oxide surface staining.

The pale cherts contain minor intervals of dark grey to black chert and argillite up to 15 m thick. Locally, the upper portion of Unit 5 contains thin to thick interbeds of maroon to dark red argillite and lesser chert. The proportion and thickness of these reddish interbeds changes rapidly along strike; in the NW area the red beds are not present and in the SE area they are slightly over 60 m thick.

Both upper and lower contacts are conformable. The upper contact is transitional with interbedding of cherts and the overlying volcanic rocks of Unit 6. The lower contact is also transitional with local interbedding of dark grey to black chert with pale green chert over a 20 m interval. Unit 5 is approximately 420 m thick.

Tempelman-Kluit (1972, 1979) collected latest Pennsylvanian or earliest Permian fusulinids and Pennsylvanian conodonts from a thin limestone bed approximately 60 m below the upper contact of Unit 5 in the SE Rose Mountain area. On the northeast side of Anvil Batholith, the rocks correlative with Unit 5 are described by Gordey and Anderson (1993) as thin-bedded, light grey green to black chert of the middle Pennsylvanian Mount Christie Formation. The Mount Christie Formation does not contain red or maroon cherts and argillites, but is equivalent to a green and red slate with minor chert unit in Dawson map area (Unit 14 of Tempelman-Kluit (1970). Previously Tempelman-Kluit (1972) and Gordey (1990) included the rocks here assigned to Unit 5 in the Anvil Range Group. On the basis of age and lithologic similarity, Unit 5 is herein correlated with Mount Christie Formation.

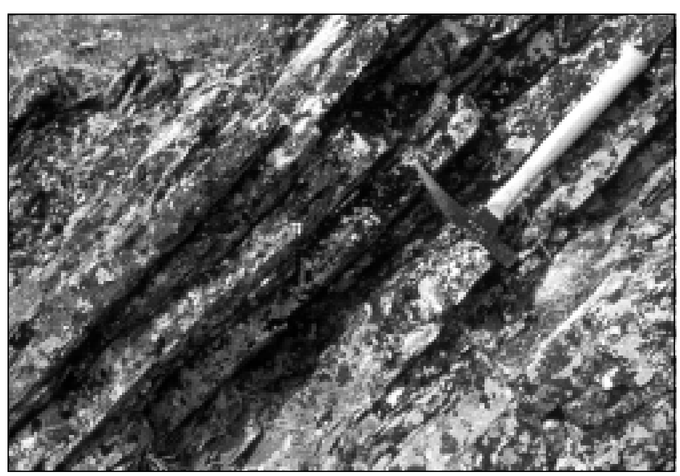

Figure 12. *Bedded, pale cream phyllitic chert of Unit 5 – Mount Christie Formation.*

UNIT 6 - ANVIL RANGE GROUP BASALT

Dark green, massive, aphanitic basalts which weather to a dark reddish brown characterize Unit 6 in the Rose Mountain area. Breccia textures with subangular to rounded clasts of basalt in a dark green to reddish green, aphanitic matrix are locally visible (Fig. 13). Patchy epidote alteration locally gives the basalt a medium green colouration. Foliation within the basalt is rarely visible.

The lower contact is conformable with some transitional interbedding of basalt with chert. The upper contact of Unit 6 was not observed. Tempelman-Kluit (1972, 1979) included the rocks here assigned to Unit 6 as part of the Anvil Range Group and considered them to be Permian. Exposures of this unit occur along a southeast trend with a strike length of at least 50 km (Gordey and Irwin, 1987).

Rocks equivalent to Unit 6 have not been observed northeast of Anvil Batholith, nor have they been recognized elsewhere in North American miogeocline stratigraphy (Abbott et al., 1986). Tempelman-Kluit (1979) correlated Unit 6 with basalts and ultramafic rocks of Anvil allochthon, a major obducted oceanic ophiolite assemblage, on the basis of age and lithologic similarity. Other regions correlated with Anvil allochthon and therefore consistent with Unit 6 are in Campbell Range belt (cf. Plint and Gordon, 1997) and Sylvester allochthon (cf. Nelson and Bradford, 1993).

SUMMARY AND DISCUSSION

Units 1 through 6 form a consistent, mappable succession over 10 km in strike length and approximately 2000 m in structural thickness. The units range in age from Ordovician to Permian. Within this succession units 3 through 6 have transitional contacts indicating they also form a stratigraphic succession without any internal structural discontinuity. The contact between Unit 3 and Unit 2 is not exposed; its structural nature is unknown.

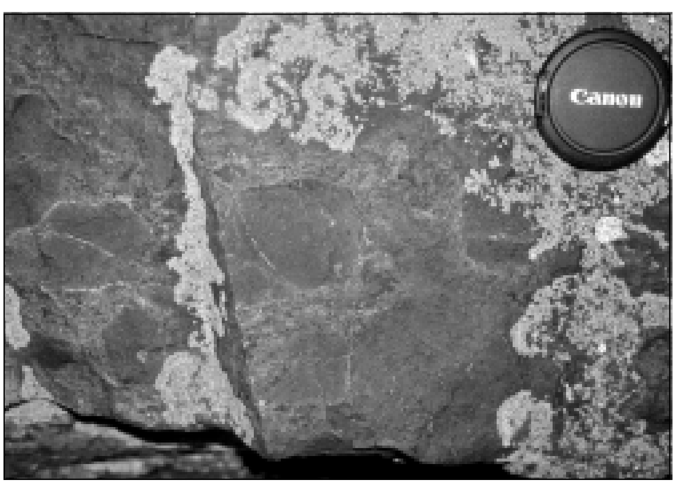

***Figure 13**. Auto-brecciated metabasalt of Unit 6 – Anvil Range Group.*

Units 1 and 2 have been correlated with Lower Paleozoic North American regional miogeocline stratigraphic units. Units 4 and 5 are also confidently correlated with Earn Group and Mount Christie Formation of the North American miogeocline, respectively. The lithologic similarity of these units to ancestral North American regional stratigraphy suggests that the entire Rose Mountain succession from Units 1 through 6 should be considered as a concordant package of units deposited on the ancient North American margin.

Unit 3 is inconsistent with correlation to regional stratigraphic units in both the North America miogeocline and Yukon-Tanana Terrane. It occurs above the Ordovician to Silurian Duo Lake Formation and below the Devonian to Mississippian Earn Group. If the Rose Mountain succession is intact, Unit 3 should be considered Silurian to Devonian in age. It would possibly correlate with bioturbated, pale grey siltstones of the Steel Formation (Gordey and Anderson, 1993). Alternatively it would possibly correlate with Earn Group strata with the source provenance for the coarse clastics and maroon metasediments within Unit 3 being Hyland Group. Because of the intimate intermixing of pale and dark grey lithologies at the upper contact of Unit 3, and the occurrence of typical Earn Group coarse clastic lithologies within Unit 3, I would favour the latter interpretation.

Units 3 through 6 have previously been interpreted as allochthonous Anvil assemblage thrust northeastward over the Road River Group (Unit 2) and Menzie Creek formation (Unit 1) of North American affinity (Gordey, 1990). If the Rose Mountain succession is entirely North American stratigraphy, the structural necessity for a large displacement thrust fault is removed. The allochthonous Anvil terrane is therefore not present atop North American terrane. Similarly, in the Finlayson area, about 190 km to the southeast, Murphy (1998) suggested that allochthonous Anvil assemblage may actually represent intrusive sills within Yukon-Tanana Terrane. Further work is needed to determine the true nature and provence of the Anvil assemblage.

Unit 6, with no correlative unit within ancestral North American stratigraphy, is most similar in age and lithology to mafic volcanics in Campbell Range belt and in the Sylvester allochthon. Unit 5 also appears similar to rocks in Campbell Range belt and in Sylvester allochthon. In these locations, the correlative units are mapped and interpreted as the suspect Slide Mountain Terrane. The dual correlative nature of Units 5 and 6 in Rose Mountain area suggests the possibility that by Pennsylvanian time, North America and Slide Mountain basements were contiguous so that subsequent units were deposited as an overlap assemblage.

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