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GEOLOGY OF SPENCER CREEK (105 B 1) AND DAUGHNEY LAKE (105 B 2) MAP AREAS RANCHERIA DISTRICT, SOUTHEAST YUKON

(Text with two 1:50,000 scale maps)

By: G.W. Lowey and J.F. Lowey

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RANCHERIA DISTRICT, SOUTHEAST YUKON
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This report is available from
Exploration and Geological Services Division
200 Range Road, Whitehorse, Yukon, Y1A 3V1

PREFACE

The report describes the bedrock geology and mineralization of the Spencer Creek (105 B 1) and Daughney Lake areas (105 B 2) in the Rancheria District of Southern Yukon. The Cretaceous Cassiar Batholith intrudes a miogeoclinal sequence of sedimentary and volcanic rocks of Paleozoic and Tertiary age. Much mineral exploration activity has focussed within the map areas, especially in the 1980's, following the discovery of the Midway deposit nearby to the south. Silver, lead, zinc and gold are found in veins, replacement bodies and breccias; tungsten in quartz-vein stockworks.

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ABSTRACT

A total of twelve lithostratigraphic units, including ten autochthonous and two allochthonous units are recognized and most of these are divided into 27 subunits. They range from Cambrian to Quaternary in age and include a wide range of sedimentary, igneous and metamorphic rock types. Lower Cambrian siliciclastic and carbonate rocks of the Atan Group and Lower Cretaceous plutonic rocks of the Cassiar Batholith predominate.

Three phases of structures are identified. First phase structures include bedding and slaty cleavage, of which the latter is attributed to late stage diagenetic recrystallization. Second phase structures trend northwest and include crenulation cleavage and related folds and lineations. They are attributed to northeast-southwest compression resulting from accretion and obduction of allochthonous rocks during arc-continent collision in Late Jurassic-Early Cretaceous time. Third phase structures are approximately 90° to the second phase structures and trend northeast. They include joints and related folds and lineations and are attributed to dextral transcurrent movement on Tintina, Kechika and Cassiar faults.

Precious and base metal mineralization is found mostly within Paleozoic sedimentary rocks and Cretaceous plutonic rocks and forms predominantly veins and replacement lenses. The dominant sulphides include galena, sphalerite, pyrite and chalcopyrite. Arsenopyrite, freibergite, tetrahedrite, pyrrhotite, wolframite, cassiterite, stannite, fluorite and lepidolite are also present. Common gangue minerals include quartz, siderite and iron and manganese oxides. Mineralization appears to be structurally controlled by the northeast-southwest jointing and, to a lesser extent, lithologically controlled by limestone-phyllite contacts. It is attributed to hydrothermal solutions migrating along the joints and was probably deposited approximately 50 Ma ago. The most useful exploration guide to finding additional mineralization is iron and manganese gossans.

ACKNOWLEDGEMENTS

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1. INTRODUCTION

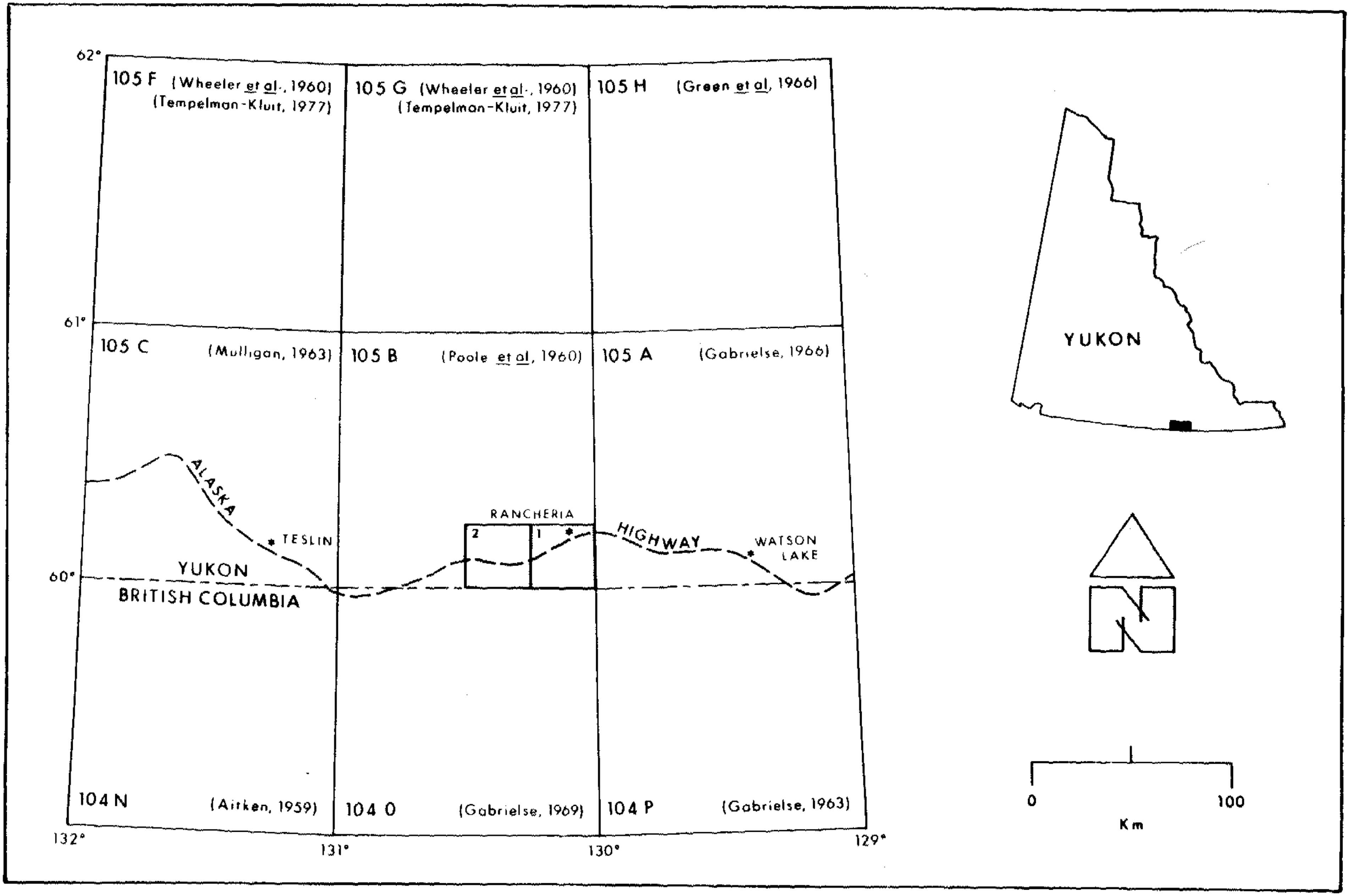
1.1 Scope of Study

The Rancheria district is a mineralized belt approximately 100 km long and 50 km wide that extends from northeastern British Columbia into southeastern Yukon. Over 50 mineral deposits and prospects of precious and base metals have been discovered in the area. Mineralization occurs mostly within Paleozoic sedimentary rocks and Cretaceous plutonic rocks and occurs predominantly as veins and replacement lenses. The deposits have mineralogical and structural similarities with those in the Keno Hill-Galena Hill district in central Yukon.

Mineral exploration in the Rancheria district has been historically active and is currently active. However, it is hampered by the lack of detailed geological base maps and the lack of a generally accepted genetic model(s) for mineralization. The Rancheria Project was initiated to fulfill these needs. Its aims are: (1) to provide 1:50,000 scale bedrock geological outcrop maps; and (2) to formulate an understanding of the relationship between mineralization and its geologic controls. The present study concerns Spencer Creek (105B-1) and Daughney Lake (105B-2) map areas (Figure 1.1) and reports on the general geology, structural geology and economic geology.

1.2 Access and Physiography

The report area is readily accessible via the Alaska Highway. It runs from the southwest corner of Daughney Lake map area (105 B-2) to the northeast corner of Spencer Creek map area (105 B-1), parallelling the Rancheria River. Secondary roads to several properties (i.e., MIDWAY, KODIAK, FIDDLER, CMC) allow access into the interior of the



1.1 Location Map.

map areas. Traverses on foot are possible throughout the map areas but are difficult in the Rancheria River valley due to dead fall resulting from a forest fire in the 1950's.

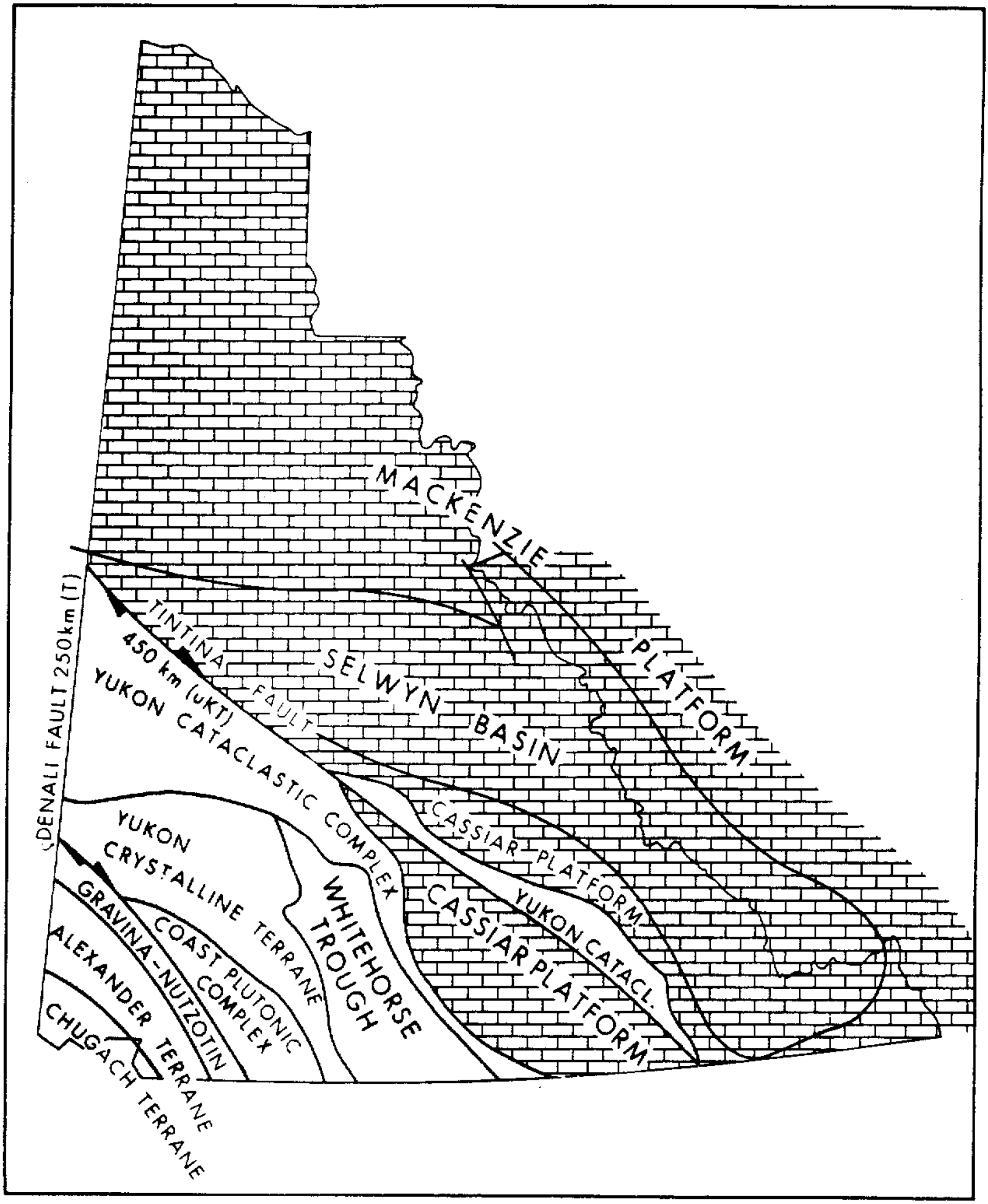
The Rancheria district lies within the Interior System of the Canadian Cordillera (Bostock, 1948). Two main physiographic divisions are represented: Cassiar Mountains, including Dease Plateau, and Liard Plain. The Cassiar Mountains occupy all of Daughney Lake map area (105 B-2) and the west half of Spencer Creek map area (105 B-1). This region is rugged, exhibits many features of alpine glaciation and has a maximum relief of 1000 m. It grades eastward into the Dease Plateau, a belt of low, rounded mountains that occupy the east half of Spencer Creek map area (105 B-1). The Dease Plateau grades northeastward into the flat-lying, drift covered region of the Liard Plain, which occupies the northeast corner of Spencer Creek map area (105 B-1).

1.3 Previous Work

The first systematic geological investigation of the report area was by Poole _et al_. (1960). This map (and descriptive notes) established the overall stratigraphy for southeastern Yukon and provided the only comprehensive geological report for the area. Prior to this work, Lord (1944) briefly examined outcrops adjacent to the Alaska Highway between Watson Lake and Teslin. Gabrielse (1969) and Mulligan (1969, 1975) suggested that mineralization was genetically related to the Lower Cretaceous Cassiar Batholith. Abbott (1984) recently summarized most deposits and prospects in the area and proposed that mineralization was younger than the Cassiar Batholith and indirectly related to large scale, Late Cretaceous - Early Tertiary transcurrent faulting.

1.4 Tectonic Setting

The Rancheria district is comprised of two discrete tectonic elements (Figure 1.2): the Cassiar Platform and Yukon Cataclastic Complex or Terrane (Tempelman-Kluit, 1979, 1981). The Cassiar Platform consists of Paleozoic siliciclastic and carbonate rocks that were deposited in a shallow, divergent ocean margin basin (Atlantic or "mature" type). Strata are autochthonous and represent an ancient North American margin (Tempelman-Kluit, 1979, 1981). The Yukon Cataclastic Terrane consists of Carboniferous and Lower Mesozoic sedimentary and volcanic rocks, now highly sheared and metamorphosed (Tempelman-Kluit, 1979, 1981), that were deposited in a divergent ocean margin basin (forearc and/or backarc type). These strata are allochthonous and were accreted to, and obducted above the ancient North American strata during arc-continent collision in Late Jurassic to Early Cretaceous time (Tempelman-Kluit, 1979). Obduction resulted in imbrication and metamorphism of the ancient North American strata, culminating with partial melting and emplacement of the Lower Cretaceous Cassiar Batholith (Tempelman-Kluit, 1979). The various tectonic elements are now dismembered due to Late Cretaceous and Early Tertiary dextral movement (Gabrielse, 1985; Tempelman-Kluit, 1981) on several transcurrent faults (c.f., Tintina, Denali, Kechika, Cassiar).



1.2 Tectonic setting (after Tempelman-Kluit, 1981).

2. GENERAL GEOLOGY

2.1 Introduction

The map areas can be divided generally into three belts of diverse rock types: Paleozoic sedimentary rocks of the Cassiar Platform underlie the east half of Spencer Creek map area (105 B-1); metamorphosed Carboniferous volcanic and sedimentary rocks of the Yukon Cataclastic Terrane underlie the southwest corner of Daughney Lake map area (105 B-2); and Cretaceous plutonic rocks of the Cassiar Batholith underlie the area between these two belts.

Paleozoic strata includes: Cambrian quartzite, phyllite, interbedded limestone and phyllite, limestone and dolostone (Atan Group); Cambro-Ordovician phyllite and hornfels (Kechika Group); Siluro-Devonian dolostone, siltstone, quartzite and limestone (Sandpile Group); Devonian limestone (McDame Group); and Devono-Mississippian quartzite, metaconglomerate and phyllite (Earn Group). These sediments were deposited in a shallow, marginal marine basin on the western edge of North America. Metamorphosed Carboniferous strata includes Mississippian andesite and intercalated chert (Sylvester Group) and Mississippian-Pennsylvanian mylonite, quartzite and dolostone (unnamed unit). These rocks were thrust over the Paleozoic strata in Late Jurassic-Early Cretaceous time. The Cassiar Batholith, consisting predominatly of granite and granodiorite, intruded both the Paleozoic and Carboniferous strata in Early Cretaceous time. Large-scale movement on several right-lateral transcurrent faults (i.e., Tintina, Kechika and Cassiar) occurred during Late Cretaceous-Early Tertiary time and was followed by widespread emplacement of Tertiary dykes and veins.

2.2 Description of Units

A total of 12 lithostratigraphic units, including ten autochthonous and two allochthonous units are recognized, and most of these are subdivided into 27 subunits (Table 2.1). The lithostratigraphic units range from Cambrian to Quaternary in age and include a wide range of sedimentary, igneous and metamorphic rocks. However, Cambrian siliciclastic and carbonate rocks and Cretaceous plutonic rocks predominate.

2.2.1 Autochthon

2.2.1.1 Cambrian Assemblage (lCs and lCc)

Siliciclastics (lCs)

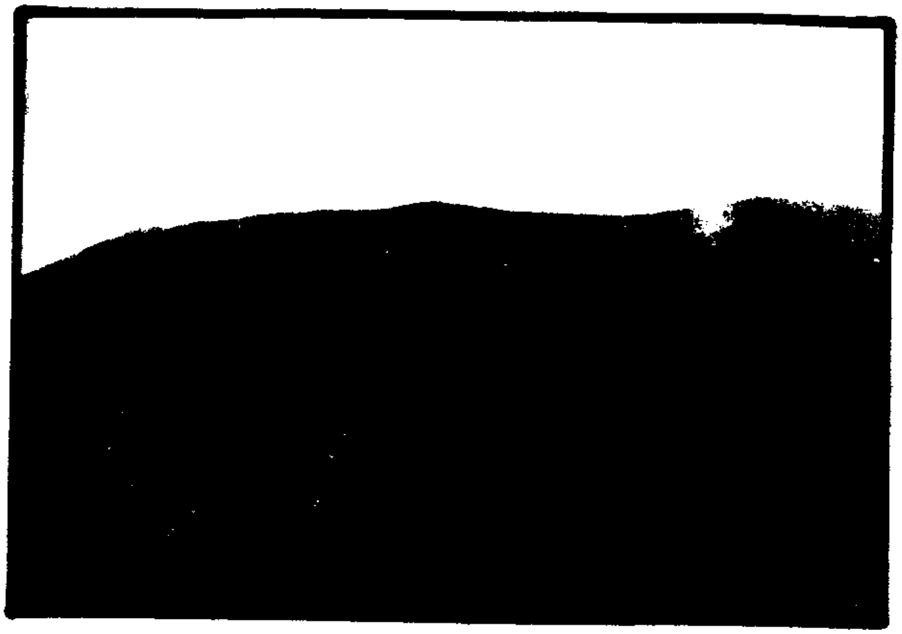
Cambrian siliclastic rocks include two subunits: quartzite (lCqt) and phyllite (lCph).

Distribution and thickness. This unit is most common in map area 105B-1 where it forms several northwest trending ridges; it also forms a similar trending ridge in the northeast corner of map area 105B-2. Exposures of quartzite (lCqt) are generally less than 100 m high (Figure 2.1) and the subunit attains a maximum thickness of approximately 350 m. It is overlain by phyllite (lCph) that is up to 250 m thick.

Lithology. The quartzite (lCqt) is light grey to medium brown and weathers the same colour. Minor amounts of thick interbeds of dark brown argillite are locally present. The modal grain size of the quartzite is medium grained sand and grains are subrounded to rounded. Mineralogically they are classified as quartzarenites and rare zircon is present. Bedding and other sedimentary structures are generally not discernible in outcrop (Figure 2.2). The

ERA	PERIOD	UNIT	MAP SYMBOLS	LITHOLOGY	THICKNE (METRE)
CENOZOIC	Quaternary	Unconsolidated	Q	Unconsolidated glacial, glaciofluvial, glaciolacustrine, alluvial and soil deposits	
	Quaternary	Basalt	Qbt	Porphyritic olivine basalt	40
		UNCONFORMITY		NONCONFORMITY	
	Tertiary	Dykes and Veins	Tmd, Tfd Tqv	Mafic dykes, Felsic dykes Quartz veins	
		INTRUSIVE		CONTACT	
MESOZOIC	Cretaceous	Granite and Orthogneiss	Kgt Kog	Granite, minor granodiorite Orthogneiss, tectonized granite	
	Jurassic (?) and Cretaceous	Diorite	JKdt	Diorite	
		INTRUSIVE		CONTACT	
PALEOZOIZ	Mississippian (?) and Pennsylvanian	Dolostone, Mylonite and Quartzite	MPds MPmy MPqt	Dolostone Mylonite, minor breccia Quartzite, minor mylonite, breccia	100
	Mississippian	Andesite and Chert	Mat,ch	Intercalated andesite agglomerate and chert, minor argillite	100
		TECTONIC CONTACT		THRUST	
	Upper Devonian and Lower Mississippian	Quartzite and Meta-conglomerate Phyllite	uDlMqt,mc uDlMph	*Interbedded quartzite and chert* pebble metaconglomerate, minor argillite Phyllite, minor schist, argillite	350
		CONFORMABLE		CONTACT (?)	
	Middle Devonian	Limestone	mDls	Limestone ("spaghetti stone"), minor fetid dolostone	100
		UNCONFORMITY		DISCONFORMITY	
	Middle Silurian and Lower (?) Devonian	Limestone, Quartzite Dolostone-Siltstone	mSDls mSDqt mSDds,st	Limestone Quartzite Dolostone and siltstone	100
		UNCONFORMITY		DISCONFORMITY (?)	
	Upper Cambrian and Ordovician	Phyllite and Hornfels	u€Oph u€Ohs	Phyllite Hornfels, minor argillite, marble	50
		CONFORMABLE		CONTACT	
	Lower	Marble, Dolostone, Limestone and Interbedded Limestone and Phyllite	l€ma l€ds l€ls l€ls-ph	Marble Dolostone Limestone Interbedded limestone and phyllite, minor marble and schist	550
	Cambrian	Phyllite and Quartzite	l€ph l€qt	Phyllite, minor quartzite Quartzite, minor phyllite	600

2.1 Lithostratigraphic units



2.1 Typical exposure of lower Cambrain quartzite. (lCqt) (repeater tower is approximately 3m high), Atan Group.

2.2 Lower Cambrian quartzite (lCqt) displaying cross-bedding (scale is in centimetres), Atan Group.

quartzite (lCqt) subunit is recognized in the field by the grey to brown colour and lack of sedimentary structures.

The phyllite (lCph) subunit is medium brown and weathers rusty light brown (Figure 2.3). Minor amounts of thin interbeds of white quartzite and rare beds of limestone are locally present. This subunit is recognized by the rusty brown colour and the close association of massive quartzite (lCqt).

Age and correlation. Fossils are not present in this unit. However, the quartzite (lCqt) is conformably overlain by phyllite (lCph), which in turn is conformably overlain by interbedded limestone and phyllite (lCls-ph), and this subunit is conformably overlain by archaeocyathid bearing limestone (lCls). In addition, the quartzite and phyllite subunits are similar to Lower Cambrian strata described by Fritz (1980). They are assigned to the Boya Formation, which is the lower part of the Atan Group, and includes map units 1 and 2 of Poole *et al*. (1980).

Carbonates (lCc)

Cambrian carbonate rocks include interbedded limestone and phyllite (lCls-ph), limestone (lCls), dolostone (lCds) and marble (lCma) subunits.

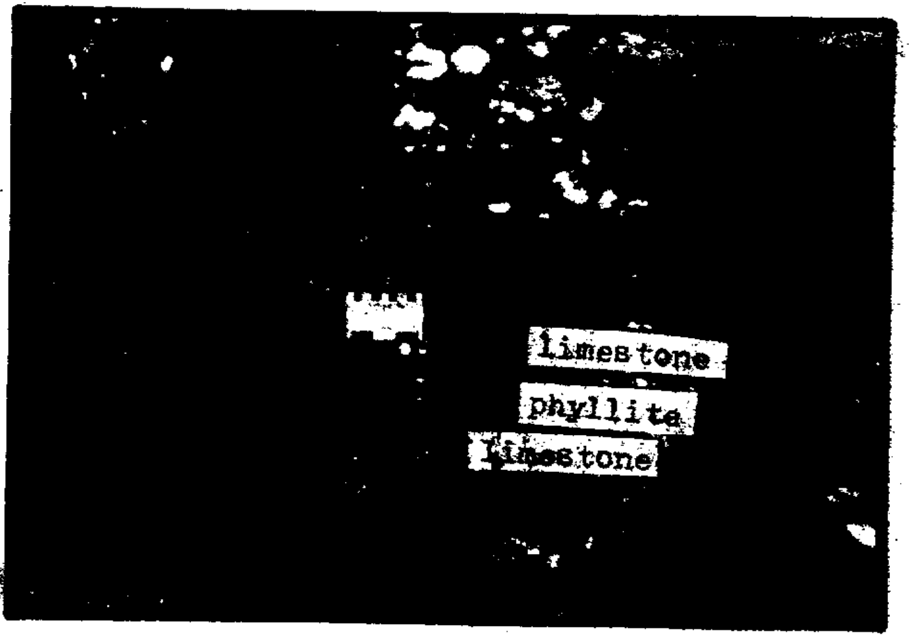
Distribution and thickness. This unit is most common in map area 105B-1 where it forms several northwest trending belts adjacent to the Cambrian siliciclastic unit (lCs). The carbonates also occur in the northeast corner of map area 105B-2 and form a small outcrop in the east-central part of this map area, immediately west of Daughney Lake. Marble (lCma) is commonly found juxtaposed to Cretaceous plutonic rocks (Kgt) and as roof pendants within these rocks. With the exception of marble (lCma), contacts between subunits are gradational. Estimated maximum thicknesses include: 250 m for interbedded limestone-phyllite (lCls-ph); 200 m for the limestone (lCls); and 100 m for the dolostone (lCds) subunit.

Lithology. The interbedded limestone and phyllite (lCls-ph) subunit consists predominantly of limestone and phyllite with minor amounts of interbedded marble and schist. The limestone is light grey, weathers light grey brown, and it is finely crystalline. The phyllite is medium grey and weathers light grey to light silvery grey. Both limestone and phyllite beds are generally less than 10 cm in thickness and are highly folded (Figure 2.4). This unit is distinguished by the highly folded interbeds of light grey brown limestone and light grey phyllite.

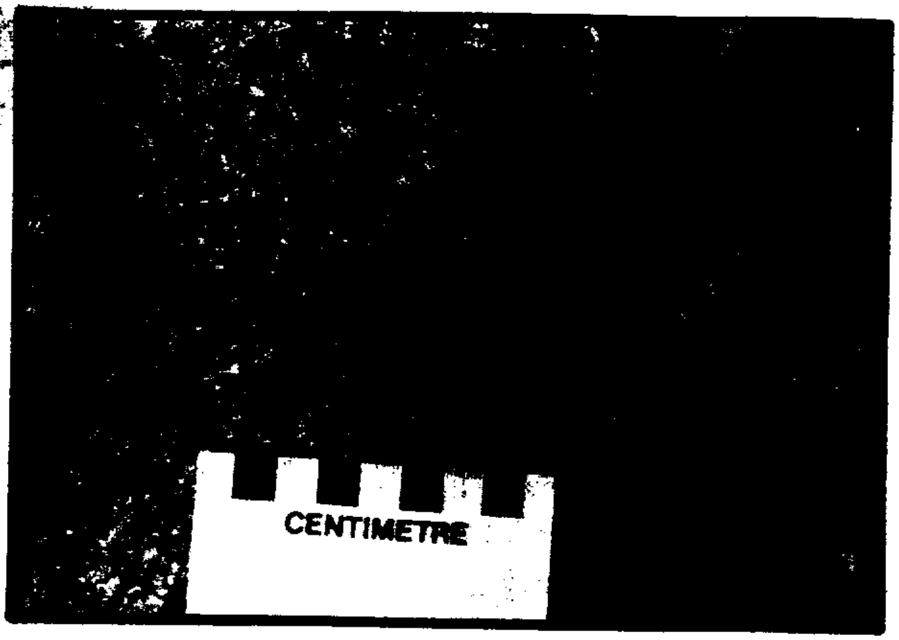
The limestone (lCls) subunit is mostly medium grey, and rarely black and weathers light to medium grey. It includes finely crystalline limestones, wackestones, packstones, grainstones and bafflestones. Archaeocyathids are abundant (Figure 2.5) and locally form bioherms (Figure 2.6). Trilobite fragments, pisolites (Figure 2.7) and oolites (Figure 2.8) are often found associated with archaeocyathids. This unit is readily identified on the basis of the archaeocyathids, and/or pisolites and/or oolites.

The dolostone (lCds) subunit is light grey and weathers light red (Figure 2.9). It ranges from fine to medium crystalline dolomite and rarely very coarsely crystalline, with up to 3 mm long dolomite rhombs (Figure 2.10). The dolostone is generally massive although pisolites are locally present. This subunit is recognized by the massive, light red weathering dolostone.

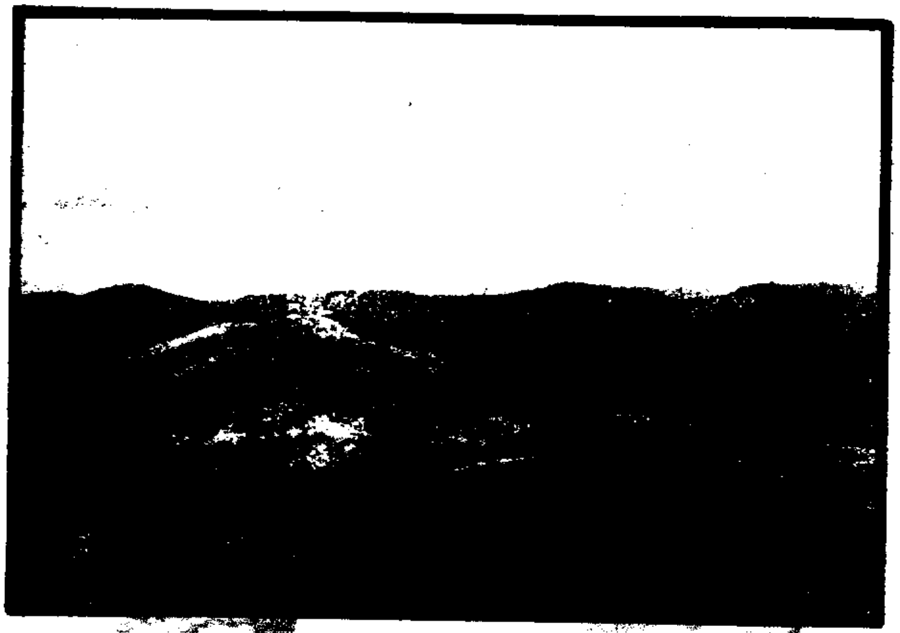
2.3 Lower Cambrian phyllite (lCph) with interbeds of quartzite, Atan Group.



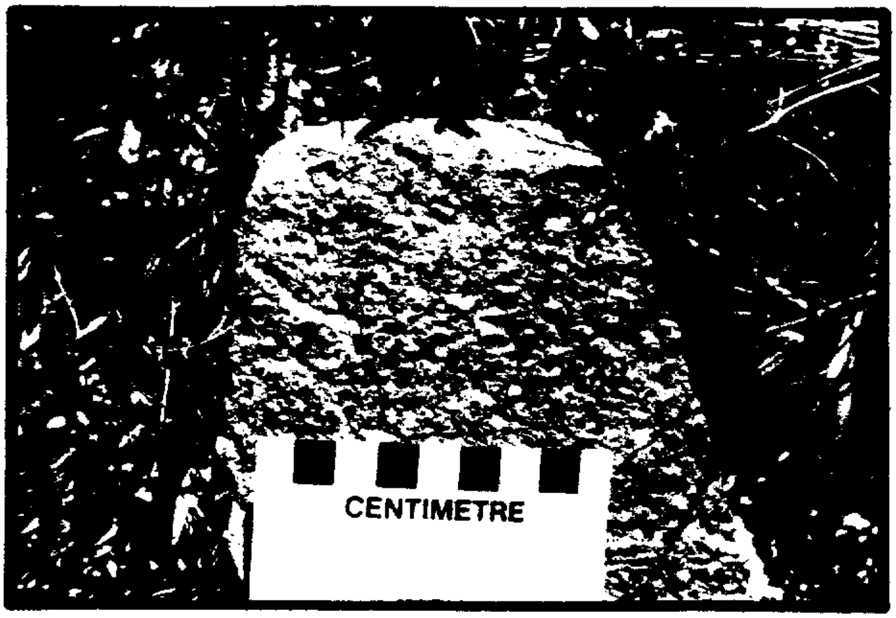
2.4 Lower Cambrian interbedded limestone-phyllite (lCls-ph) (limestone is light grey and phyllite is dark grey), Atan Group.



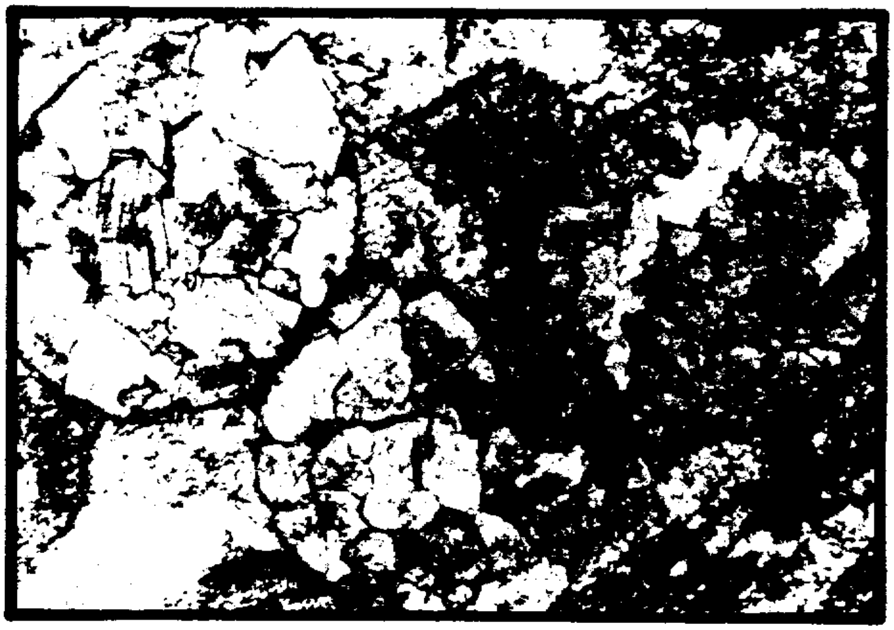
2.5 Archaeocyathid bafflestone, lower Cambrian limestone (lCls) subunit, Atan Group.



2.6 Lower Cambrian limestone (lCls) biohem at the YP property, Atan Group.



2.7 Pisolite rudstone, Lower Cambrian limestone (lCls) subunit, Atan Group.



2.8 Oolite grainstone, Lower Cambrian limestone (lCls) subunit (length of view approximately 1mm), Atan Group.

The marble (lCma) subunit is light grey and weathers the same colour. Minor amounts of schist are locally present. The marble is coarsely to very coarsely crystalline and laminated and bedded (Figure 2.11).

Age and correlation. As previously mentioned, archaeocyathids are abundant in the limestone (lCls) subunit, and indicate an Early Cambrian age. The other carbonate subunits are in conformable contact with this limestone and are probably the same age. The carbonate unit is assigned to the Rosella Formation, which is the upper part of the Atan Group (c.f., Fritz, 1980), and includes map unit 3 of Poole et al. (1960). Much of the silver-lead-zinc mineralization in the Rancheria district occurs as replacement lenses within this unit.

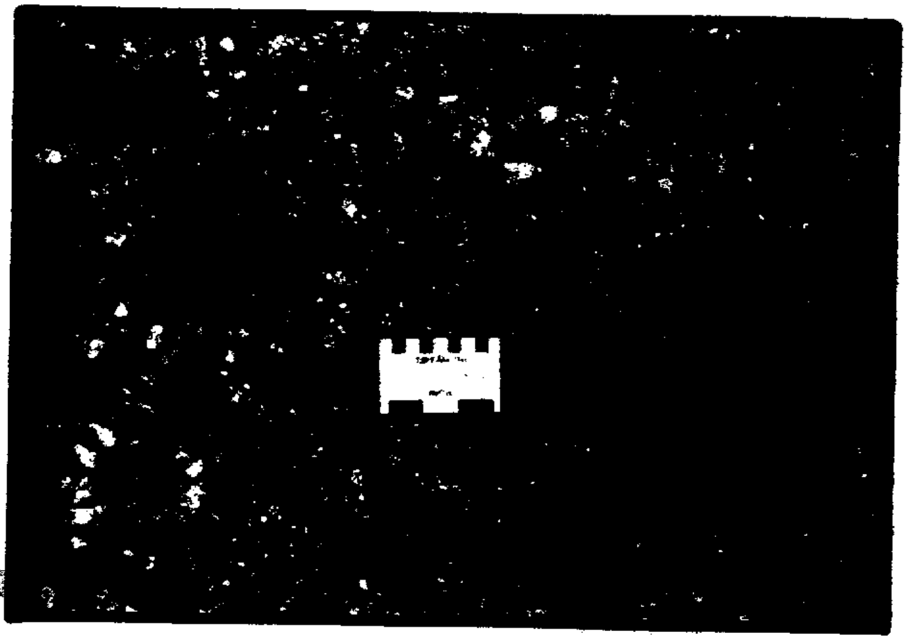
2.2.1.2 Cambro-Ordovician Assemblage (uCO)

The Cambro-Ordovician unit is subdivided into phyllite (uCOph) and hornfels (uCOhs).

Distribution and thickness. The phyllite (uCOph) subunit occurs mostly in map area 105B-1, where it crops out in valleys of the Rancheria and Tootsee Rivers. A small exposure is present in map area 105B-2, immediately west of Daughney Lake. The hornfels (uCOhs) subunit is exposed only in map area 105B-1, where it forms two or three isolated hills in the south-central part of this map area. The Cambro-Ordovician assemblage is approximately 50 m thick.

Lithology. The phyllite (uCOph) is light to medium grey and weathers medium silver-grey. It is usually highly folded and bedding is generally not recognizable in outcrop (Figure 2.12). Minor amounts of black, thin bedded

2.9 Lower Cambrian dolostone (lCls), Atan Group



2.10 Dolomite crystals from Lower Cambrian dolostone (lCls) subunit.

2.11 Roof pendants (light grey) of Lower Cambrian marble (lCma) within the Cassiar Batholith.

2.12 Cambro-Ordovician phyllite (uCOph), Kechika Group.

argillite occur locally and rare beds of limestone may be present. This subunit is distinguished by the highly folded, silver-grey phyllite.

The hornfels (uCOhs) is light grey brown and weathers light red-brown. Minor amounts of marble and skarn are present. The hornfels is very thinly to thinly laminated, gently folded and lithologically similar to the phyllite (uCOph) subunit in places. Magnetite and pyrite are present along fracture zones (Figure 2.13).

Age and correlation. No fossils were found in this unit. However, similar strata containing graptolites were thought to be Middle Cambrian to Middle Silurian (Poole *et al.*, 1960), Middle and (?) Upper Cambrian and Lower and Middle Ordovician (Gabrielse, 1963), and Upper Cambrian to Ordovician (Gabrielse, 1969). Gabrielse (1969) points out that Middle Cambrian rocks are not present in the Kechika Group. This unit probably includes Upper Cambrian to Ordovician strata and is assigned to the Kechika Group (c.f., Gabrielse, 1963). It includes map unit 4 of Poole *et al.* (1960).

2.2.1.3 Siluro-Devonian Assemblage (mSD)

This unit includes dolostone and siltstone (mSDds,st), quartzite (mSDqt) and limestone (mSDls) subunits.

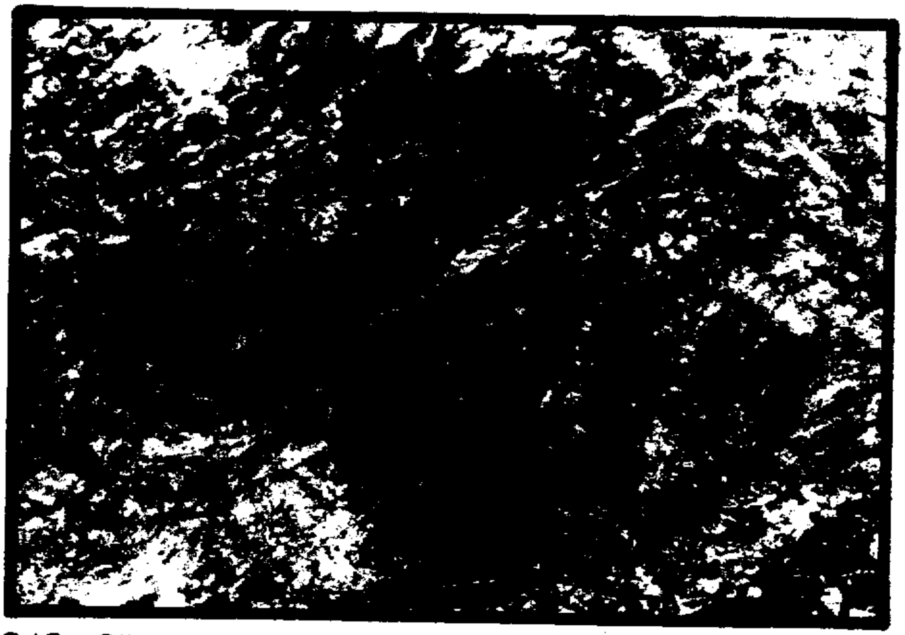
Distribution and thickness. The Siluro-Devonian assemblage is present only in map area 105B-1. It forms several small (less than 10 m) exposures south of the Rancheria River and west of Kechika Fault. This unit has an estimated thickness of 100 m.

Lithology. The dolostone and siltstone (mSDds,st) subunit is light to medium grey and weathers medium grey and light

2.13 Cambro-Ordovician hornfels (uCOhs), Kechika Group.

2.14 Epichnial trace fossils, Siluro-Devonian dolostone-siltstone (mSDs, st) subunit (coin is 4cm in diameter), Sandpile Group.

2.15 Siluro-Devonian quartzite (mSDqt), Sandpile Group.



2.16 Siluro-Devonian limestone (mSDls), sandpile Group.

2.17 "Spaghettistone" from Devonian limestone (mDls) unit, McDame Group.

2.18 Devono-Mississippian quartzite and meta-conglomerate (uDlMqt, mc), subunit, Earn Group.

brown. It is finely crystalline, massive to thinly bedded and epichnial trace fossils are locally present (Figure 2.14). This subunit is conformably overlain by quartzite (mSDqt). The quartzite is medium to dark grey and weathers medium grey. The modal grain size is medium grained sand and grains are subrounded. Mineralogically it is classified as a quartzarenite and zircon and tourmaline grains are common. It is thinly horizontally laminated and well bedded (Figure 2.15). Minor amounts of phyllite are locally present (particularly south of Butler Mountain). The limestone (mSDls) subunit apparently conformably overlies the quartzite. It is medium grey and weathers light grey. The limestone is finely crystalline and horizontally laminated and bedded (Figure 2.16). The Siluro-Devonian assemblage is recognized by the association of dolostone-siltstone, quartzite and limestone and the presence of trace fossils in the dolostone and siltstone (mSDds,st) subunit.

Age and correlation. Fossils were not found in this unit, with the exception of trace fossils, although Poole *et al.* (1960) reported that the basal 30 m of strata contain Middle Silurian graptolites, and lithologically similar strata in adjacent map areas were thought to be Ordovician, Silurian and (?) Devonian in age (Gabrielse, 1963) and Late Silurian (?) and Early (?) Devonian in age (Gabrielse, 1969). This unit is tentatively assigned a Middle Silurian and Devonian age and is correlated with the Sandpile Group (c.f., Gabrielse, 1963). It includes map units 5 and part of 6 of Poole *et al.* (1960).

2.2.1.4 Devonian Assemblage (mD)

Distribution and thickness. This unit is restricted to map area 105B-1 south of the Rancheria River, where it is exposed in the Tootsee River valley and on hills immediately east of the river. It is estimated to be approximately 100 m thick.

Lithology. This unit consists almost entirely of limestone that is light to dark grey and weathers medium grey. The limestone is finely crystalline and massive or horizontally bedded. Poorly preserved fossils are locally abundant and Gabrielse (1969) described similar limestones as a "spaghettistone", in reference to white rod-like organisms in a dark matrix (Figure 2.17). Minor amounts of interbedded black fetid dolostone and limestone are also present. This unit is distinguished by the "spaghettistone" and fetid beds.

Age and correlation. Poorly preserved fossils are present but not identifiable. Identifiable fossils from similar strata in adjacent map areas indicates a Middle Devonian age (Gabrielse, 1963, 1969). This unit is assigned to the McDame Group (c.f., Gabrielse, 1963) and includes part of map unit 6 of Poole *et al*. (1960). The deposit at Midway, B.C., occurs in rocks of this group.

2.2.1.5 Devono-Mississippian Assemblage (uDlM)

This unit is divided into two subunits: interbedded quartzite and metaconglomerate (uDlMqt,mc); and phyllite (uDlMph).

Distribution and thickness. The Devono-Mississippian assemblage occurs in map area 105B-1 south of the Rancheria River, where it crops out in the Tootsee River valley and on immediately adjacent hills. Exposures are up to 100 m thick and the unit has an estimated maximum thickness of approximately 350 m.

Lithology. The interbedded quartzite and metaconglomerate (uDlMqt,mc) subunit is dark grey and weathers the same colour. Modal grain size in the quartzite is medium grained sand and grains are subangular. Mineralogically it is classified as a litharenite. Grain size in the metaconglomerate ranges from fine to coarse pebbles. Clasts are subrounded and consist mostly of chert (Figure 2.18). Radiolarian tests are visible in the black chert pebbles. The metaconglomerate is classified as a chert pebble lithrudite. Minor amounts of black argillite occur within this subunit. The phyllite (uDlMph) subunit is medium black and weathers the same colour. Minor amounts of argillite and schist are locally present. The Devono-Mississippian assemblage is recognized in the field by the chert pebble metaconglomerate.

Age and correlation. No fossils were found in this unit with the exception of poorly preserved plant fragments. Similar strata were asigned a Late Devonian and Early Mississippian age (Poole et al., 1960), a Mississippian age (Gabrielse, 1963), and a Late Devonian age (Gabrielse, 1969). Strata in this unit are considered Upper Devonian and Lower Mississippian. It is assigned to the lower part of the Sylvester Group (c.f., Gabrielse, 1963) and is correlative with the Earn Group (c.f., Campbell, 1967). The Devono-Mississippian assemblage includes part of map unit 7 of Poole et al. (1960).

2.2.2 Allochthon

2.2.2.1 Mississippian Assemblage (Mat,ch)

Distribution and thickness. Mississippian allochthonous rocks are restricted to map area 105B-1, where they are exposed on an isolated hill 2 Km south of the YP property. This unit is estimated to be approximately 100 m thick.

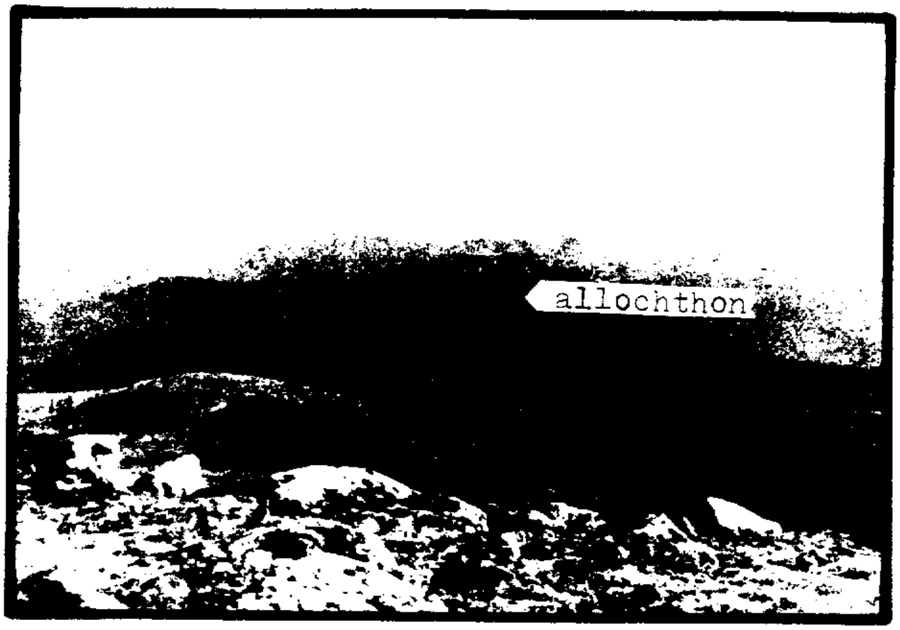
Lithology. Light to medium green andesite agglomerate is intercalated with medium green chert and minor amounts of medium red argillite (Figure 2.19). The andesite agglomerate is porphyro-aphanitic with 1 to 2 mm long hornblende phenocrysts in a carbonatized and silicified groundmass. Outcrops are typically blocky in appearance, with 1 to 30 cm blocks visible (Figure 2.20). The chert is horizontally laminated and bedded and forms up to 5 m thick beds within the andesite (Figure 2.21). The argillite occurs as discontinuous beds within the andesite and chert.

Age and correlation. Fossils are not present in this unit. Poole *et al*. (1960) assigned the strata a Late Devonian and Early Mississippian age, and Gabrielse (1963) assigned similar strata the same age. Gabrielse (1969) revised the age to Mississippian. This unit is considered Mississippian and is assigned to the upper part of the Sylvester Group (c.f., Gabrielse, 1963). It includes part of map unit 7 of Poole *et al*. (1960).

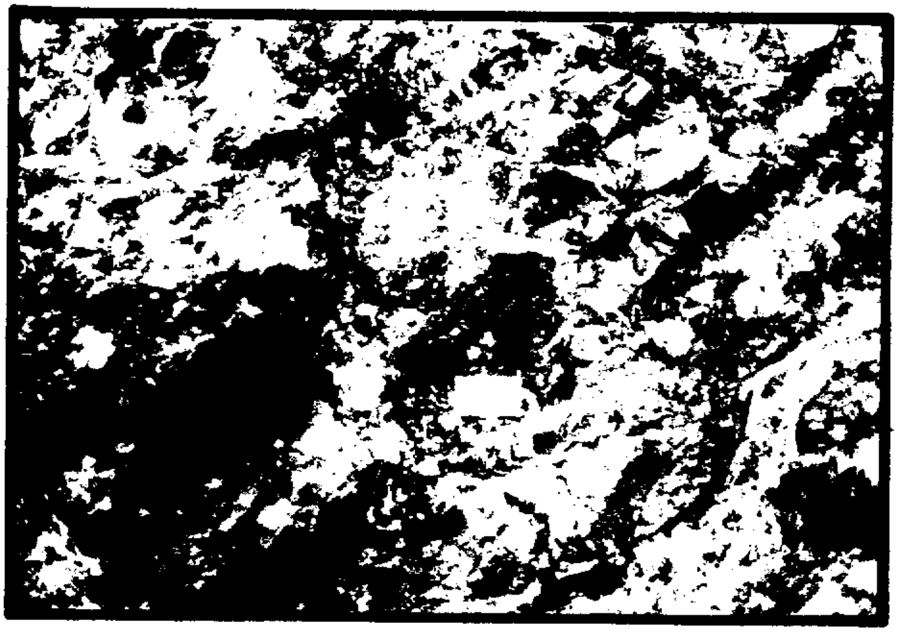
2.2.2.2 Mississippian-Pennsylvanian Assemblage (MP)

This unit is divided into mylonite (MPmy), quartzite (MPqt) and dolostone (MPds) subunits.

Distribution and thickness. Mississippian-Pennsylvanian allochthonous rocks are restricted to map area 105B-2,



2.19 Mississippian allochthon (Mat, ch), Sylvester Group.



2.20 Mississippian andesite agglomerate (Mat, ch), Sylvester Group.

where they occur west of the Cassiar Fault zone. Stratigraphic relationships between subunits is unclear. Exposures are generally less than 5 m thick. The unit has an estimated maximum thickness of 100 m.

Lithology. The mylonite (MPmy) consists of interlayered light and dark grey laminae of very fine crystalline quartz that displays well developed foliation (Figure 2.22). The quartzite (MPqt) is light grey green and very fine grained with abundant chlorite and/or muscovite (Figure 2.23). The dolostone (MPds) is light grey and weathers the same colour. It is very finely crystalline and massive (Figure 2.24). Minor amounts of breccia (Figure 2.25) are locally present in this assemblage.

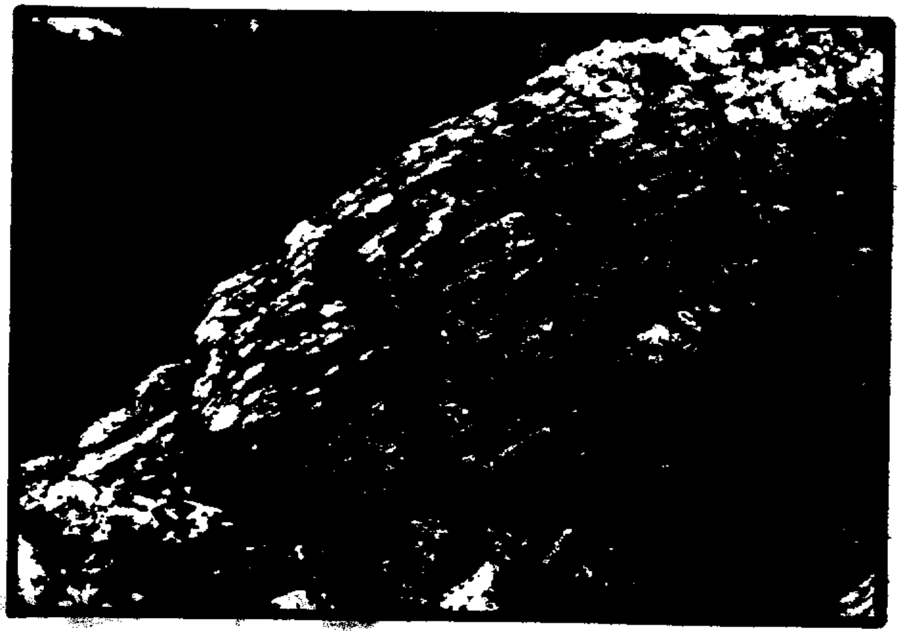
Age and correlation. Fossils were not found in this unit. The strata was assigned a Late Devonian and Early Mississippian age by Poole *et al*. (1960). Similar strata to the south, in the adjacent Jennings River map area (104 O), contain fusulinids and were assigned a Pennsylvanian age by Gabrielse (1969). This unit is considered Mississippian and Pennsylvanian and includes map unit 8 of Poole *et al*. (1960).

2.2.3 Jura-Cretaceous Diorite Plug (JKdt)

Distribution. This is restricted to Spencer Creek map area (105 B-1), where it crops out as a small 500 by 200 m) plug in the northwest part of the map area.

Lithology. The Jura-Cretaceous diorite (JKdt) is light grey green to dark black and weathers light grey brown (Figure 2.26). It is phaneritic, medium crystalline, and consists of 60% plagioclase (An_{25}), 20% biotite (containing abundant rutile inclusions), 20% calcite and

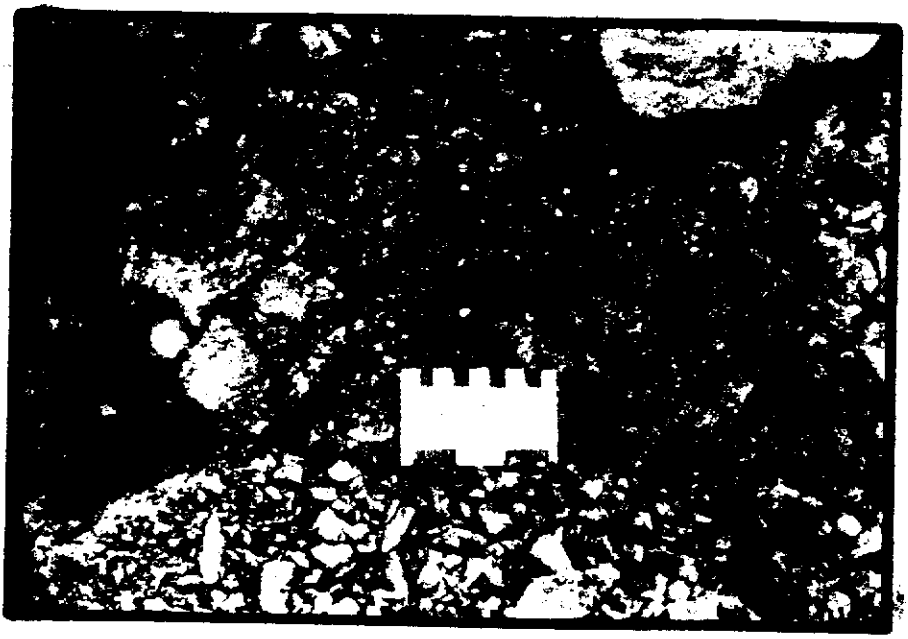
2.21 Mississippian chert (Mat, ch), Sylvester Group.



2.22 Mississippian-pennsylvanian mylonite (MPmy).

2.23 Mississippian-Pennsylvanian quartzite (MPqt).

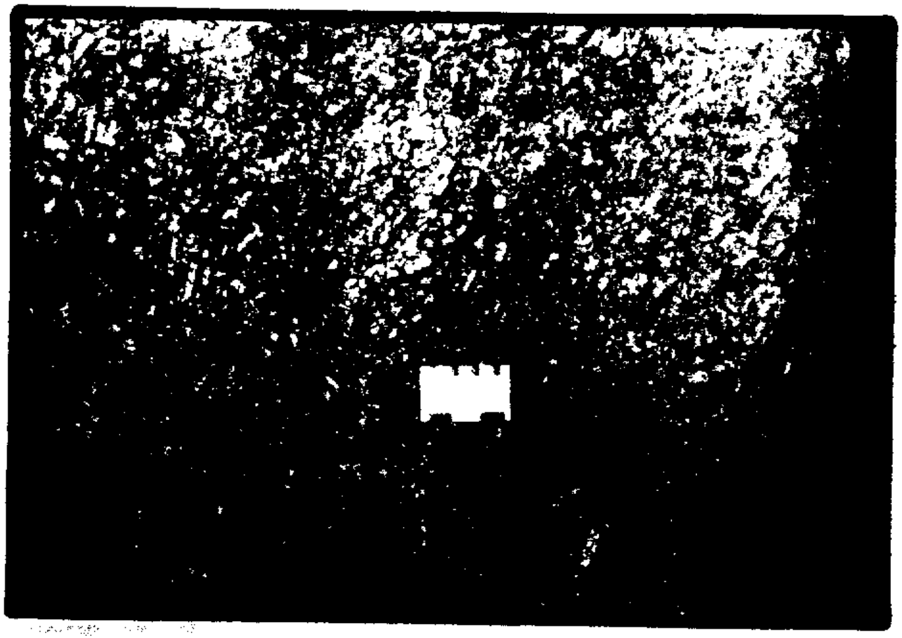
2.24 Mississippian-Pennsylvian dolostone (MPds).



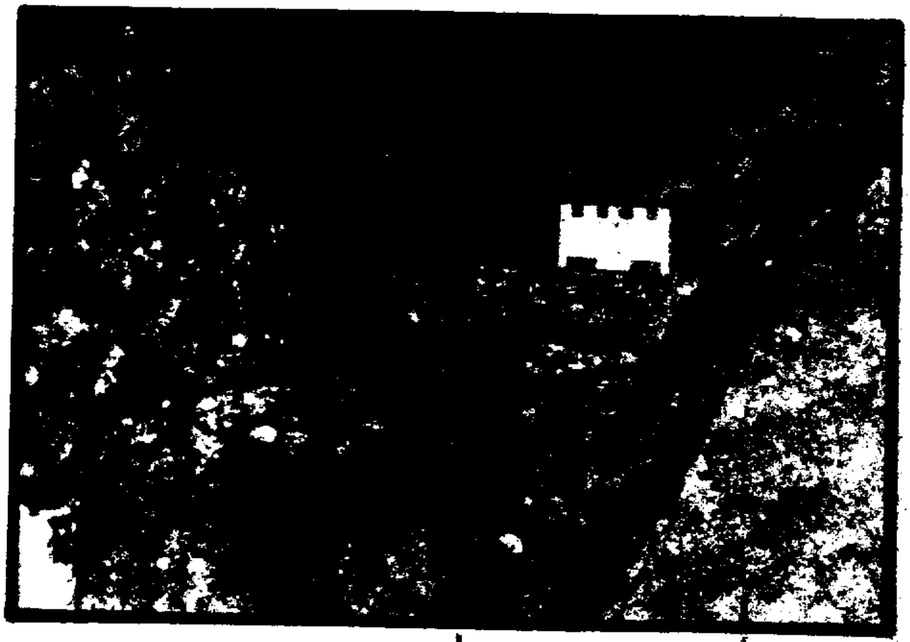
2.25 Breccia associated with Mississippian-Pennsylvanian (MP) unit.

2.26 Jura-Cretaceous diorite (JKdt) plug.

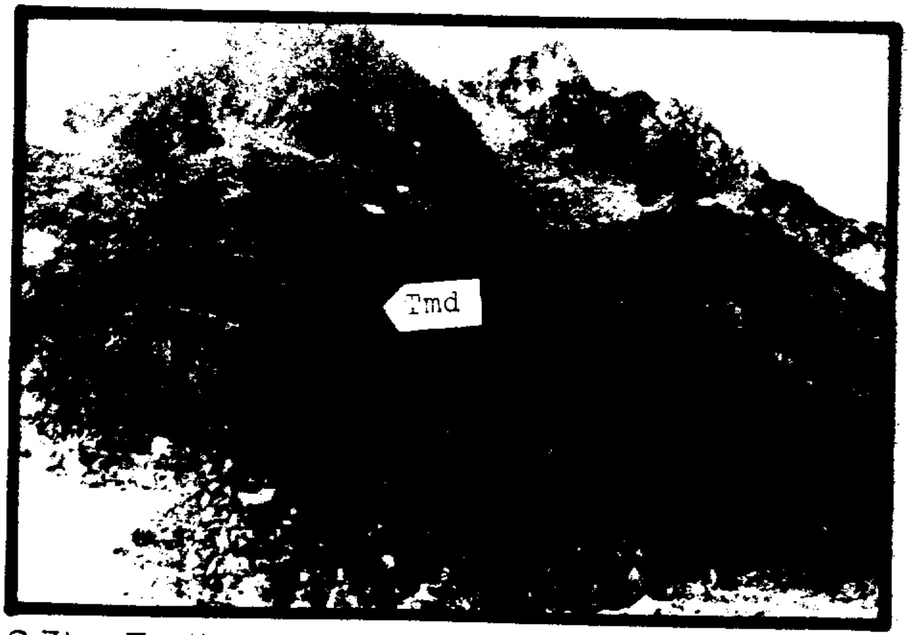
2.27 Mountainous terrain underlain by Cretaceous granite (Kgt), Cassiar Batholith.



2.28 Orthoclase phenocrysts, Cretaceous granite (Kgt) subunit, Cassiar Batholith.



2.30 Cretaceous orthogneiss (Kog), Cassiar Batholith.



2.31 Tertiary mafic dyke (Tmd) in granite.

quartz, probably pseudomorphic after hornblende, and less than 1% apatite.

Age and correlation. No radiometric dates have been obtained from this unit so its age assignment is tentative. Poole *et al*. (1960) suggested the diorite was Jurassic and/or Cretaceous in age and observed that it was cut by Cretaceous plutonic rocks (Kgt). The diorite may represent an early stage of differentiation of the Cretaceous Cassiar Batholith.

2.2.4 Cretaceous Cassiar Batholith (K)

The Cassiar Batholith is a belt of mid-Cretaceous plutonic rocks up to 20 Km wide and 400 Km long, that extends from northeast British Columbia into southeast Yukon. The Rancheria district lies at the north end of this belt.

Within the map areas, the Cassiar Batholith can be divided into two subunits: granite (Kgt) and orthogneiss (Kog).

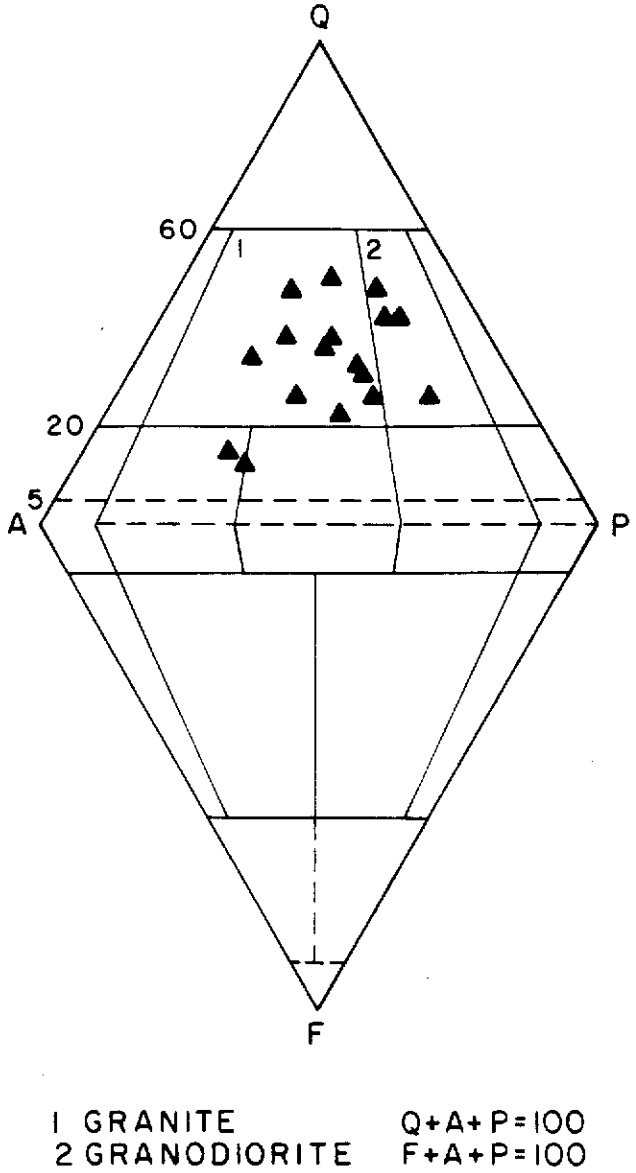
Distribution. The granite (Kgt) subunit underlies most of map area 105B-2 and also occurs in the southwest corner of map area 105B-1. It forms the highest terrain in the map areas (Figure 2.27). The orthogneiss (Kog) subunit occurs in map area 105B-2, where it forms a belt up to 3 km wide on either side of the Cassiar Fault zone. (See section 3.8)

Lithology. The granite (Kgt) is speckled light grey or light red and dark black. It is phaneritic, medium to coarsely crystalline and equigranular to porphyritic with up to 5 cm long, zoned orthoclase phenocrysts (Figure 2.28). Myrmekitic texture is rare. Mineralogically, this subunit consists of approximately 40% alkali feldspars, 30% quartz, 20% plagioclase, 10% biotite and muscovite and less than 1% zircon and magnetite (based on hand samples and microscopic examination of 10 thin sections). It is classified as a granite (Figure 2.29), with minor amounts of granodiorite and rare amounts of other plutonic rock types. No regional composition zonning is apparent. Biotite-, and hornblende-rich xenoliths, several to tens of centimetres in length, are locally abundant. Roof pendants of marble (subunit 1Cma) are also present.

The eastern region of the Cassiar Batholith is in contact with Paleozoic sedimentary rocks and is irregular. The western region is in contact with Carboniferous metamorphic rocks and is straight, due to the Cassiar Fault (see section 3.8). A contact metamorphic aureole (up to 2 Km wide) is present in the northeast corner of Daughney Lake map area (105 B-2) but is not well developed elsewhere. Only on the STERLING property is it possible to walk from granite, marble, limestone and dolostone in the same outcrop. Marble and minor schist generally crop out close to the eastern contact of the batholith, grading eastward into unaltered limestone and phyllite, respectively.

The orthogneiss (Kog) is medium to dark grey and speckled light grey, or light red and light black. It weathers light grey. The orthogneiss contains augen of albite in a cataclastic matrix of quartz, feldspar and mica (Figure 2.30). Minor amounts of sheared and tectonized granite are present locally. Quartz chlorite schist exposed west of Daughney Lake and just west of the map area may represent highly metamorphosed granite.

Age and correlation. This unit is assigned to the Cassiar Batholith (c.f., Lord, 1944) and Christopher et al. (1972) reports that it has a K-Ar mean age of 102±3 Ma.



2.29 **Mineralogical classification of cretaceous granite (Kgt) subunit. Data from Gabrielse: (1963), classification from Hyndman (1972).**

Radiometric dates within the map areas range from 87 to 105 Ma (Gabrielse et al., 1980). Much of the mineralization in the Rancheria area occurs as silver-lead-zinc veins within this unit.

2.2.5 Tertiary Dykes and Veins (T)

This unit includes mafic dykes (Tmd), felsic dykes (Tfd), quartz veins (Tqv) and quartz-feldspar veins (Tqf).

Distribution. Dykes and veins are widely scattered throughout both map areas.

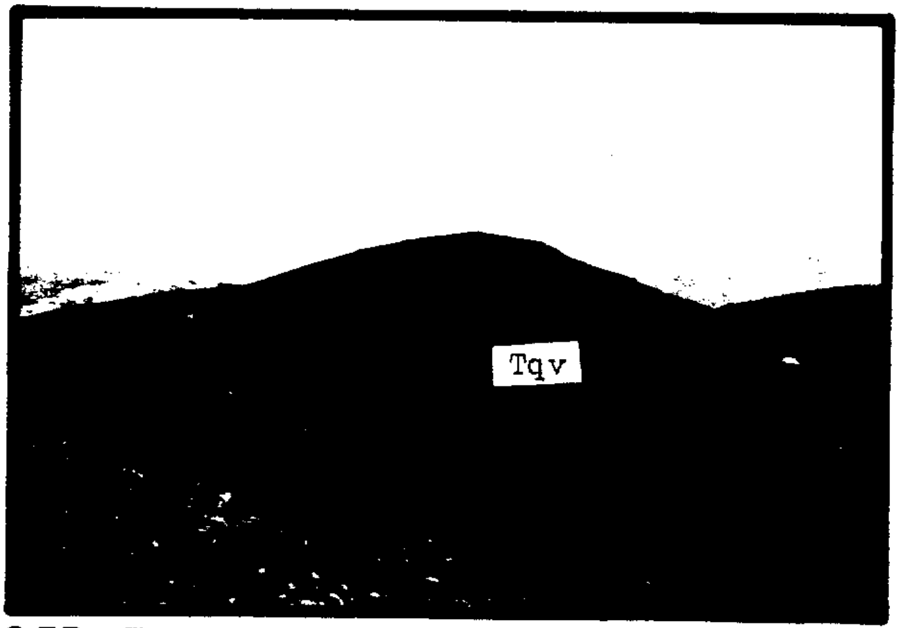
Lithology. Mafic dykes (Tmd) are porphyro-aphanitic with biotite and rarely augite(?) phenocrysts in a dark green ground mass (Figure 2.31). Felsic dykes (Tfd) are also porphyro-aphanitic, but with quartz and albite phenocrysts in a light grey groundmass (Figure 2.32). Dykes are generally less than 1 m wide. Quartz veins and quartz-feldspar veins are light grey and light yellow, respectively (Figures 2.33, 2.34). They are generally coarsely crystalline and less than 0.5 m wide.

Age and correlation. A rubidium-strontium radiometric age of 52 ± 3 Ma was obtained from a felsic dyke on the YP property by the University of British Columbia radiochronology laboratory (Abbott, 1984), and a potassium-argon age of 50.8 ± 0.8 Ma was obtained from a quartz vein on the Fiddler property (Sinclair, in press). Mafic dykes have not been radiometrically dated but are believed to be of similar age.

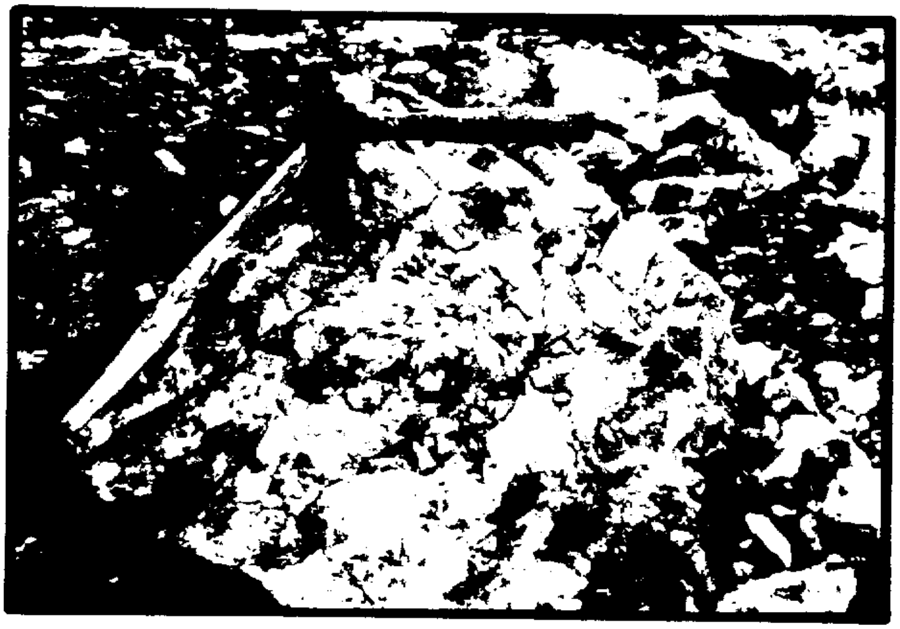
2.2.6 Basalt (Obt)

Distribution and thickness. This unit occurs in both map areas and is restricted to the valley of the Rancheria

2.32 Tertiary felsic dyke (Tfd) in Cambrian sediments.



2.33 Tertiary quartz vein (Tqv), Fiddler property.



2.34 Tertiary quartz-feldspar vein (Tqf) (quartz is light grey, feldspar is medium grey.

River. It forms several discontinuous cliffs that are up to 40 m thick.

Lithology. The basalt is porphyro-aphanitic with light green olivine phenocrysts in a light to dark brown matrix. It is locally scoriaceous and vesicular and individual flows approximately 2 to 5 m thick are discernable in outcrop (Figure 2.35). Tops of flows are marked by ropy basalt. Columnar jointing is poorly developed in some outcrops.

Age and correlation. Basalt within the map area has not been dated. Potassium-argon radiometric ages from similar basalts in the adjacent Watson lake map area were reported by Klassen (in press) to range from 765 to 232 Ka. This unit is correlative with the Tuya Formation (c.f., Gabrielse, 1963) and the Selkirk volcanics.

2.2.7 Unconsolidated deposits (Q)

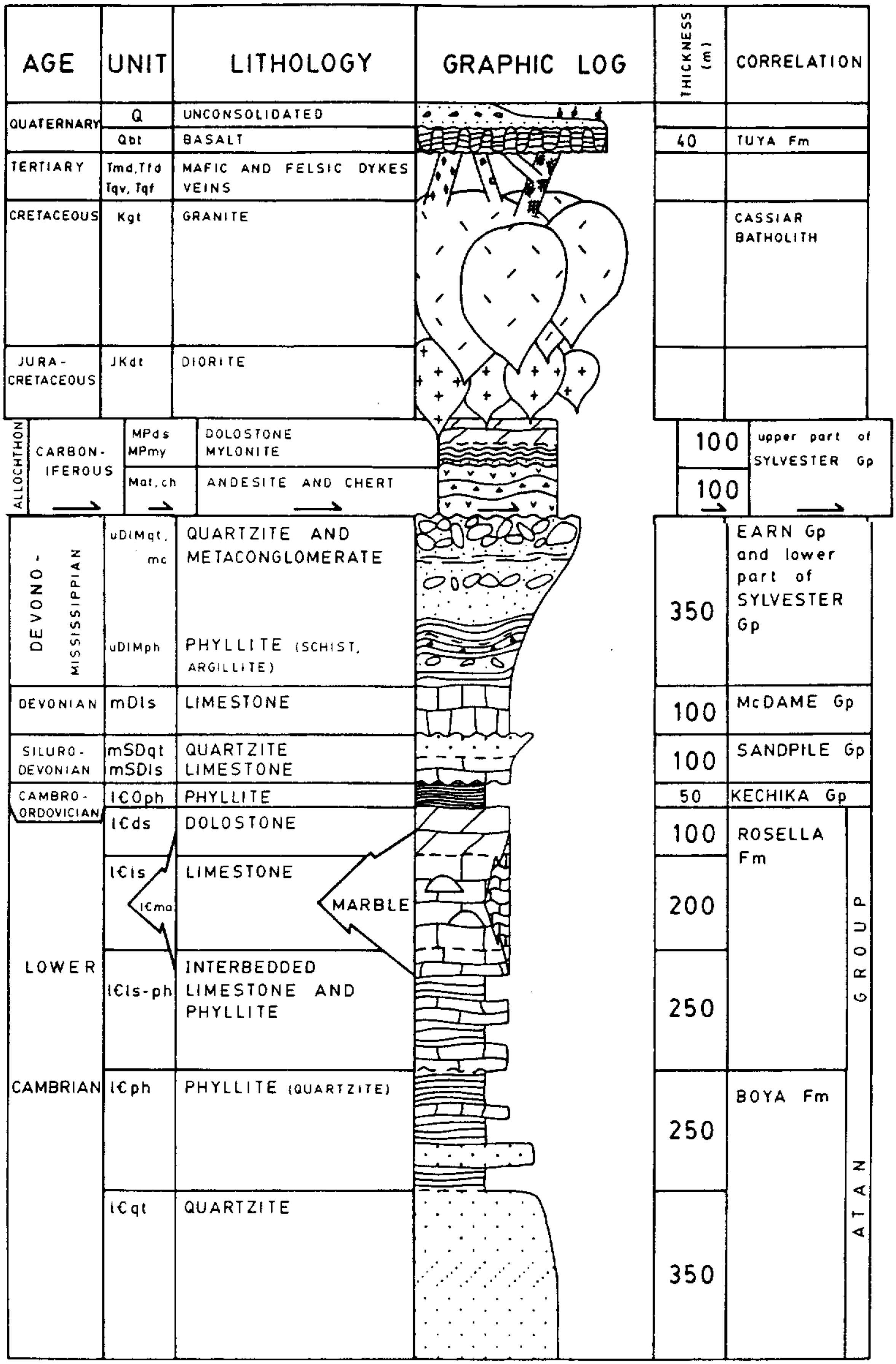
Much of the map area is covered by a thin to thick mantle of unconsolidated glacial, glaciofluvial, glaciolacustrine (Figure 2.36), alluvial and soil deposits. These deposits were mapped in detail by Klassen (1982).

2.3 Summary of Lithostratigraphy

Figure 2.37 represents a schematic stratigraphic summary of all the lithostratigraphic units and most of the subunits recognized during mapping.

2.35 Quaternary basalt (Qbt) displaying several subaerial flows and columnar jointing.

2.36 Quaternary unconsolidated deposits (glaciolacustrine).



AGE	UNIT	LITHOLOGY	GRAPHIC LOG	THICKNESS (m)	CORRELATION	
QUATERNARY	Q	UNCONSOLIDATED				
	Qbt	BASALT		40	TUYA Fm	
TERTIARY	Tmd, Tfd Tqv, Tqf	MAFIC AND FELSIC DYKES VEINS				
CRETACEOUS	Kgt	GRANITE			CASSIAR BATHOLITH	
JURA-CRETACEOUS	JKdt	DIORITE				
ALLOCHTHON CARBONIFEROUS	MPds MPmy	DOLOSTONE MYLONITE		100	upper part of SYLVESTER Gp	
	Mat, ch	ANDESITE AND CHERT		100		
DEVONO-MISSISSIPPIAN	uDlMqt, mc	QUARTZITE AND METACONGLOMERATE		350	EARN Gp and lower part of SYLVESTER Gp	
	uDlMph	PHYLLITE (SCHIST, ARGILLITE)				
DEVONIAN	mDls	LIMESTONE		100	McDAME Gp	
SILURO-DEVONIAN	mSDqt mSDls	QUARTZITE LIMESTONE		100	SANDPILE Gp	
CAMBRO-ORDOVICIAN	lЄOph	PHYLLITE		50	KECHIKA Gp	
LOWER CAMBRIAN	lЄds	DOLOSTONE		100	ROSELLA Fm	ATAN GROUP
	lЄls lЄma	LIMESTONE	MARBLE	200		
	lЄls-ph	INTERBEDDED LIMESTONE AND PHYLLITE		250		
	lЄph	PHYLLITE (QUARTZITE)		250	BOYA Fm	
	lЄqt	QUARTZITE		350		

2.37 Schematic summary of lithostratigraphy.

3. STRUCTURAL GEOLOGY

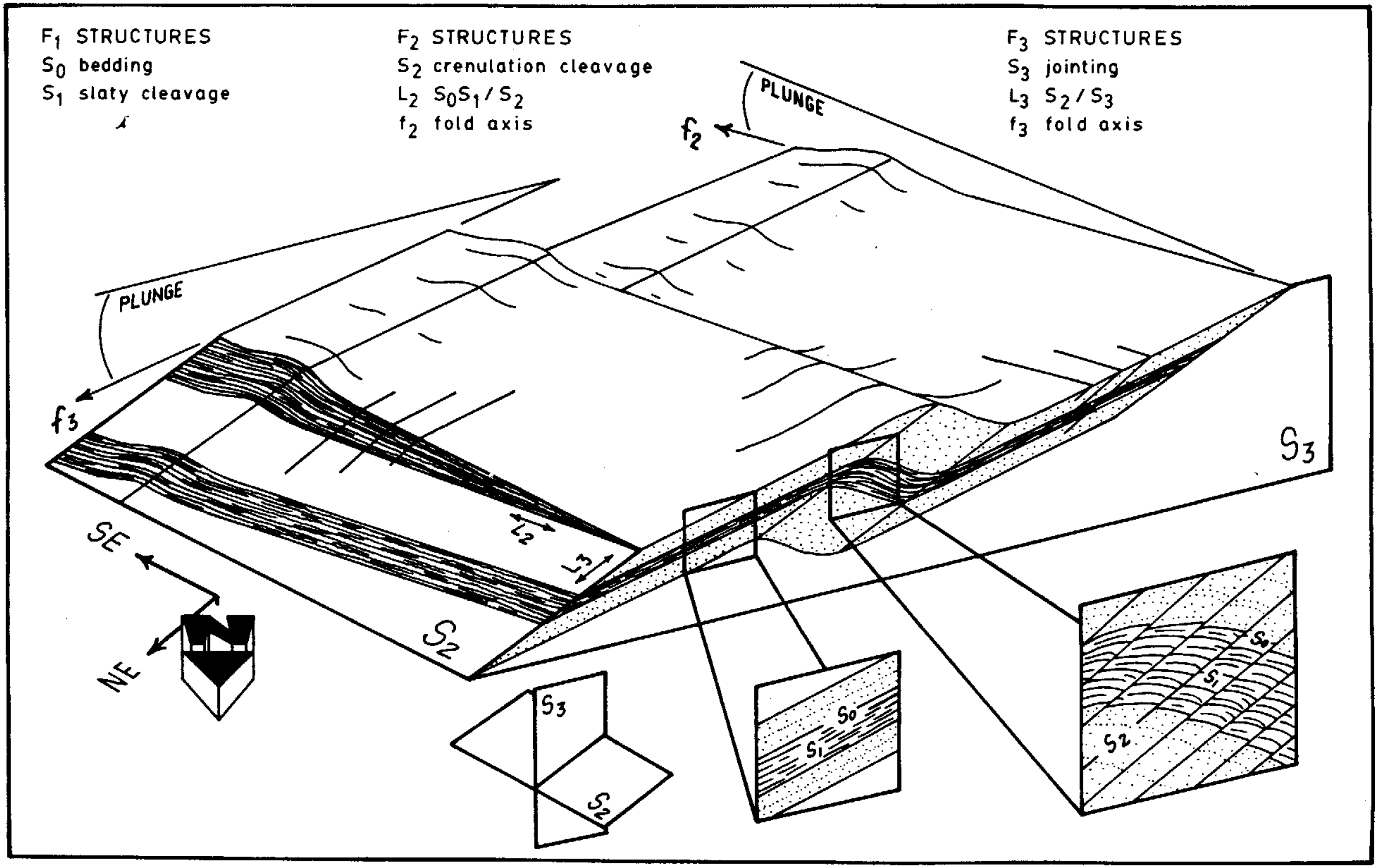
3.1 Introduction

The regional structural trend in the map areas is northwest and similar to that throughout most of the Cordillera. Poole _et al_. (1960) recognized that the dominant structures were an anticlinal area occupied by the Cassiar Batholith (Kgt, Kog) that is flanked on either side by major northwest trending synclines. Lower Paleozoic strata in the southeast corner of Spencer Creek map area (105 B-1) were suggested by Poole _et al_. (1960) to be isoclinally folded, but the repetitive nature of the strata (i.e., alternating bands of quartzite, lCqt and limestone, lCls), together with the absence of certain stratigraphic units (i.e., phyllite, lCph, interbedded limestone and phyllite, lCls-ph and dolostone, lCds), indicates that northeasterly directed imbricate thrust faulting may have occurred. Additional field work is required to substantiate this interpretation.

Three discrete phases of structures are recognized in the Rancheria area (Figure 3.1). The first phase (F_1 structures) includes bedding(S_0) and slaty cleavage(S_1). The second phase (F_2 structures) trend northwest and includes crenulation cleavage(S_2) and associated lineations(L_2) and folds(f_2). The third phase (F_3 structures) are 90° to F_2 and trend northeast. It includes jointing(S_3) and associated lineations(L_3) and folds(f_3). The three phases of structures are best displayed by the Lower Cambrian interbedded limestone and phyllite (lCls-ph) subunit.

3.2 F_1 Structures

The modal bedding(S_0) strikes 330° and dips 15° east



3.1 Schematic diagram summarizing the three phases of structures identified in the Rancheria area.

(Figure 3.2) and parallels the regional structural trend of the Cordillera. Slaty cleavage(S_1) generally parallels bedding (Figure 3.3) and has a similar trend.

3.3 F_2 Structures

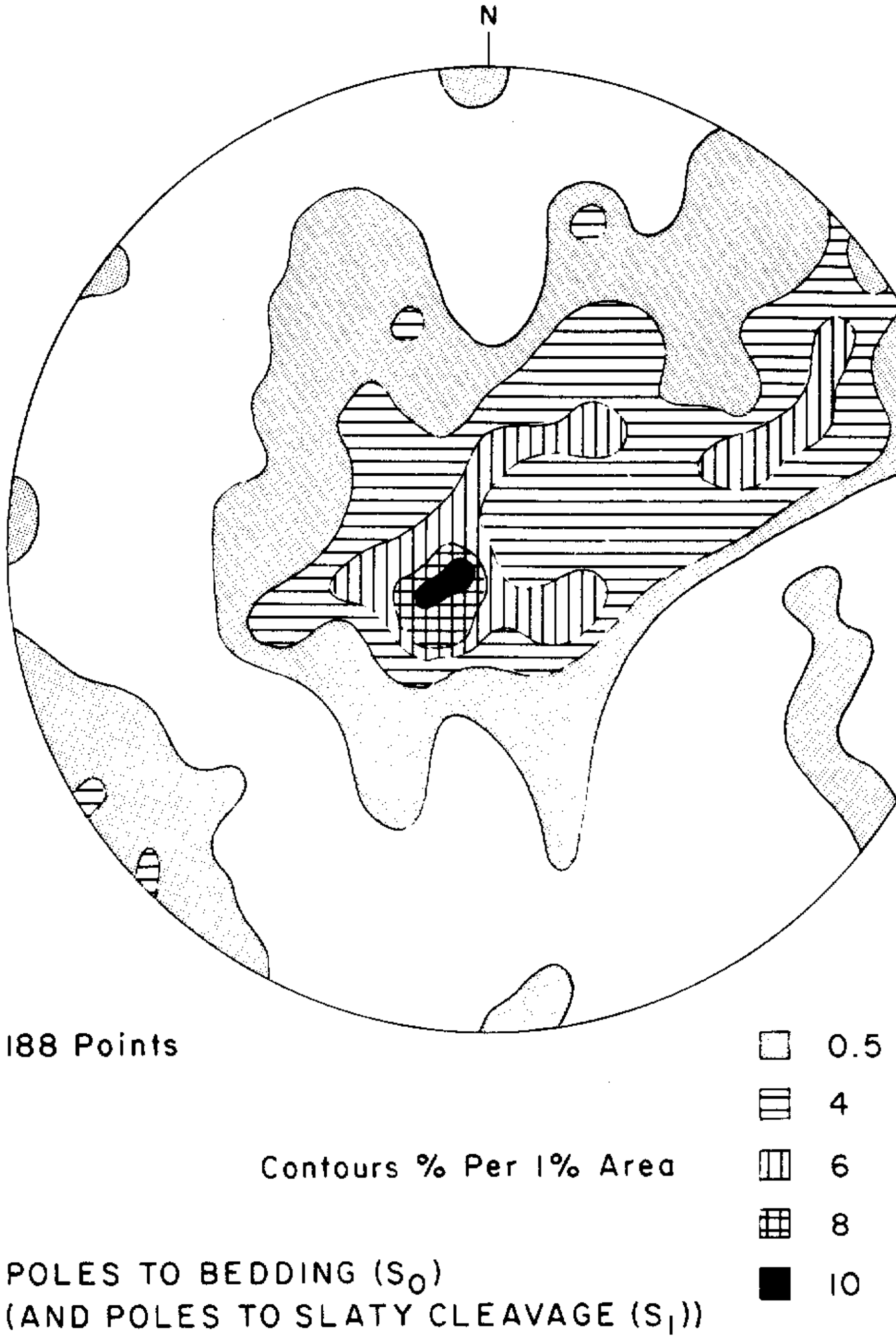
A 1 to 2 cm, uniformly spaced crenulation cleavage(S_2) cuts the bedding and slaty cleavage (Figure 3.4). The modal crenulation cleavage strikes 335° and dips 40° east (Figure 3.5). Intersecting planes of crenulation cleavage (S_2) and bedding/slaty cleavage(S_0/S_1) forms a lineation (L_2). Folds associated with F_2 structures include: small scale, inclined to overfolded, closed to tight folds (Figure 3.6); intermediate scale, inclined to overfold, closed to tight folds (Figure 3.7); and large scale, upright gentle folds (Figure 3.8). A rare example of a refolded fold was observed at one outcrop (Figure 3.9). Most folds tend to verge to the southwest. The modal fold axes and lineations (L_2) trend 155° and plunge 20° southeast (Figure 3.10).

3.4 F_3 Structures

A 10 to 100 cm, non-uniformly spaced jointing(S_3) cuts the F_2 structures (Figure 3.11). The modal joints strike 240° and dip 85° north (Figure 3.12). The intersection of the jointing(S_3) and the crenulation cleavage(S_2) forms a lineation (L_3). Several small scale folds (f_3) are associated with the jointing and the modal fold axes and lineations trend 070° and plunge 50° northeast (Figure 3.13).

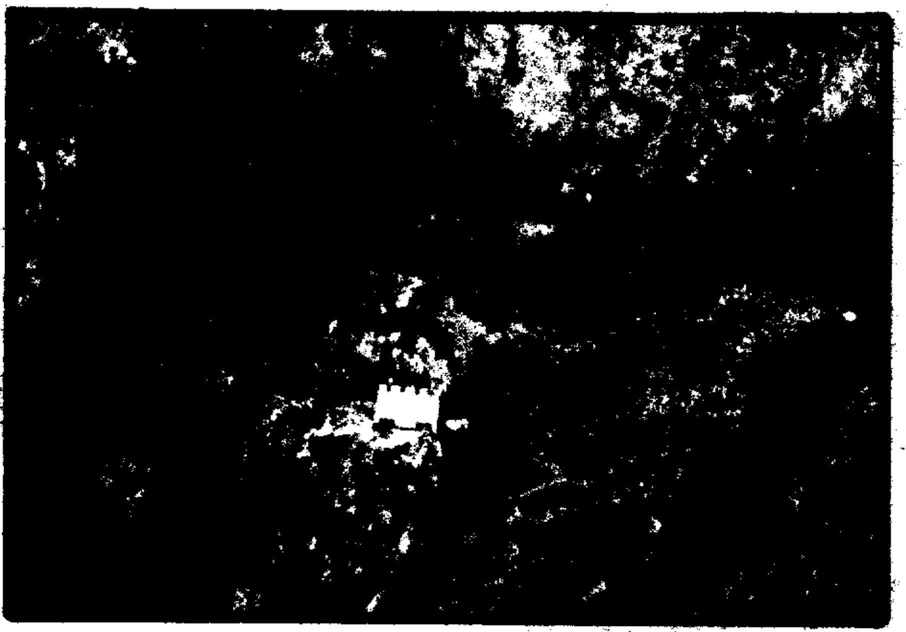
3.5 Dykes and Veins

The modal strike and dip of mafic dykes, felsic dykes and veins, including mineralized veins and lenses, is 255° and 85° north (Figure 3.14). They all closely parallel the

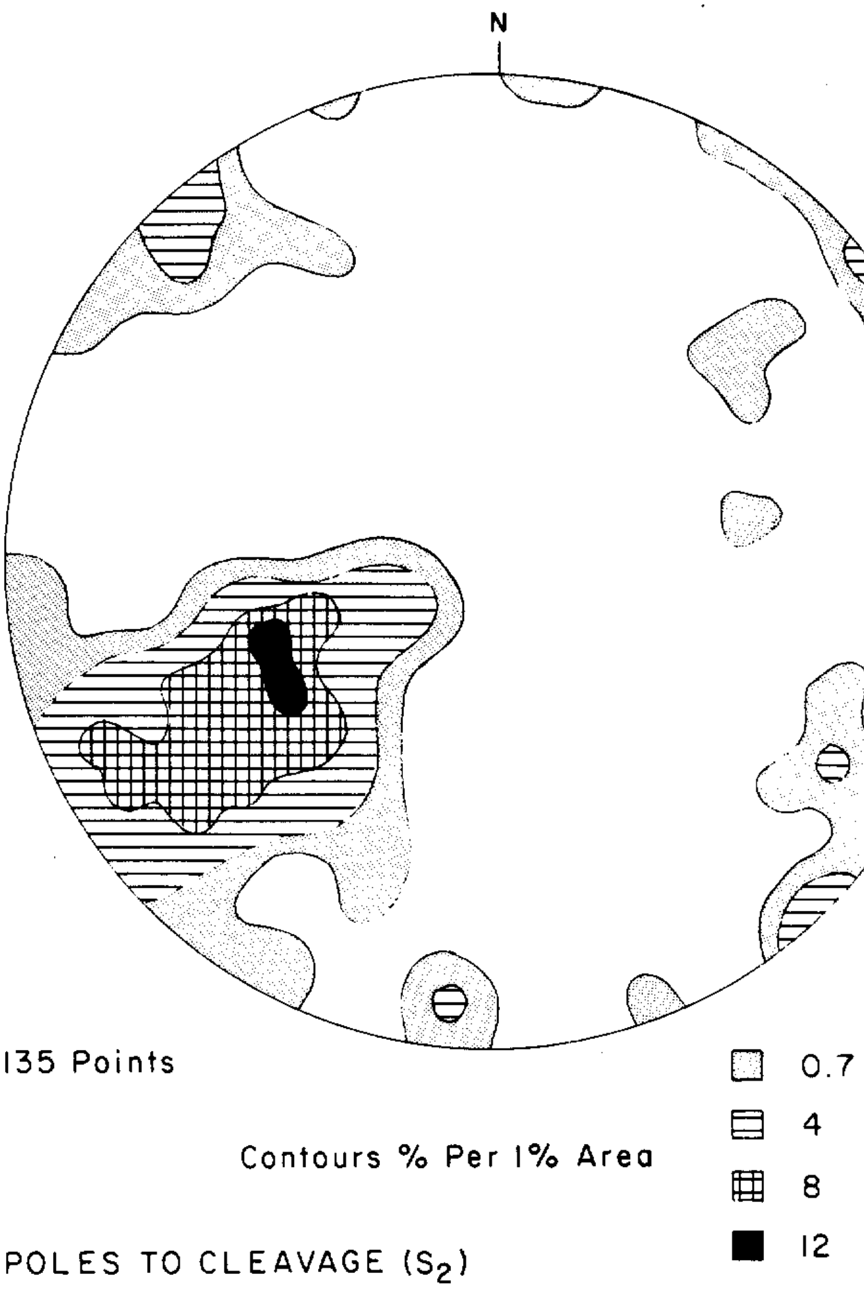


3.2 Stereonet plot of poles to bedding (S_0) and slaty cleavage (S_1).

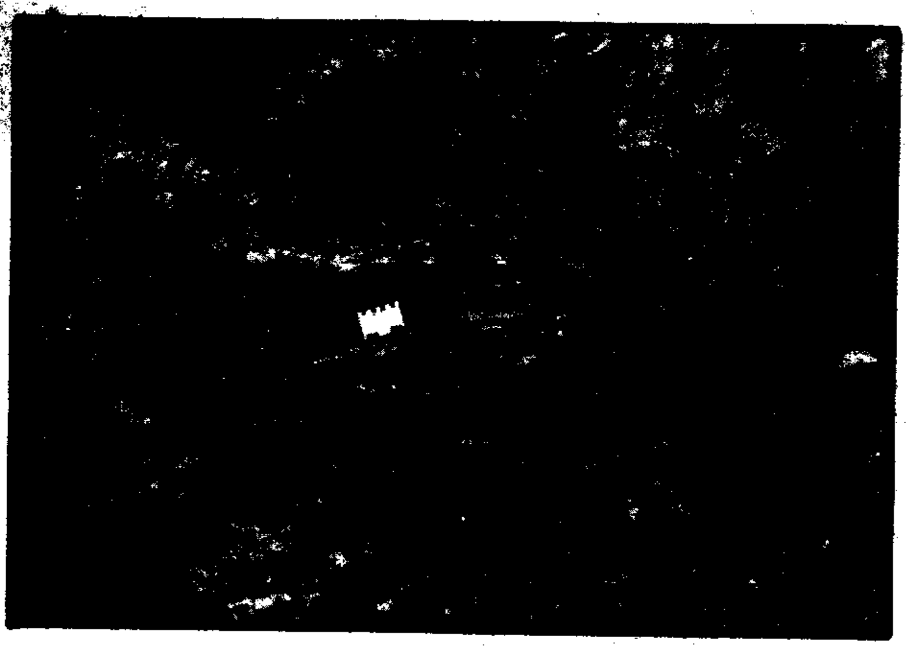
3.3 Not available.



3.4 Crenulation cleavage (S_2) intersecting bedding and slatey cleavage.

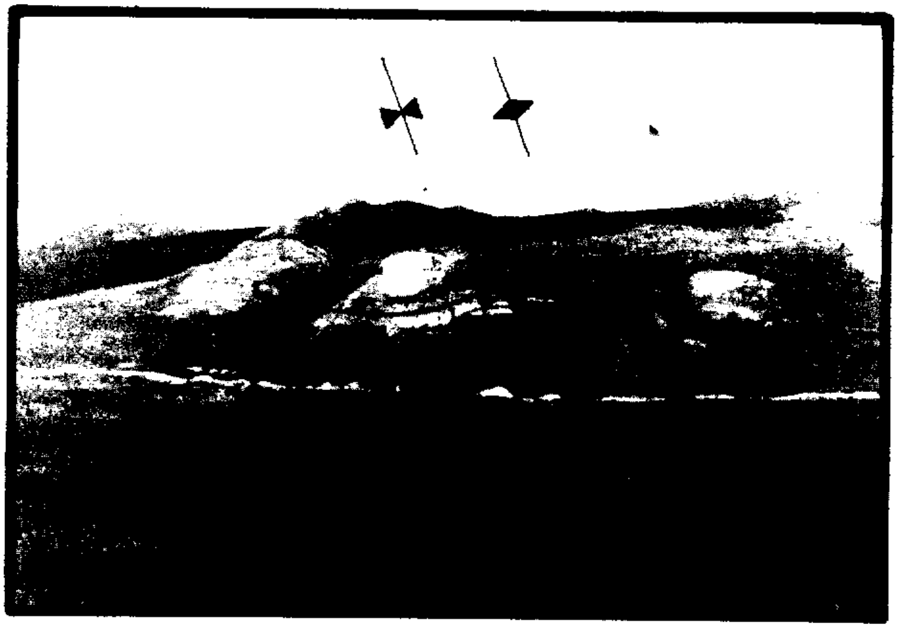


3.5 Stereonet plot of poles to crenulation cleavage (S_2).

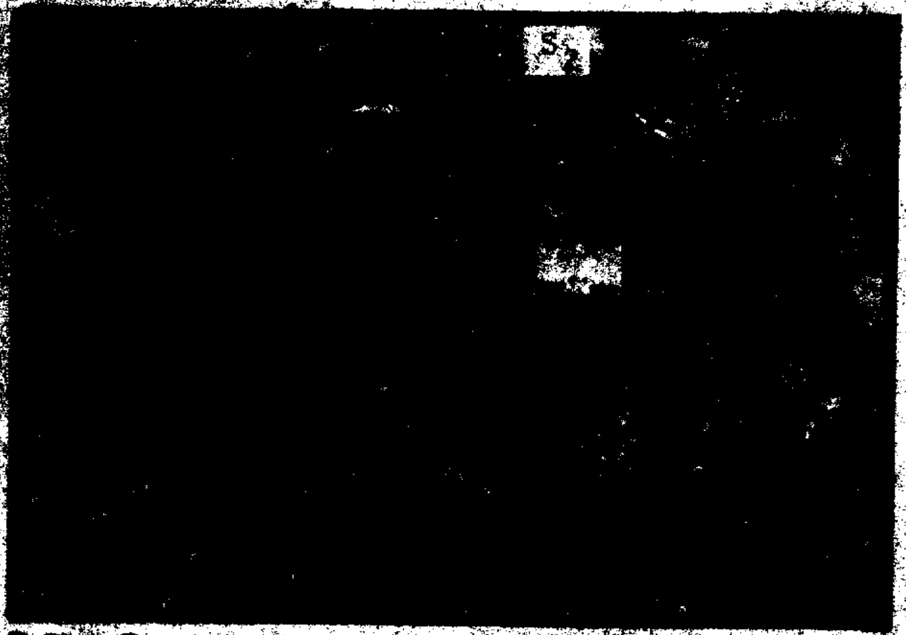


3.6 Small-scale, overfolded tight fold.

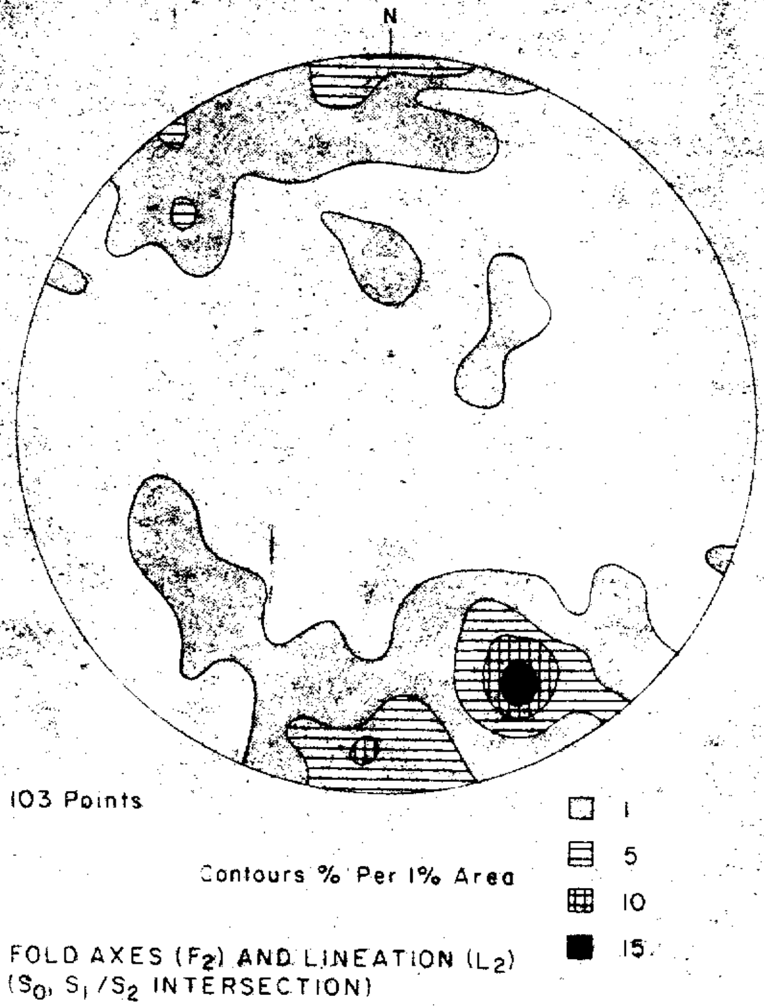
3.7 Intermediate-scale, inclined closed fold.



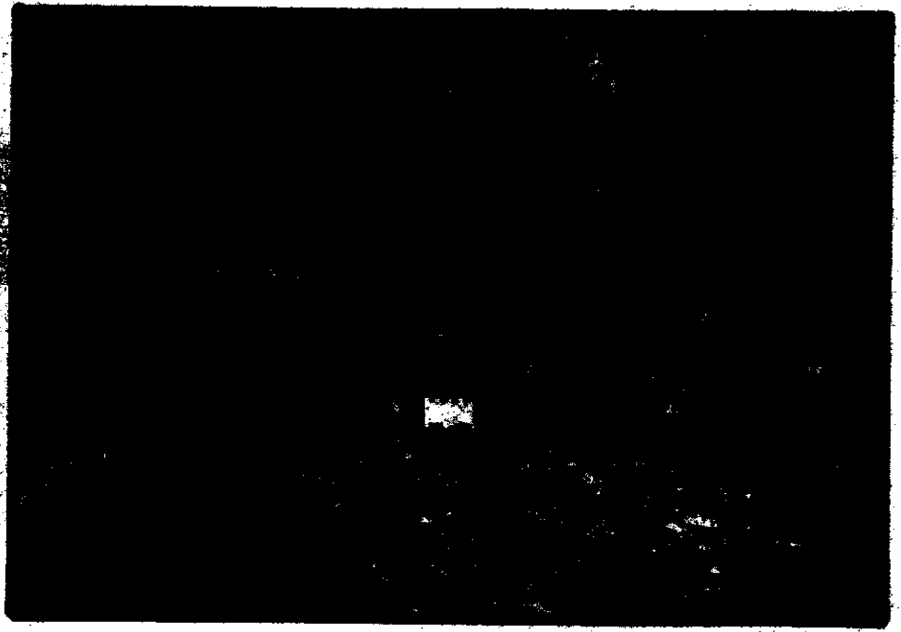
3.8 Large-scale, upright open fold (syncline-anticline pair).



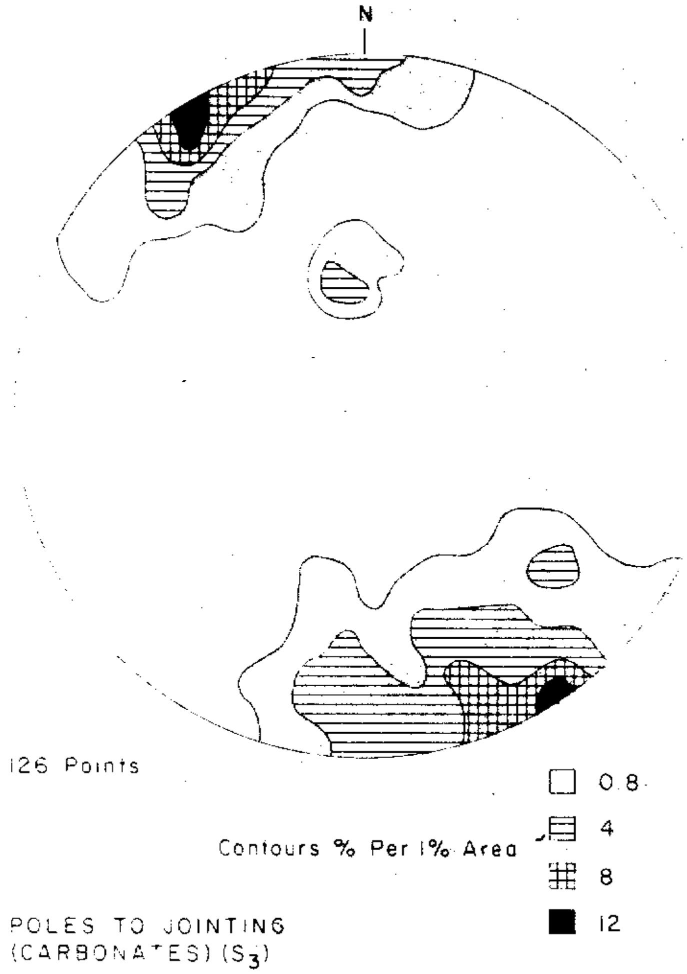
3.9 Re-folded fold.



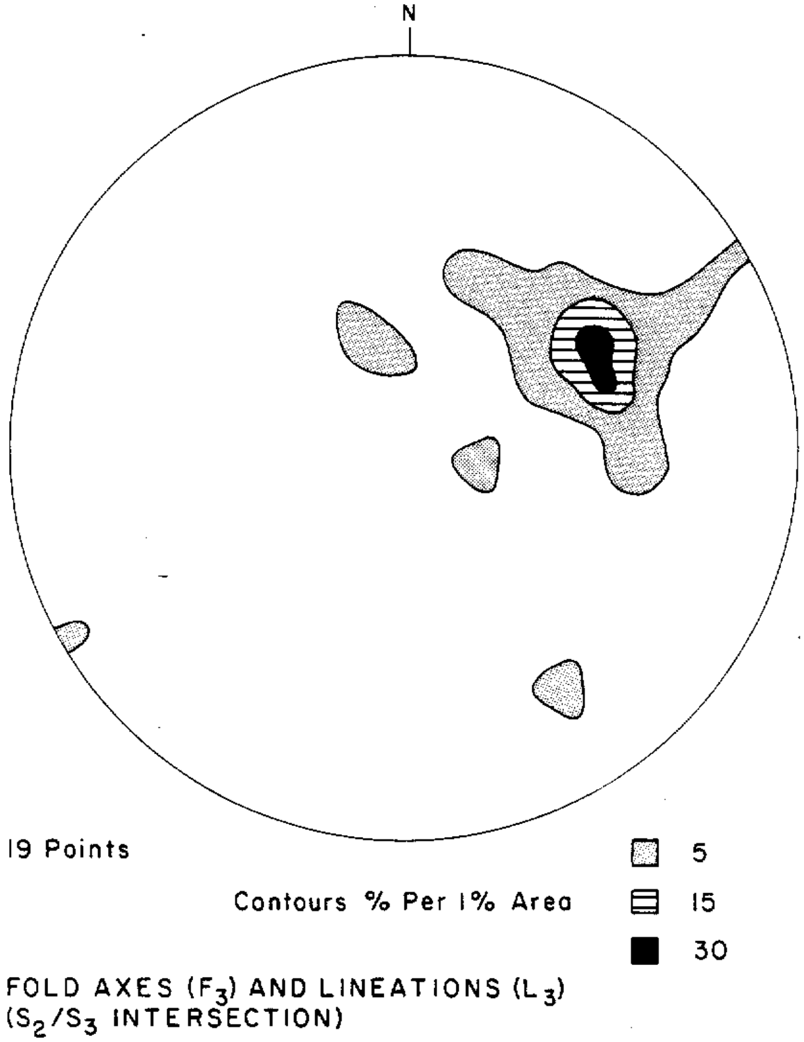
3.10 Stereonet plot of fold axes (f_2) and related lineations (L_2).



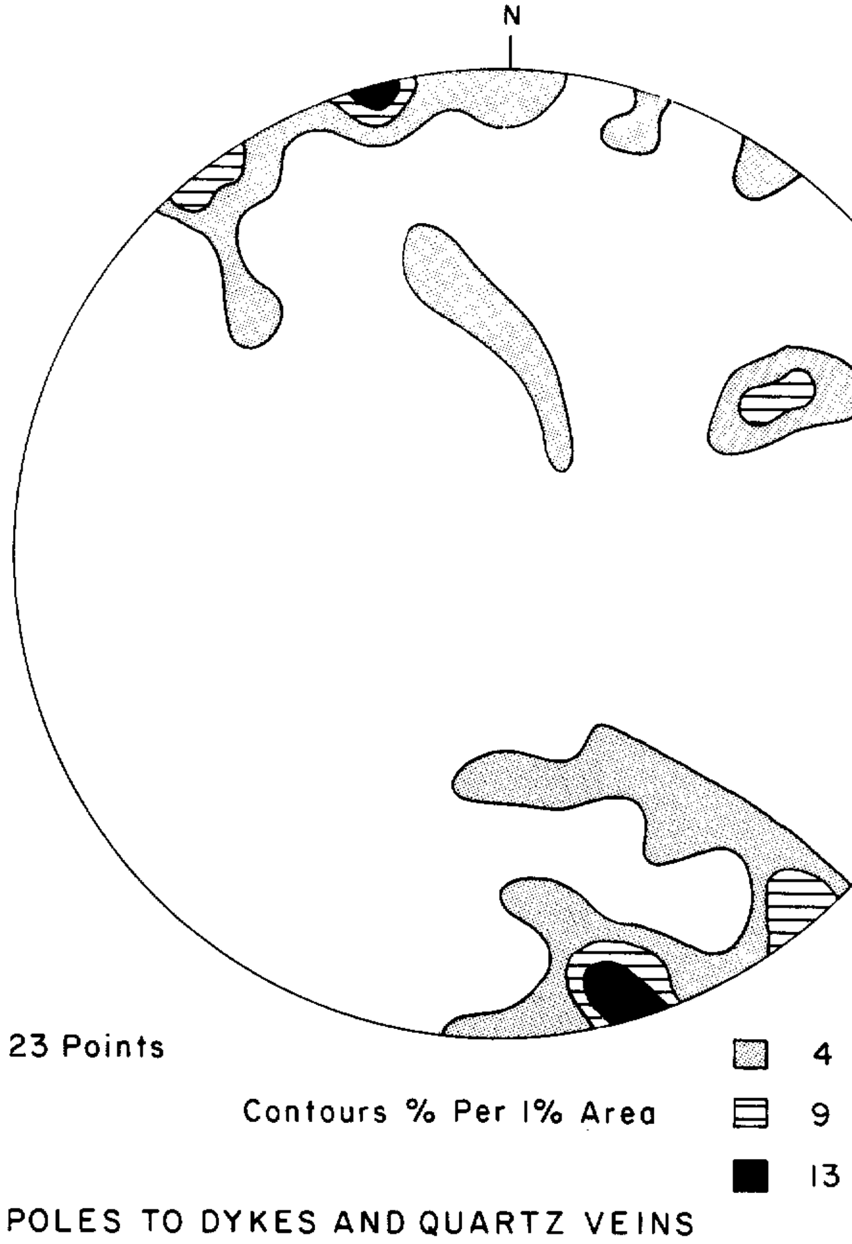
3.11 Jointing (S_3) in Paleozoic sediments.



3.12 Stereonet plot of poles to jointing (S_3).



3.13 Stereonet plot of fold axes and related lineations (L_3).



3.14 Stereonet plot of poles to dykes and veins, including mineralized veins and replacement lenses.

S_3 direction and were probably preferentially emplaced along the joints.

3.6 Jointing in Granite

The prominent joint direction in granite (Figure 3.15) strikes 264° and dips 85° north (Figure 3.16), parallel to the S_3 jointing in the Paleozoic sedimentary rocks. A less well developed jointing (conjugate?) strikes 351° and is vertical.

3.7 Summary of Measured Structures

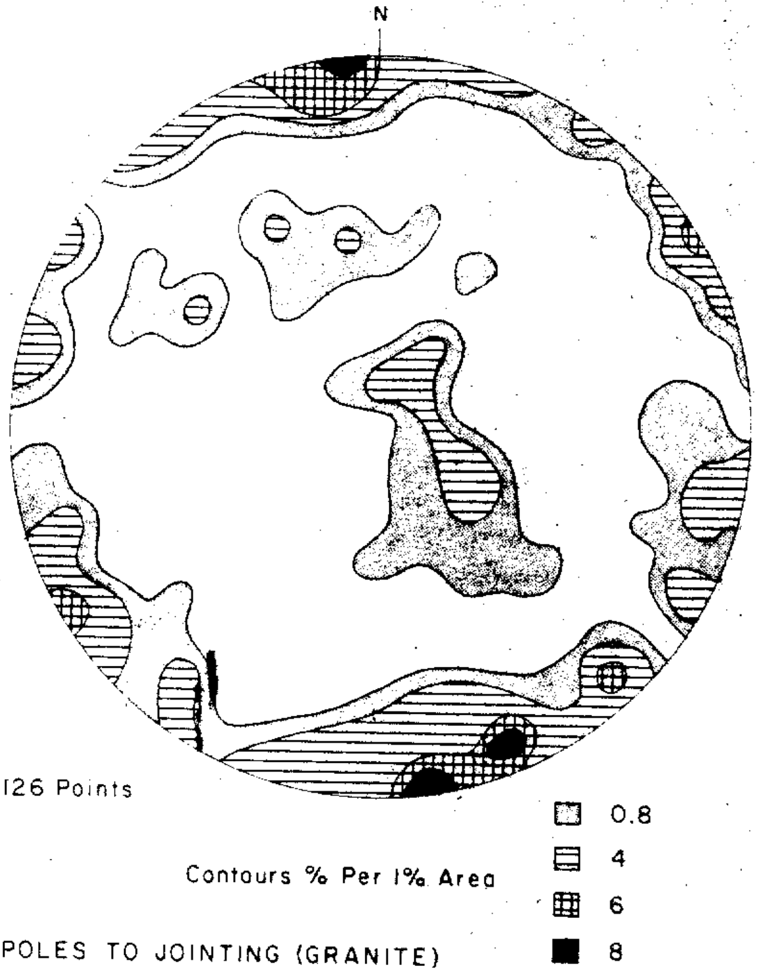
Figure 3.17 presents a modal summary of measured structural data.

3.8 Faults

Two major, northwest trending dextral transcurrent faults occur in the map areas. The Kechika Fault occurs in map area 105B-1, where it juxtaposes Lower Paleozoic and Upper Paleozoic strata. Gabrielse (1985) suggested that more than 170 km of movement took place along this fault during Late Cretaceous to Oligocene time. However, the Kechika Fault has not been traced successfully north of the map area and appears to terminate in a valley of a tributary stream of Spencer Creek.

The Cassiar Fault occurs in the southwest corner of map area 105B-2. It juxtaposes a 2 to 3 km wide zone of sheared and tectonized plutonic rocks (Kog) and Carboniferous metamorphic rocks (MPqt, MPmy). Stretching lineations in mylonite indicate predominantly transcurrent movement (Gabrielse, 1969, 1985), but evidence of northeasterly directed thrusting (Gabrielse, 1969) and vertical movement (Poole, 1956) are also present. Correlation of strata across the Cassiar Fault has not been

3.15 Jointing in granite (Kgt).



3.16 Stereonet plot of poles to jointing in granite (Kgt).

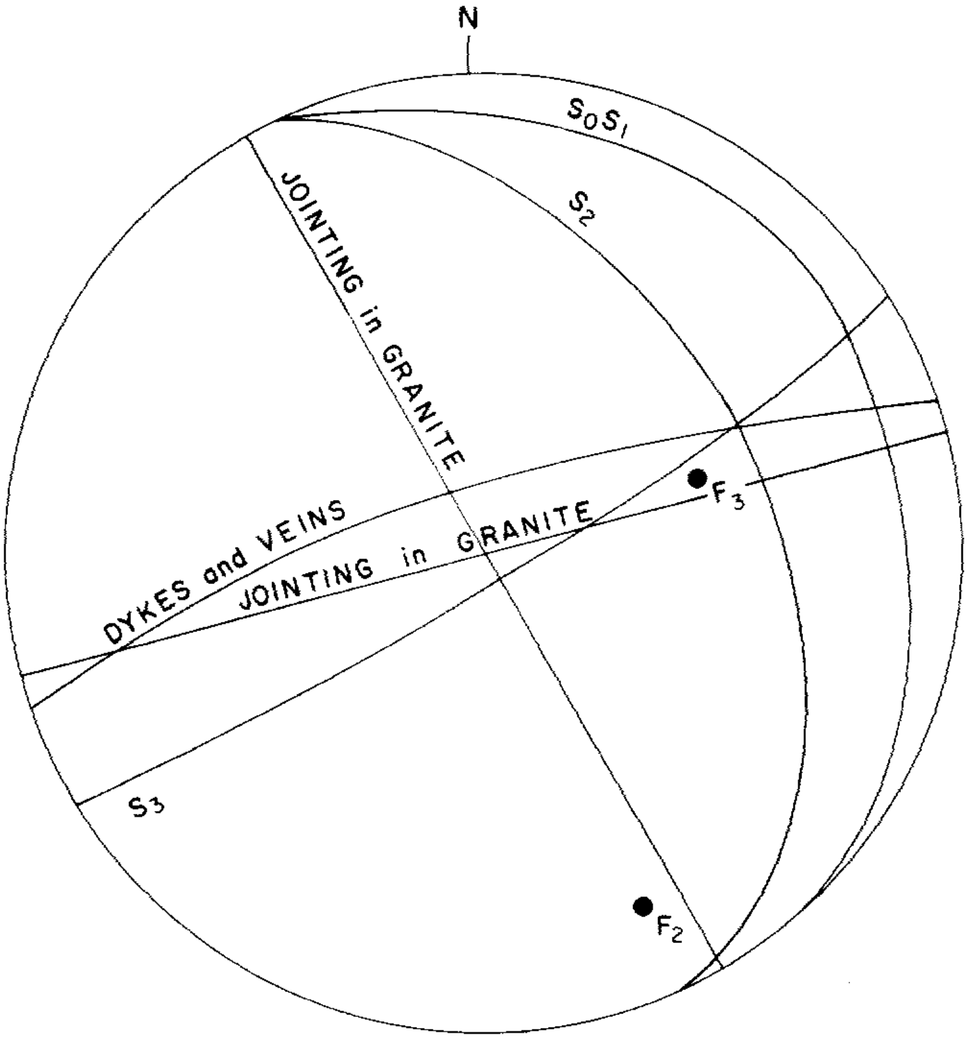
made and the amount of displacement is unknown (Gabrielse, 1985), although movement postdates emplacement of the Cassiar Batholith and probably occurred during the Late Cretaceous.

Thrust faults are less common in the map area. Mississippian andesite and chert (Mat,ch) are preserved in klippen in Spencer Creek map area (105 B-1) and represent the northwest extension of the Sylvester Allochthon (c.f., Harms, 1985). A northeast directed thrust fault is interpreted west of Daughney Lake where allochthonous Carboniferous rocks are exposed southwest of autochthonous Lower Paleozoic strata.

3.9 Origin and Age of Structures

Slaty cleavage that is approximately parallel with bedding (i.e., S_1 parallel to S_0) is often referred to as "bedding cleavage" and may be attributed to: (1) isoclinal folding; (2) strain parallel to bedding; (3) load metamorphism; and (4) mimetic recrystallization (Billings, 1972). There is no field evidence of widespread isoclinal folding or flow parallel to bedding and load metamorphism does not appear to have been capable of producing bedding cleavage (Billings, 1972). The slaty cleavage probably formed as a result of mimetic recrystallization during late stage diagenesis.

Phase 2 or F_2 structures are widespread throughout the map areas and parallel regional structural trends in the Cordillera. They predate emplacement of the Cassiar Batholith. F_2 structures are attributed to predominantly northeast-southwest compression that was related to accretion and obduction of allochthonous rocks during arc-continent collision in Late Jurassic-Early Cretaceous time.

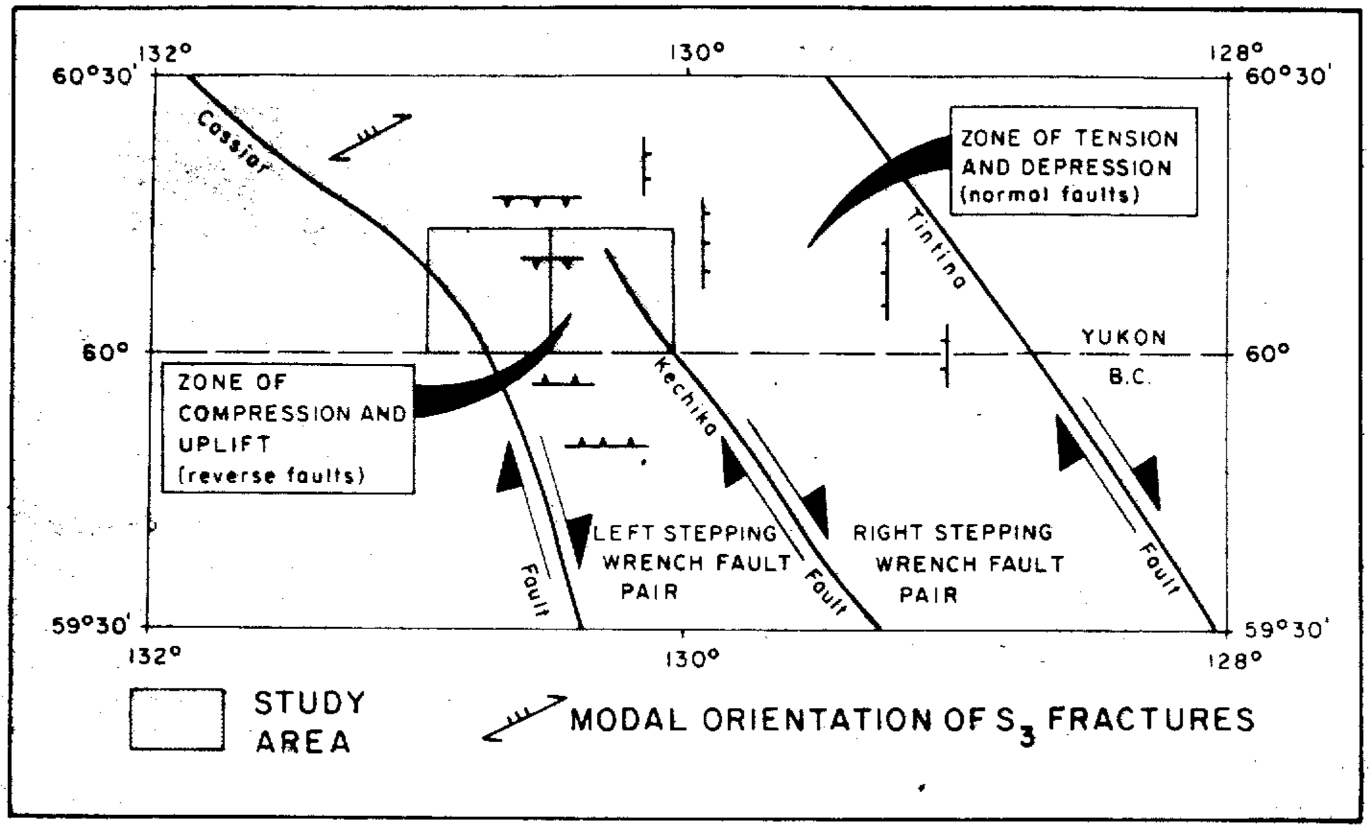


MODAL SUMMARY OF STRUCTURAL DATA

3.17 Summary of measured structural data, modal orientations.

Phase 3 or F_3 structures, primarily jointing (S_3), were suggested by Abbott (1984) to be related to the formation of Reidel shears during wrench faulting (i.e., movement on Tintina, Kechika and Cassiar faults). However, the orientation of Reidel shears predicted by theory and from modeled experiments (Tchalenko, 1970; Wilcox et al., 1970; Harding, 1974) do not coincide with the S_3 jointing direction. In addition, the diagram presented by Abbott (1984) displaying shear forces, a strain ellipse and various composite structures related to wrenching, only applies to simple shear involving a single transcurrent fault (see diagrams in Tchalenko, 1970; Wilcox et al., 1970; Harding, 1974; and particularly Sylvester and Smith, 1976). Penecontemporaneous movement on at least three major transcurrent faults (c.f., Tintina, Kechika and Cassiar) influenced deformation of strata in the Rancheria area.

An alternative interpretation for the S_3 jointing is provided by Rodgers (1980). He mathematically analyzed en echelon wrench faults and discovered that a left stepping, dextral wrench fault pair produces a zone of compression and uplift between the two faults, leading to the development of small scale reverse faults oriented at 25 to 40° to the two major faults. It was previously noted that the Kechika Fault terminates in Spencer Creek map area (105 B-1). The Kechika Fault, together with the Cassiar Fault, represents a left-stepping, dextral wrench fault system (Figure 3.18). Reverse faults predicted by Rodger's (1980) experiment closely parallels the S_3 joint direction. Generally, the relative movement on the S_3 joints is difficult to discern in the field, but evidence for reverse faulting was observed at one outcrop (Figure 3.19). The Tintina and Kechika Faults represent a right stepping, wrench fault pair and small-scale, north trending extension faults would develop between the major faults.



3.18 Left- and right-stepping wrench fault pairs.

3.19 small-scale reverse fault movement on jointing (S_3), indicating zone of compression and uplift.

Regardless of the actual mechanism forming the S_3 jointing, approximately 50 Ma old dykes and quartz veins were preferentially emplaced along these surfaces. In addition, mineralized veins and lenses were also likely preferentially emplaced along the S_3 joints. The only apparent regional phenomenon that took place approximately 50 Ma ago and capable of explaining the penecontemporaneous formation of joints and emplacement of dykes, veins and mineralization, were the nearly synchronous movements on Tintina, Kechika and Cassiar Faults.

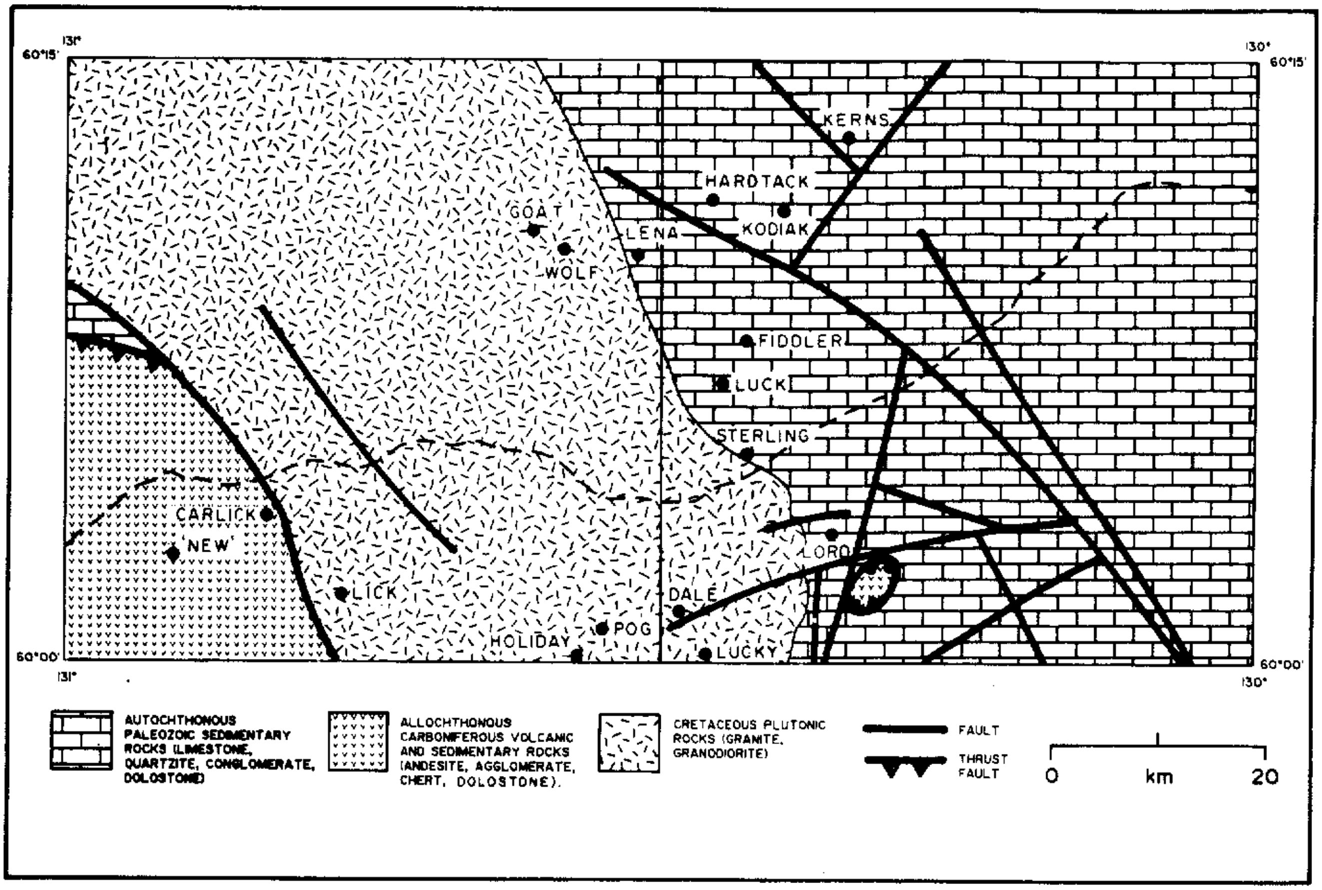
4. ECONOMIC GEOLOGY

4.1 Introduction

Numerous silver-lead-zinc mineral occurrences lie within Spencer Creek (105 B-1) and Daughney Lake (105 B-2) map areas of the Rancheria district (Figure 4.1). These mineral occurrences include argentiferous galena and sphalerite-bearing quartz veins in granite (Kgt) of the Cassiar Batholith; silver-rich galena-sphalerite-bearing quartz and carbonate veins and replacement deposits in Lower Cambrian sediments; wolframite-bearing quartz veins in Lower Cambrian sediments; galena-sphalerite-bearing quartz veins in Carboniferous mylonite and quartzite; and tungsten-bearing skarns in roof pendants within the Cassiar Batholith. The characteristics of these deposits are summarized in Table 4.2 and a detailed description of each property is presented in sections 4.7 and 4.8

The majority of mineral occurrences in the district exhibit similar characteristics which suggest a common genesis. Mineralization appears to be structurally controlled by east-west jointing and faulting (S_3), that is attributed to Late Cretaceous and Early Tertiary dextral movement on large transcurrent faults such as the Tintina, Kechika and Cassiar Faults. Fault breccias and mafic and felsic dykes of Tertiary age parallel mineralized trends.

Mineralogy and structural and lithologic controls on mineralization in the Rancheria area is similar to that in the Keno Hill-Galena Hill area, Yukon. A proposed model for mineralization is discussed in section 4.5.



4.1 Location of major mineral occurrences in the Rancheria district.

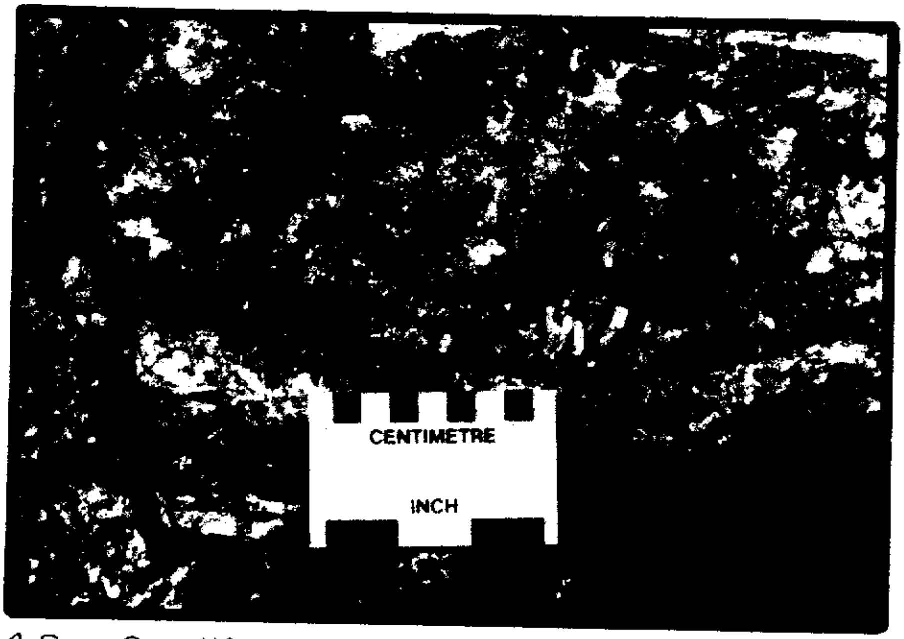
4.2 Mineralogy and Ore Textures

Galena, sphalerite, pyrite and chalcopyrite form the dominant sulphide assemblages. Arsenopyrite, freibergite, tetrahedrite and pyrrhotite may also be present. Quartz and siderite are the dominant gangue minerals. Wolframite, cassiterite, stannite and fluorite occur at the Fiddler; and scheelite occurs at the Fiddler, Luck, Goat, Hot and Kerns. Gold assays of 15.26 g/t were obtained over a drill intersection of 3.35 m at the YP (Butler Mountain).

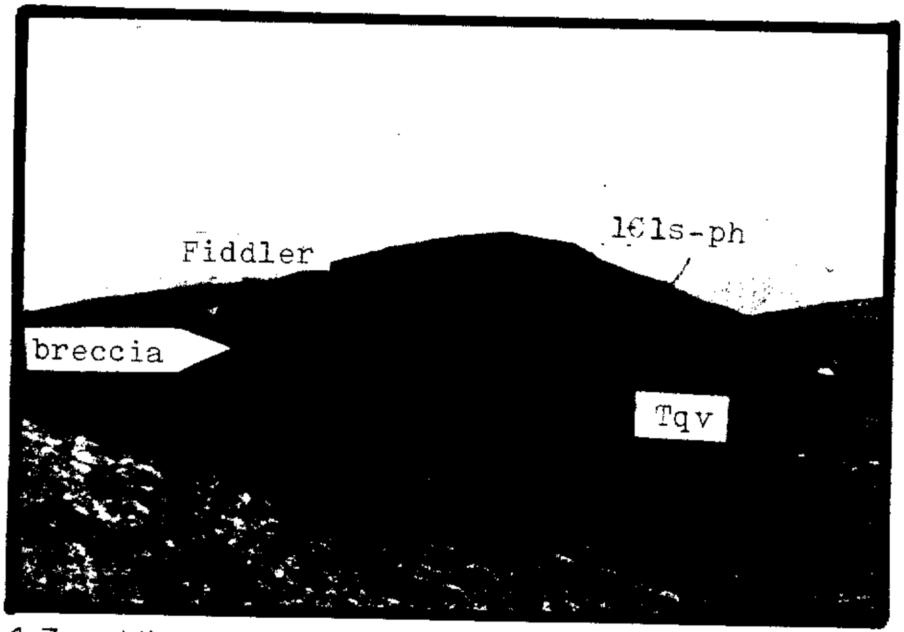
4.2.1 Argentiferous Galena - Sphalerite Bearing Quartz Veins in Granite

Quartz is the dominant gangue in granitic-hosted veins. Sulphides may be erratically distributed or exhibit crustiform banding.

Mineralization at the Pog consists of alternating bands of sphalerite-siderite-pyrite-quartz-galena (Figure 4.2) with later pyrite and quartz occurring in vugs and fractures. Crustiform banding is indicative of mineral deposition inwards from open fracture walls. The vein-wallrock contact is sharp, suggesting that the veins are fissure fillings. Manganese oxides commonly stain weathered surfaces. Alteration envelopes (up to 30 m wide at the Holliday) commonly surround the veins. Sericite alteration is prevalent directly around the veins and mafic minerals are altered to chlorite. A wider envelope of argillic alteration in which feldspars are altered to clay surrounds the veins. Barite occurs in quartz gangue at the Holliday; micaceous minerals such as sericite or chlorite may also occur in quartz.



4.2 Crustiform banded mineralization at the Pog.



4.3 View looking west at the fiddler; Northeast striking wolframite-bearing quartz veins are exposed in trenches on ridge.

4.2.2 Wolframite - Scheelite Bearing Quartz Veins in Sediments

Wolframite-bearing quartz veins occur in interbedded calcareous phyllite and limestone of Lower Cambrian age at the Fiddler (Figure 4.3). A series of en echelon quartz veins contains irregular concentrations of wolframite, galena, scheelite and minor amounts of cassiterite, stannite, sphalerite, chalcopyrite and pyrite.

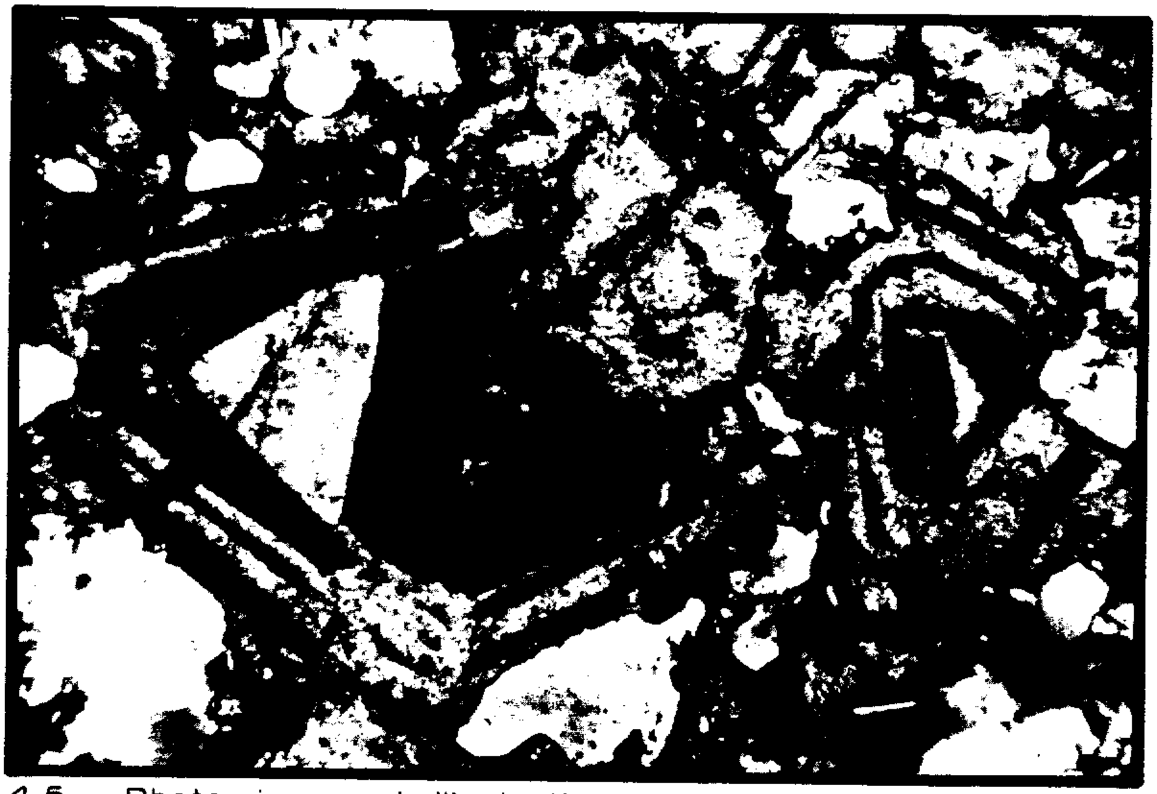
Quartz veins are coarse-grained and range from massive to comb structured. Green fluorite occurs as an accessory mineral. In places, quartz veins contain large amounts of yellow feldspar. Feldspar occurs as euhedral crystals intergrown with quartz and along fracture planes. The main vein is rimmed by a 1 cm wide border of light green mica that was identified as lepidolite by x-ray diffraction. Contact with the country rock is sharp.

A scheelite-bearing quartz breccia occurs 300 m east of the wolframite-bearing quartz veins and parallels their strike. The breccia consists of angular clasts of calcareous phyllite in a quartz-chalcedony matrix (Figure 4.4). The breccia contains up to 30% angular fragments of calcareous phyllite which may be unaltered or highly silicified. The quartz-chalcedony matrix exhibits colloform growth rings. Minor green fluorite and white calcite occur in the matrix. Scheelite is disseminated in the matrix, and in areas of highest tungsten grade, phyllite fragments are silicified and altered with scheelite concentrated around the relict fragments (Harris, 1971). The contact between the breccia and the surrounding country rock may be sharp or gradational through a quartz stockwork zone.

4.2.3 Carbonate Veins and Replacement Lenses in Sediments

Other sediment-hosted mineral occurrences such as the Kodiak, Sterling and Luck deposits consist of fault and fracture controlled replacement lenses and carbonate veins in Lower Cambrian limestone and calcareous phyllite.

4.4 Quartz-phyllite breccia at the Fiddler.



4.5 Photomicrograph illustrating growth zoning in sphalerite from the Luck (A+B); the actual width of the slide is 1.5mm.

Galena, sphalerite and pyrite are the most common sulphide minerals and siderite is the predominant gangue.

At the Kodiak, massive pods of galena occur in an orange-weathering siderite gangue. Siderite predominates and contains vug fillings of pyrite and galena. Primary minerals are difficult to identify because the sulphides are oxidized to black and rust coloured wad.

Galena, sphalerite and pyrite occur disseminated or as lenses in the host rock or in narrow carbonate veinlets at the Luck (A + B); scheelite occurs disseminated in one of the calcite veins (Harris, 1971). The host rocks are interbedded limestone and phyllite of Lower Cambrian age. Black and rust coloured oxides coat fracture planes and the mineralized outcrop is highly fractured. Sphalerite exhibits growth zoning when viewed microscopically with a doubly polished thin section (Figure 4.5). Growth zoning is indicative of unobstructed growth in a fluid-filled void. The groundmass is a fine-grained brown carbonate, which is probably siderite.

Mineralization at the Sterling consists of coarse-grained pyrite, galena and sphalerite in a matrix of coarse-to-fine-grained dolomite and strained quartz. Pyrite exhibits growth zoning and minor chalcopyrite was observed in microscopic sections. Mineralization occurs in irregular pods and lenses and disseminated in narrow fracture zones.

4.2.4 Iron and Manganese Gossans

Samples of black oxides from the Kerns and Hardtack showings were identified as goethite by x-ray diffraction. Limonite, hematite, pyrolusite, psilomelane and hemimorphite were reported at other mineralized showings in the Rancheria district (Abbott, 1984).

4.3 Geochemistry

Table 4.1 illustrates major and trace element variation for mineralization and major rock types in the Rancheria district.

1. Mafic and felsic dykes are characterized by relatively high barium, strontium and manganese; high concentrations of these elements are typical of extensional tectonic regimes. Mafic dykes contain higher iron and an apparent positive correlation exists between iron and manganese. Felsic dykes contain higher concentrations of La than mafic dykes. Tin is anomalous in Sample 7.1; data is insufficient to determine whether felsic dykes are typified by a higher tin content. Concentration of elements such as lead and zinc may be affected by proximity to mineralization.

2. Granitic rocks contain higher cerium values than mafic and felsic dykes; granite also contains relatively high Pb values.

3. Tungsten exhibits no significant variation among major rock types.

4. Silver exhibits no significant variation among major rock types.

5. Siliciclastic rocks such as phyllite contain the highest zinc values of non-mineralized samples and constitute a potential source for this element.

6. Mineralized samples are generally enriched in manganese.

7. A weak correlation exists between silver and arsenic indicating the former occurs in sulphosalts such as tetrahedrite and freibergite.

8. Highest values of bismuth occur at the Fiddler where bismuthinite is reported and in silver-lead-zinc mineralization at the Pog (samples 131-8, 131-9).

9. Cadmium correlates positively with zinc and probably substitutes for zinc within the sphalerite lattice.

10. Antimony correlates positively with arsenic, indicating their occurrence as the sulphosalts tennantite-tetrahedrite.

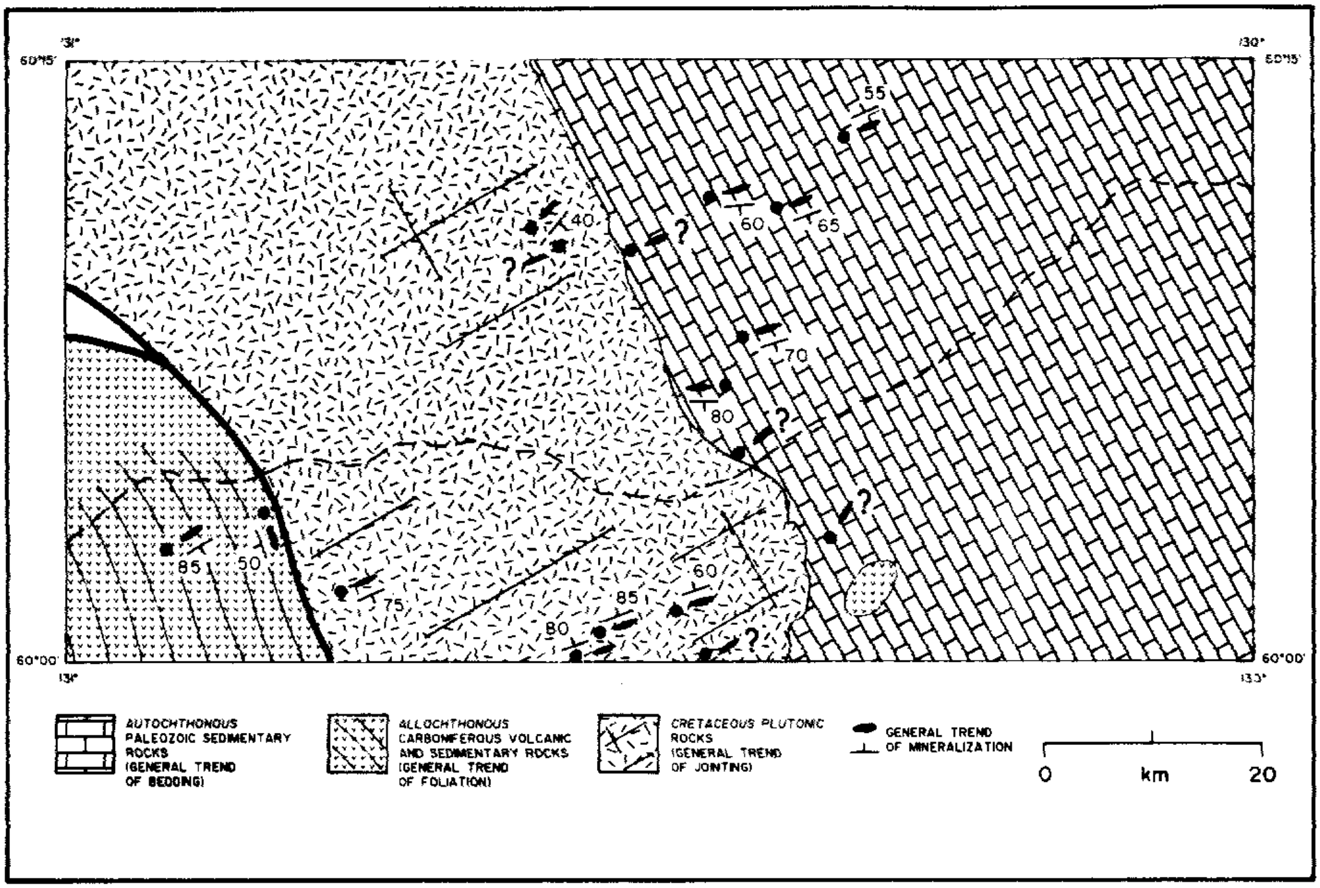
11. Silver-lead-zinc mineralization may also contain significant quantities of tin and tungsten.

4.4 Controls on Mineralization

4.4.1 Structural and Lithologic Controls

Figure 4.6 illustrates the dominant trends of mineralization in the Rancheria district. Veins and most replacement deposits occur in east-west trending fracture and shear zones with steep northerly or southerly dips. Mineralized trends parallel the S_3 joint direction which is pervasive in both granite and sediments; S_3 jointing represents the latest phase of deformation in the Rancheria district.

The Dale, Holliday and Pog deposits appear to be spacially and genetically related to an east-west trending fault zone which displaces the Cassiar Batholith along its eastern margin (see Figure 4.1). East-west trending joints and

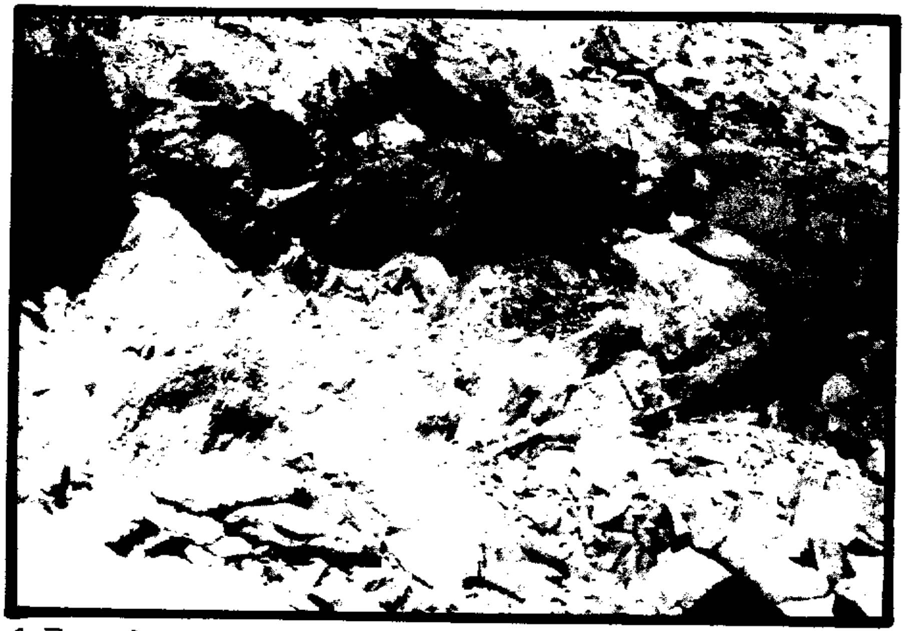


4.6 Dominant trends of mineralization in the Rancheria district: mineralization is structurally controlled and follows steeply dipping N-E and E-W trending faults and fracture zones.

fractures which parallel veins are well-developed in granite at these showings. The Pit Vein on the Holliday claims exhibits gently plunging slickensides on granite near the vein contact (DIAND, 1984, p. 142). Mafic dykes parallel mineralization at the Dale (Figure 4.7) and Holliday showings, and occur in similarly trending fractures at the Pog. Argentiferous-galena-sphalerite-bearing quartz veins at the Luck (Freer) also parallel shear zones and fractures in granite which strike 085°to -090° and dip steeply south. All of the mineralized occurrences in granite are fault or fracture controlled and formed after consolidation of the Cassiar Batholith.

Sediment-hosted deposits exhibit similar attitudes to those in granite and also appear to be fault and fracture controlled. Breccias are associated with mineralization at the YP (Butler), Sterling and Fiddler properties. The origin of the breccias is uncertain but they appear to be fault-related.

At the Fiddler property, a scheelite-bearing quartz-phyllite breccia is exposed for a strike length of 600 m and width of up to 40 m. The breccia strikes 060° and dips steeply to the south paralleling the strike of nearby wolframite-bearing quartz veins. The contact between the breccia and the surrounding country rock may be sharp or gradational through a quartz stockwork zone up to 25 m wide; the southern contact is a fault zone of sheared phyllite and quartz veins (Harris, 1971). Clasts appear to be locally derived suggesting that fragmentation was the result of fault movement. Wolframite-bearing quartz veins and scheelite-bearing breccia appear to have precipitated from hydrothermal solutions which migrated along a series of en echelon northeast trending faults and fracture zones.



4.7 A mafic dyke parallels a northeast-striking galena-bearing quartz vein at the Dale.

4.8 Clast supported carbonate breccia at the YP (butler mountain).

The breccia at the Sterling property is comprised of angular clasts of limestone and dolostone in a coarse-grained calcite matrix. Again, clasts appear to be locally derived and fragmentation was probably related to fault movement. The breccia follows a northerly trend and is in sharp contact with marble to the west and dolostone to the east. Abbott (1984) reports pyrite, chalcopyrite, galena, sphalerite and tetrahedrite to be sparsely distributed in the calcite matrix.

A brief description of breccias at the YP (Butler Mountain) is given in DIAND (1984, p. 137). Breccias are associated with a north-trending, steeply dipping zone of felsic dykes and sulphides (Abbott, 1984). Most breccias are clast-supported and contain angular fragments of dolostone, limestone, phyllite, felsic dyke rock and sulphides with little matrix (Figure 4.8). Since breccias contain sulphide fragments, they postdate the mineralization, at least in part, and faulting continued after the mineralizing event.

Direct relationships between faults, veins and replacement bodies are seen at the Luck (A + B) and Kodiak deposits. At the Luck, galena-sphalerite-pyrite mineralization occurs in an easterly-trending lens-shaped zone in interbedded limestone and phyllite (1Cls-ph). Sulphides occur as replacement lenses and narrow, irregular veinlets. The mineralized outcrop is highly fractured and the predominant joint direction strikes 270° and dips 40°S. Replacement occurs along this east-west joint direction. The northern contact between mineralization and the country rock is marked by an easterly trending calcite-scheelite vein which was emplaced along a fault (Harris, 1971).

Replacement lenses in limestone beds interbedded with phyllite at the Kodiak appear to be genetically related to a northeast-trending fracture or fault zone (Abbott, 1984). Replacement lenses originate at and decrease in thickness away from a fracture zone (Figure 4.9) which contains a narrow, intermittent 2 to 3 cm wide vein (Abbott, 1984).

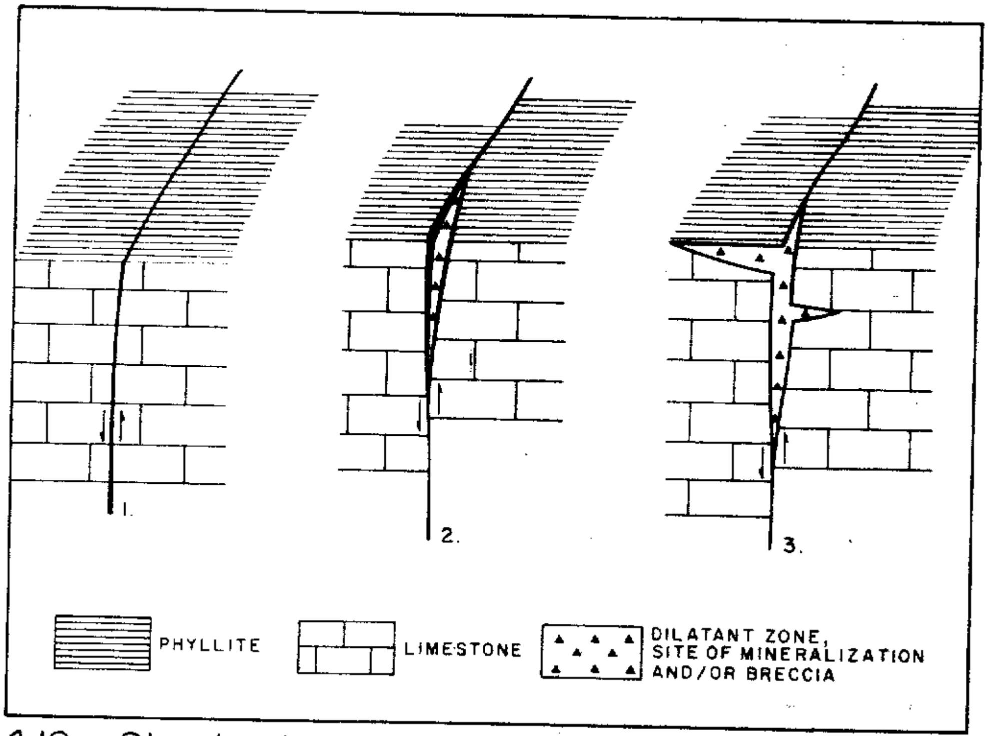
Jointing (S_3) and carbonate-phyllite contacts exert strong controls on mineralization (Figure 4.10). These structural and lithologic controls are similar to those described by Boyle (1965) for the Keno Hill-Galena Hill district: as a fault passes into incompetent phyllite, it is deflected and subsequent movement results in brecciation and fracturing in the area below the phyllite capping, thus creating a dilatant zone and low pressure area into which migrating solutions can move. Quartz and carbonate veins are localized along the fracture and replacement lenses occur in limestone and parallel limestone-phyllite contacts.

4.4.2 Associated Igneous Activity

Mineralization in the Rancheria district is fault and fracture controlled and postdates consolidation of the Cassiar Batholith. As suggested by Abbott (1984) the Rancheria deposits are probably younger than and unrelated to large mid-Cretaceous intrusions such as the Cassiar Batholith. This hypothesis is further substantiated by the absence of mineral zonation between known mineral occurrences and proximity to granite.

Mineral deposits in the Rancheria district are often associated with mafic or felsic dykes. Mafic dykes occur at the Kodiak, Dale, Hardtack, Pog, Luck (Freer), Kerns and Holliday showings. Mafic dykes commonly parallel veins or

4.9 Carbonate veins occur along fractures, and replacement lenses occur in limestone and parallel limestone-phyllite contacts at the Kodiak.



4.10 Structural and lithologic controls of mineralization; Note: apparent movement indicated is a normal, but a reverse fault can also occur.

manganiferous gossans or occur nearby in similar structural trends.

Felsic dykes are associated with the YP (Butler Mountain) and were found in drill core and outcrop at the Fiddler (Harris, 1971) and in outcrop on the Kodiak claims. At the YP, felsic dykes occur in a north-trending, steeply dipping zone of breccias and massive sulphides. Drilling on the property has revealed that the dykes widen and coalesce into a small plug at the north end of this zone. A rubidium-strontium age of 52±3 Ma was obtained by the Geochronology Laboratory at the University of British Columbia from a core sample of dyke rock collected by Gary Medford (Abbott, 1984).

Samples of mafic and felsic dykes rock obtained as part of this study are presently being dated by the Geological Survey of Canada (W.D. Sinclair, pers. comm.).

Two easterly trending dykes are reported to occur in outcrop at the Fiddler property. One occurs 1,200 m north of the quartz breccia zone, is 6 m wide and contains small phenocrysts of quartz, plagioclase and biotite in an aphanitic felsic groundmass (Harris, 1971). The other occurs 600 m south of the breccia zone, is aphanitic and massive and contains an estimated 57% plagioclase, 35% quartz, 7% muscovite and 1% disseminated pyrite (Harris, 1971).

Felsic dykes may indicate the presence of large intrusions at depth. Drill holes up to 600 m deep on the Fiddler property have revealed the presence of a metamorphic aureole and molybdenum- and tungsten-bearing skarns beneath the tungsten bearing veins on the surface (Abbott, 1984).

While no age dates are available on the felsic dykes at the Fiddler, a radiometric age date of 50.8 ± 0.8 Ma was obtained from mica from the greisen alteration zone (Sinclair, in press). From this, it can be inferred that mineralization at the Fiddler, and probably other deposits in the district may be related to an igneous event approximately 50 Ma ago.

4.5 Genetic Model

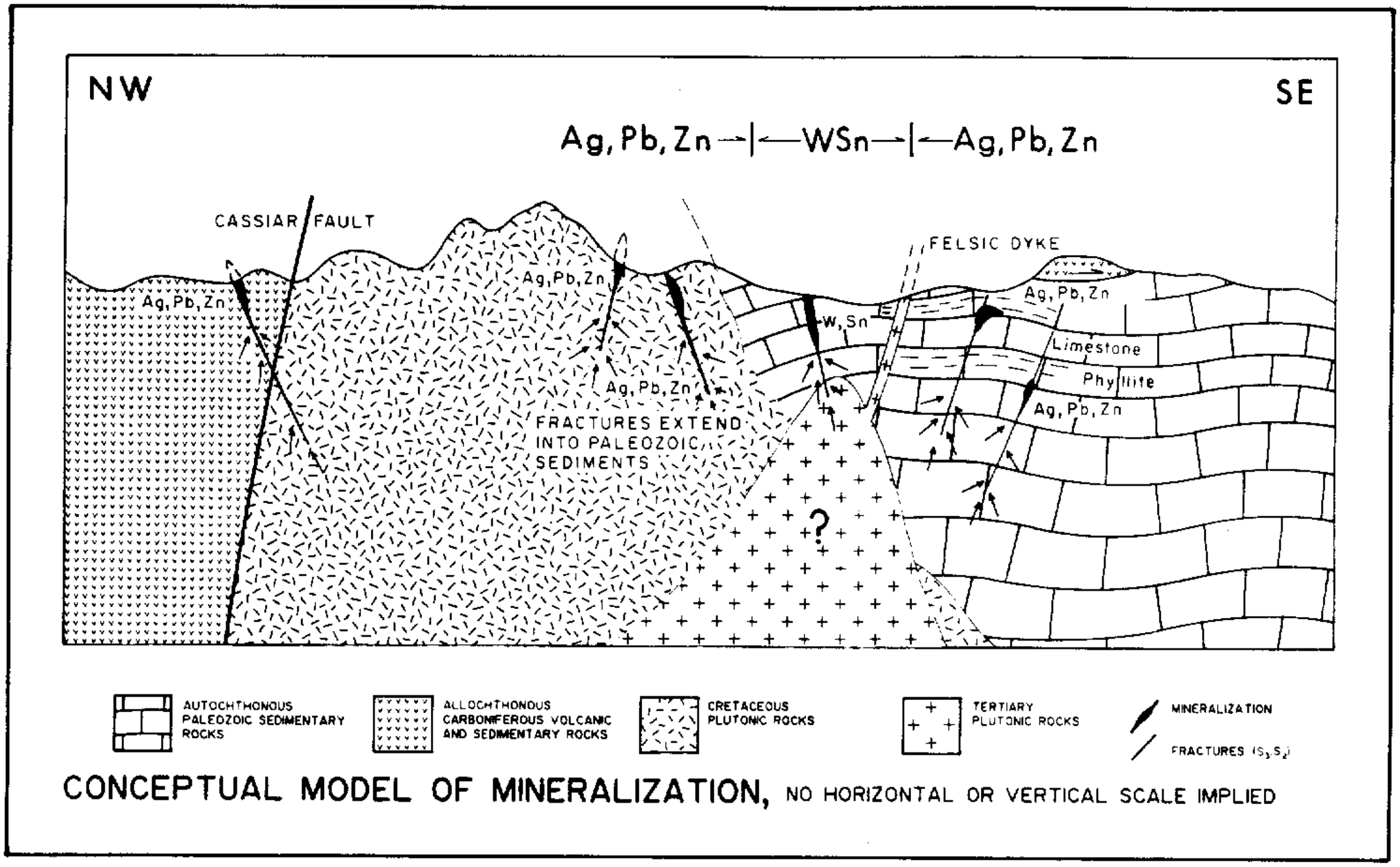
No generally accepted genetic model(s) has been proposed for this area. Boyle (1965) has proposed a model for the Keno Hill-Galena Hill deposits, which are mineralogically and structurally similar to those in the Rancheria district. A proposed model for mineralization in the Rancheria area is as follows (adapted from Boyle, 1965):

(a) Late Cretaceous-Early Tertiary dextral movement on large transcurrent faults such as Tintina, Kechika and Cassiar Faults results in the development of an east-west (S_3) joint system.

(b) Early Tertiary (50 Ma) volcanism, plutonism and dyke emplacement is temporally related to transcurrent fault movement resulting in a rise of the geothermal gradient and convective heat flow.

(c) Hydrothermal solutions migrate along S_3 fractures and minerals precipitate in dilatant zones (Figure 4.11).

(d) A mineral zonation related to intrusive centres may occur in the Rancheria district that is similar to the Keno Hill-Galena Hill district: tungsten and tin minerals are deposited proximal to a heat source (i.e. pluton) whereas silver, lead and zinc minerals are deposited distally.



4.11 **Proposed model for mineralization.**

4.6 Suggestions to Prospectors

Characteristics of the major mineral occurrences in the Rancheria district are summarized in Table 4.2. The following information provides a guideline for prospectors:

1. Mineralization is structurally controlled and associated with steeply dipping northeast to east trending faults and fracture zones (which may or may not appear as lineaments on air photos).

2. Host lithology is diverse; silver-lead-zinc mineralization occurs in Cretaceous granite, Lower Cambrian limestone and dolostone and interbedded limestone and phyllite, Devonian limestone (at Midway) and Carboniferous mylonite and quartzite.

3. Ductility contrasts between lithology such as limestone and phyllite exert strong controls on localization of ore shoots.

4. Mineralization is often spatially and genetically associated with breccias.

5. Mineralization may be spatially associated with similarly trending mafic and felsic dykes.

6. Surface showings are often oxidized to black or rust coloured gossans.

7. Sericitic, chloritic and argillic alteration are common in granite-hosted occurrences.

8. Stream-sediment sampling may be useful in delineating mineralized areas; silver, tungsten, molybdenum and lead are the most useful indicator elements.

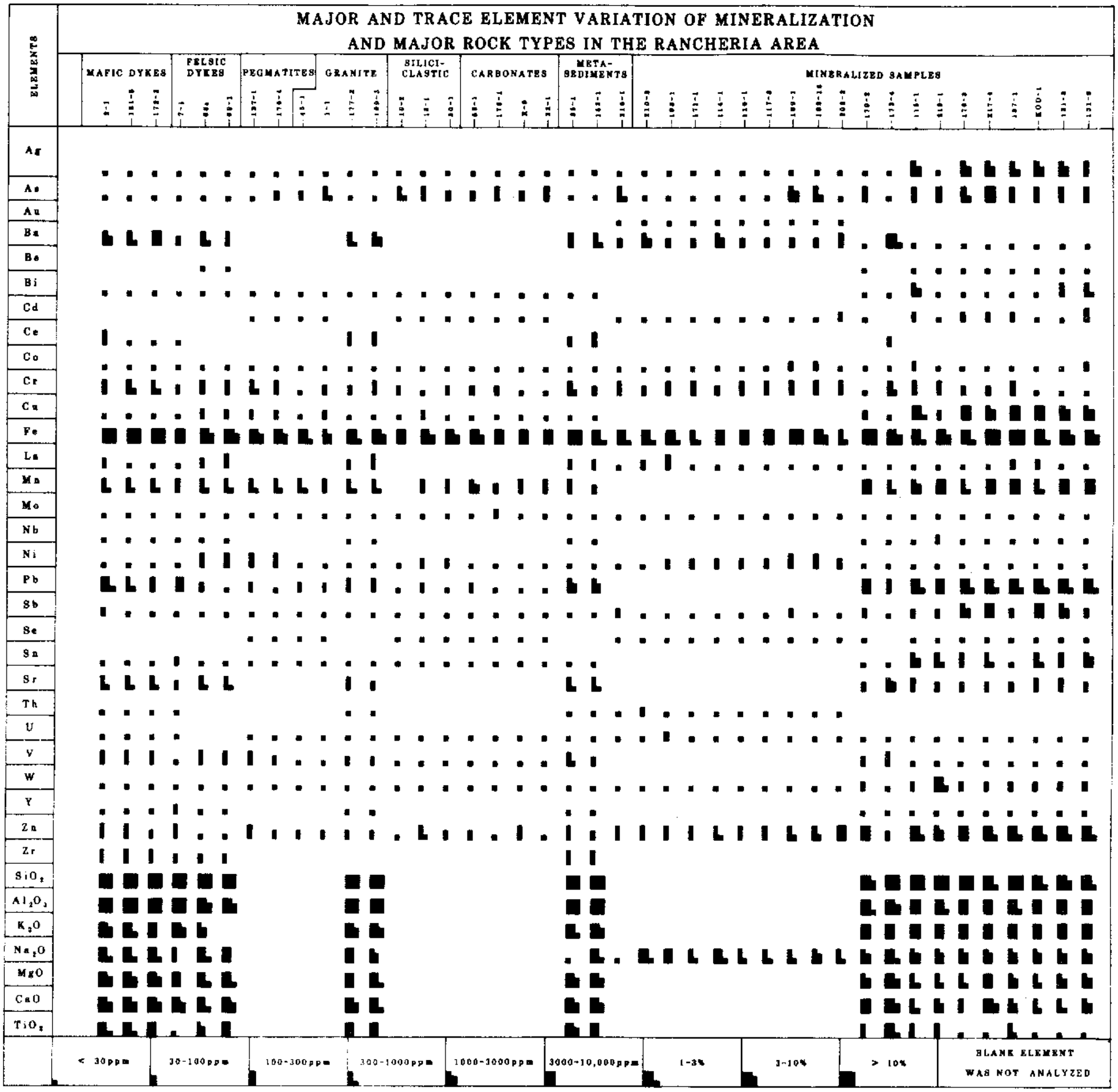


Table 4.1 Major and Trace Element Variation of Mineralization and Major Rock Types in the Rancheria Area.

	MINERAL OCCURRENCE	DALE	LUCKY (ANT)	LUCK (FREER)	POG	HOLLIDAY	LICK	TROY	ALAN	GOAT	CARLICK	NEW SHOWING	SHILSKY	YP	STERLING	FIDDLER	LUCK (A&B)	KODIAK	HARDTACK	KERNS	LENA	WOLF	BLACK ROCK	HOT
STRUCTURAL AND LITHOLOGIC CONTROLS	ROOF PENDANTS IN GRANITE									■			■									■		■
	FRACTURES	■		■	■			■						■	■	■	■	■						
	LINEAMENTS	■									■										■			
	FAULTS & SHEAR ZONES	■		■	■	■	■			■	■			■	■	■	■	■	■				■	
	CARBONATE-PHYLLITE CONTACTS																■	■						
	S_3 JOINTING	■		■	■	■	■			■		■			■	■	■	■	■	■		■		
ASSOCIATED PHENOMENA	BRECCIAS													■	■	■								
	MAFIC DYKES	■		■	■	■												■	■					
	FELSIC DYKES													■		■		■		■				■
ALTERATION MINERALS	Fe & MN WAD	■	■	■	■	■								■	■	■	■	■	■	■		■		
	LIMONITE		■	■			■		■	■	■	■				■	■	■			■	■		
	KAOLINITE	■		■		■					■													
	CHLORITE	■		■		■			■		■			■										
	SERICITE		■	■		■			■		■													
	GREISEN LEPIDOLITE															■								
GANGUE	FLUORITE									■						■								
	SIDERITE				■										■		■	■						
	CALCITE													■	■		■	■	■					
	QUARTZ	■	■	■	■	■					■	■		■		■			■	■	■	■	■	
ORE MINERALS	CASSITERITE															■								
	WOLFRAMITE															■								
	SCHEELITE									■				■		■	■			■				■
	ARSENOPYRITE													■	■									
	FREIBERGITE-TETRAHEDRITE	■												■										
	PYRRHOTITE									■			■	■										■
	PYRITE	■			■		■		■	■	■	■	■	■	■	■	■				■			■
	CHALCOPYRITE	■	■	■		■		■					■	■	■	■	■			■	■		■	
	SPHALERITE	■	■	■	■	■	■			■		■		■	■	■	■	■	■	■	■		■	
	GALENA	■	■	■	■	■	■			■		■		■	■	■	■	■	■	■	■	■	■	
DEPOSIT TYPE	SKARN									■			■											■
	BRECCIA ORE													■		■								
	REPLACEMENT													■	■		■	■	■					
	VEIN	■	■	■	■	■	■			■	■	■		■	■	■	■	■	■	■	■	■		
HOST ROCK	CARBONIFEROUS CHERT & MYLONITE											■											■	
	MYLONITE										■													
	CRETACEOUS GRANITE	■	■	■	■	■	■	■	■	■														
	LOWER CAMBRIAN CARBONATE									■			■	■	■					■				
	INTERBEDDED LIMESTONE/PHYLLITE									■				■		■	■	■	■		■	■		■

Table 4.2 Summary table of characteristics of major mineral occurrences

4.7 Description of Mineral Occurrences, Spencer Creek map area (105 B-1)

Figure 4.12 illustrates current mineral claims staked in Spencer Creek map area (105B-1). A systematic discussion of the major mineral occurrences and basis for additional claim staking is given in this section.

4.7.1 DALE

Butler Mountain Minerals Ltd.
Lead, zinc, silver vein
105B-1
60°01'N, 130°29'W

References: DIAND (1984, p. 140, Abbott (1984), DIAND (1983, p. 96), DIAND (1982, p. 97, 105), Green (1966, p. 79).

Claims: Lola 1-18, L 1-14, Garrett 1-36, GP 1-8

Source: Property visits in 1985 and DIAND (1984, p. 140), DIAND (1983, p. 96).

History: In 1968, 8.2 tonnes of ore shipped from the property assayed 56% Pb and 3,531.5 g/t Ag. In 1970, 20 additional tonnes were shipped. In 1981, one 106.7 m deep diamond drill hole and VLF-EM and magnetometer surveys were completed. The hole intersected 3 m of 0.34 g/t Au, 199.9 g/t Ag, 4.31% Pb and 2.68% Zn. A total of 11.5 line-km of EM-16 and 9 line-km of magnetometer surveys were conducted. The EM survey indicated that the shear zone extends for a possible 15 km. An adit is collared in intrusive rock east of the showing. The history and results of this work are unknown.

Description: A galena-bearing quartz vein is exposed by bulldozer trenching for a strike length of 20 m. The exposed vein is approximately 20cm wide, strikes 245° and dips 60°N. A 1.5 m wide mafic dyke (Tmd) parallels the vein and cuts it in one place. An envelope of poorly developed argillic alteration occurs around the vein. Vein mineralization at the Dale is hosted by granite (Kgt) of the Cretaceous Cassiar Batholith and parallels a north-east trending shear zone which contains discontinuous Ag-Pb-Zn mineralization over a 400 m strike length and widths up to 2.1 m.

4.7.2 LUCK (FREER)

Klondike Silver Mines
Silver, lead, zinc vein
105B-1
60°00'N, 130°29'W

References: Craig & Milner (1975, pp. 109-110)

Claims: ANT 1-64, BRU 1-36

Source: Assessment report 060112 by G.E. White and National Mineral Inventory (105B01 Ag 009).

History: The ground was staked in 1969 and acquired by Cone Mt. Mines Ltd. which built a tote road to the property in 1970 from Kilometre 1009 Alaska Highway. Work in 1972 included trenching, EM surveys and geochemical sampling. Samples of float graded 31 g/t Ag, and 10% Pb.

The ground was restaked as the ANT 64 and BRU 36 claims in 1980 by Klondike Silver Mines Ltd. In 1981, Terra Mining and Exploration Ltd. optioned the claims and carried out an exploration program including some drilling but due to poor results allowed their option to lapse.

Description: Argentiferous galena, sphalerite and chalcopyrite occur in quartz veins and lenses in shear zones and fractures in granite (Kgt) which strike 085°-090° and dip 75-85° south. The granite is also cut by northerly trending mafic dykes (Tmd) up to 5m wide. Four veins occur in Yukon and a fifth occurs on the B.C. side. Veins are less than 3 m wide. Chlorite, sericite and argillic alteration envelopes occur in granite for several metres around the showings. Some of the best mineralization was found in Zone 2 where a grab sample of galena in quartz assayed 558 g/t Ag, 8.4% Pb and trace Au.

4.7.3 LUCKY (ANT)

Klondike Silver Mines Ltd.
Silver, lead, zinc vein
105B-1
160°00'N, 130°26'W

References: DIAND (1984, p. 146) and Abbott (1984)

Claims: ANT 1-16

Source: Property visit in 1985 and DIAND (1984, p. 146).

History: In 1972, Cone Mountain Mines explored the headwaters of the east branch of Freer Creek with a soil geochemical survey, obtaining anomalies of up to 31 ppm Ag. Two trains of mineralized boulders were discovered in talus. Bulldozer trenching failed to reach bedrock. Terra optioned the property in 1981 and explored with VLF geophysics, prospecting and diamond drilling. One hole, 91.4 m long, was drilled but failed to intersect significant mineralization. Forty-three assays from different mineralized boulders averaged 9,252.1 g/t Ag, 0.03 g/t Au, 0.43% Cu, 57.9% Pb and 0.74% Zn.

Description: At least six trains of boulders, containing fine grained argentiferous galena with lesser amounts of sphalerite, chalcopyrite, bornite and other highly altered granitic (Kgt) boulders are found in fresh granite talus in the Cassiar Batholith.

4.7.4 HARDTACK

D. Schellenberg
Hardy International Development Ltd.
Silver, lead, zinc vein
105B-1
60°12'N, 130°28'W

References: DIAND (1984, p. 143), Abbott (1984) and National Mineral Inventory (105B01 Ag 008).

Claims: ORO 1-26

Source: Property visit in 1985 and above references.

History: The claims were originally staked in 1951 and some hand trenching was done. Pacific Giant Steel Ores performed soil sampling and bulldozer trenching in 1967. Spencer Creek Mines conducted mapping, geophysical surveys and bulldozer trenching from 1968-1970. The Hardtack showing is located within a group of claims held in 1984 by Hardy International Development Ltd.

Description: Mafic dykes (Tmd) striking 075° and dipping 80° south cut across bedding in interbedded limestone and phyllite (lCls-ph). Manganiferous oxides replace limestone in zones up to a metre wide along the dyke contacts. Wallrock is intensely fractured and contains stringers and coatings of orange carbonate.

Two or more parallel veins (15 cm wide) have been traced for a strike length of over 210 m. The veins strike 060° and are manganese stained near surface. Mineralization consists of galena and sphalerite in a quartz-calcite gangue. A chip sample assayed 1,350 g/t Ag, 65.5% Pb and 0.9% Zn over 15 cm.

4.7.5 LUCK (A + B)

Serem Ltd.
Silver Seven Exploration Ltd.
Lead, zinc, silver replacement deposit
Tungsten veinlet
105B-1
60°07'N, 130°27'W

References: Abbott (1984), Craig and Laporte (1972, p. 134-137) and assessment report 06068 by F.R. Harris

Claims: A + B 1-32, BNA 1-5, LB 1-9, BUG 5-8, JA-P 1-8

Source: Property visits in 1985 and assessment report 06068 by F.R. Harris.

History: The property was first explored for tungsten in 1943. The original Luck 1-15 group was staked in 1961 by E. Krysko and transferred to Scurry Rainbow Oils Ltd. In 1962, the company carried out self-potential and electromagnetic geophysical surveys and a geochemical survey over the claims. The anomalies outlined during these surveys were trenched and diamond drilled. A total of 14 trenches and 13 drill holes totalling 780 m were made on the property by 1967. The company also constructed 1,682 m of access roads on the property.

An extensive exploration program consisting mainly of trenching, mapping and sampling was carried out by P.H. Sevensma Consultants Ltd. for Silver Seven Exploration Ltd. in 1969. In 1975, geochemical soil sampling and trenching programs were conducted by Delphi Resources. The property was then optioned by Serem Ltd. and in 1977 detailed geological mapping and gravity programs were conducted.

Description: The property is underlain by interbedded limestone and phyllite (lCls-ph) of Lower Cambrian age. Sphalerite, pyrite and galena occur in an easterly trending lense-shaped zone, 1 to 12 m wide and 100 m long. The mineralized outcrop is highly fractured; the predominant joint direction strikes 270° and dips 40° south. Black and rust coloured oxides coat fracture planes. Sulphide minerals occur disseminated or as massive lenses or irregular veinlets in the host rock. Replacement occurs along an east-west trending joint and fracture plane. The northern contact of the mineralized zone is marked by an easterly trending calcite-scheelite vein which was emplaced along a fault. Detailed sampling of the sulphide occurrence indicated an average of 260 g/t Ag, 8.5% Pb and 9.9% Zn over 10 m. Representative samples of the 1 m calcite- scheelite vein assayed from 0.01 to 0.18% WO_3.

4.7.6 FIDDLER
Silver Seven Exploration Ltd.
Silver, lead, tungsten vein
105B-1
60°07'N, 130°26'W

References: Abbott (1984), Mulligan (1975), Craig and Laporte (1972, p. 134-137).

Claims: MORN 1-4, Al 1-6, PIGGY 1-69, RAY 1-8, PIG 1-4, ULY 1-4

Source: Property visits in 1985 and assessment report 060680 by F.R. Harris.

History: The wolframite-bearing quartz veins which are now known as the Fiddler West Zone were staked in 1943 for Consolidated Mining and Smelting Company of Canada Ltd. In 1951, the Yukon Tungsten Corporation Ltd. acquired the property, constructed a truck road, drove a 160 m adit and 71.2 m of raises to test the underground extension of the wolframite veins. A small mill was built near the Alaska Highway, but there was no production, and the mill later burnt down.

In 1969, an extensive program of mapping, sampling and trenching was carried out by Silver Seven Exploration Ltd. Bulldozer trenching led to the discovery of a scheelite-bearing quartz breccia zone 455 m east of the wolframite veins which is now referred to as the Fiddler East Zone.

Description: (a) Fiddler West Zone: A series of northeast striking quartz veins (up to 0.8 m wide) occur within interbedded limestone and phyllite (1Cls-ph). Quartz veins contain variable concentrations of wolframite, galena, scheelite, fluorite and lesser amounts of cassiterite, stannite, sphalerite, chalcopyrite and pyrite. Quartz varies from massive to comb structure and in places large quantities of feldspar are present. The main vein is rimmed by a 1 cm wide alteration envelope of coarse grained light green lepidolite. The main vein assayed 516.3 g/t Ag, 0.2% Cu, 3.24% Pb and 0.67% Zn over 3 m. Channel samples of the main vein taken near the inclined raise assayed up to 4.35% WO_3 over 45 cm.

(b) Fiddler East Zone: A quartz-phyllite breccia striking 060° and dipping steeply south is exposed for a strike length of 600 m and width of 40 m. The breccia contains angular clasts of calcareous phyllite in a quartz-chalcedony matrix. Clasts range from unaltered to highly silicified. Disseminated scheelite and minor fluorite and calcite occur in the matrix. In areas of highest grade, phyllite fragments are silicified and altered with scheelite concentrated around the relict fragments. Channel samples assayed up to 0.54% W over 1.5 m.

Pete Showing: The Pete showing is located 1,200m southwest of the wolframite-bearing quartz veins. Massive galena 2 to 20 cm wide occurs in a shear zone in Lower Cambrian phyllite which trends 310° to 325° and dips 40° to 65°N. Three samples (10-20 cm wide) assayed 353 to 5,000 g/t Ag, 8.36 to 34.6% Pb, 1.9 to 8.3% Zn, and 1 to 2 g/t Au.

North Showing: This is located 1,000m north of the Fiddler West Zone. The showing consists of a 15 cm wide zone of massive galena in a northwest trending shear zone in Lower Cambrian interbedded limestone and phyllite.

4.7.7 STERLING

R. Stack
Silver, lead, zinc vein and replacement deposits, skarn(?)
105B-1
60°05'N, 130°24'W

References: DIAND (1984, p. 139-140), Abbott (1984)

Claims: Zulu Lady 1-24

Source: Property visits in 1985, DIAND (1984, p. 139-140)

Description: The property has been explored by numerous hand trenches and small bulldozer trenches. The Sterling is underlain by Lower Cambrian dolostone (lCds) within 200 m of a north-trending contact with the Cretaceous Cassiar Batholith. The main showing consists of irregular pods of coarse-grained galena, sphalerite and pyrite associated with a north-trending dolostone-limestone breccia. The breccia is exposed by trenching over a 2 by 4 m area and is in sharp contact with marble to the west and dolostone to the east. A 1 m wide carbonate vein trending 065° is exposed for approximately 60 m at the upper showing. The vein contains diffusely disseminated galena and is enveloped by a fine-grained dolostone breccia. Hairline fractures of galena occur in dolostone outcrop throughout the property (Ron Stack, pers. comm. 1985).

4.7.8 KODIAK
Hardy International
(Optioned to Claymore Resources)
Lead, silver, zinc vein, replacement
105B-1
60°11'N, 130°24'W

References: Abbott (1984), DIAND (1984, p. 143), DIAND (1983, p. 100), Green (1966, p. 44)

Claims: DANE 1-11, JACK 1-69, A9 1-15, TONY 3-5, VAL 1-2

Source: Property visit in 1985 and DIAND (1984, p. 143), and National Mineral Inventory.

History: The Kodiak and Dee claims (12 total) were optioned by Canex Aerial Explorations in 1964, and 92 more claims were staked, and an access road (25 km long) was built from Kilometre 990 on the Alaska Highway. Canex dropped their option later in the year. It was restaked in 1967 and a grid soil survey, bulldozer trenching and sampling were conducted. The claims were transferred and Spencer Creek Mines conducted mapping and geophysical surveys in 1968 and bulldozer trenching in 1969 and 1970. It was restaked in 1973 and explored with shallow drill holes in 1974. It was restaked in 1975, 1976, 1977 and 1978 when some hand trenching was done. The Kodiak showing is located within a group of claims held by Hardy International Development Ltd. in 1984.

Description: Small galena-bearing carbonate veins parallel northeast to east trending shear zones and fractures and galena-bearing replacement lenses in siderite gangue parallel limestone-phyllite contacts near faults and fracture zones. The host rock is Lower Cambrian interbedded limestone and phyllite (lCls-ph). Surface exposures are oxidized to a black or rust coloured wad. Mafic dykes occur locally and trend northeast to east. 1985 trenching by Claymore Resources uncovered a small showing of crustiform galena and siderite in an east trending fracture zone.

Three separate galena-bearing veins, up to 30 cm wide, have been explored. A chip sample across a 7.5-10 cm wide vein assayed 1,376 g/t Ag, 37.3% Pb, 6.1% Zn, 0.6% Cu and 0.06 g/t Au.

4.7.9 YP (Butler)

Butler Mountain Minerals Corp.
Silver, lead, zinc vein and replacement deposist
105B-1
60°03'N, 130°22'W

References: Lord (1944), DIAND (1984, p. 137-139), Abbott (1984), and assessment report 091501 by B. Furneaux and G.E. White

Claims: YP 1-4, Idaho 1-19

Source: Property visits in 1985, DIAND (1984, p. 137-139) and assessment report 091501

History: Gossans were first reported by Lord in 1944. Since then the property has been intermittently staked and explored with bulldozer trenching, geochemical and geophysical surveys, diamond drilling and prospecting. A number of small, scattered gossans and galena veins were discovered. Several tonnes of high grade argentiferous galena were mined, but never shipped.

Description: Massive sulphide lenses and quartz veins containing variable percentages of pyrrhotite, pyrite, marmatite (black sphalerite), chalcopyrite, galena and arsenopyrite are associated with a north-trending zone of steeply dipping felsic dykes (Tfd) and breccias. Sulphide mineralization occurs adjacent to felsic dykes and within breccias and sedimentary rocks (1Cc, 1Cls-ph). Drill intersections of 15.26 g/t Au over 3.4m and 337.37 g/t Ag over 2.2 m have been reported.

4.7.10 KERNS

McCrory Holdings Ltd.
Silver, lead, zinc vein
105B-1
60°14'N, 130°22'W

References: DIAND (1984, p. 144), Abbott (1984), National Mineral Inventory (105B01 Ag 007).

Claims: JACK 1-32

Source: Property visit in 1985 and above references

History: The property was first staked in 1965 as the Beaver claims by Duval Corporation. G. Leverman restaked it as the OWL claims in 1969 and formed a new company, Spencer Creek Mines Ltd., that conducted mapping and bulldozer trenching in 1969-70. The property is currently held by McCrory Holdings Ltd.

Description: A manganiferous gossan approximately 2 m^2 is exposed by blasting in Lower Cambrian limestone (lCc); x-ray diffraction identified goethite as the principal oxide. Mineralization cuts across bedding and parallels jointing that strikes 230° and dips 55° N. Fragments of mafic dyke rock (Tmd) occur in debris. No sulphides were observed during field work.

Quartz veins containing galena, minor sphalerite, chalcopyrite and scheelite cutting Lower Cambrian phyllite and limestone are reported in the National Mineral Inventory report.

Grab samples taken from veins averaged 120 g/t Ag, 4.2% Pb and 0.7% Zn across an average width of 0.7 m. Copper assayed as high as 0.9% and tungsten as high as 0.1%.

4.7.11 HOT
Amax of Canada Ltd.
Canamax Resources
W Skarn
105B-1
60°00'40"N, 130°07'30"W

References: DIAND (1981, p. 159)

Claims: HOT 1-80

Source: DIAND (1981, p. 159) and National Mineral Inventory (105B01 W 002).

History: The HOT 1-80 claims were staked in 1979, following reconnaissance stream panning. During 1980, soil samples were collected and analyzed for W, Mo, Cu, Pb, Zn, Fe, Mn, Ag and Au. Eight anomalous zones with an average of 100 ppm tungsten were outlined. The zones trend northwest and follow the most intensely metasomatized parts of the succession. Chip sample analysis showed that tungsten was confined to calc-silicate rocks. Electromagnetic and magnetic surveys located a cluster of narrow anomalies over intense calc-silicate development.

Description: The claims are underlain by Upper Cambrian and Ordovician hornfels, argillite, minor skarn and marble (uCOhs) of the Kechika Group. The sediments are intruded by small dykes which were interpreted by company geologists as apophyses of the Cretaceous Cassiar Batholith. Calc-silicate and hornfels alteration, sulphide distribution, and geophysical and geochemical data suggest that a shallowly buried intrusive underlies the property. Scheelite occurs finely disseminated in metamorphic rocks and may be accompanied by pyrrhotite and minor pyrite.

4.7.12 BLUE
Acorn Resources Corp.
Geochem Anomaly
105B-1
60' 22'N, 130°24'W

Claims: Blue 1-26

Source: DIAND (1984, p. 148)

History: The Blue claims were staked in February, 1983. Mapping was carried out at 1:5000 scale. Soil samples and VLF-EM readings were taken at 50 m intervals on lines spaced at 250 m.

Description: The claims occur along the eastern contact of the Cretaceous Cassiar Batholith with Lower Cambrian sediments. A north-striking fault runs through the saddle bringing Lower Cambrian limestone on the east into contact with interbedded quartzite and phyllite on the west. Several felsic dykes intrude both granite and sediments.

A significant Ag-Pg-Zn anomaly has been outlined with a strike length of almost 2 Km. Silver values range up to 5.2 ppm, lead values up to 168 ppm, and zinc ranges from 350 ppm. In addition, several conductive structures were indicated by the VLF-EM surveys.

4.7.13 MR
Regional Resources Ltd.
Getty Canadian Metals Ltd.
Cordilleran Engineering
Lead, zinc, silver replacement vein
105B-1, 8
60°17'N, 130°18'W

References: Abbott (1984), DIAND (1984, pps. 147-148), DIAND (1983, p. 98-99)

Claims: MR 1-390

Source: Field observations in 1985 and above references

History: A road was constructed into the property and extended to Meister Lake in 1985. Exploration work included geological mapping, line-cutting, soil, stream and lithological sampling, reconnaissance gravity surveys, electromagnetic and induced polarization tests, trenching of geochemical anomalies, and diamond drilling. A better than average trench intersection assayed 47.55 g/t Ag, 0.32% Pb and 12.01% Zn over 14 m.

Description:

Trenching and drilling revealed a north-trending, steeply west dipping mineralized zone 0 to 18 m wide, comprised of layered iron and manganese oxides. The mineralized zone lies north of 105B-1. The claims are underlain by Lower Cambrian quartzite, phyllite and limestone.

4.7.14 Additional Claims

The entire southern portion of map-sheet 105B-1 is almost entirely staked. Exploration activity in this area has been intense, since the discovery of the Midway Ag-Pb-Zn deposit in 1981. The Midway property is underlain by thick-bedded Devonian limestone of the McDame Formation, which is overlain by Devonian-Mississippian phyllite and quartzite of the Sylvester Group. Claims such as the Zam, Cord, Dill, Sun, Wind, Run, Tom, Moon, Run and Tim were staked on the basis of similar lithology to that hosting the Midway deposit. Outcrop is limited in this area, and exploration activities concentrated on geochemical sampling and geophysical programs.

The PL, Lydia, Kent and Flo claims are located adjacent to Butler Mountain's YP property and are underlain by similar lithologic units. The area is underlain by Lower Cambrian interbedded limestone and phyllite (lCl-ph), Lower Cambrian limestone (lCls) and lower Cambrian dolostone (lCds). Lower Cambrian sediments are locally intruded by quartz porphyry dykes of probable Tertiary age (TFd).

The Head claims are located approximately 3 km northeast of the Fiddler, on strike with the wolframite-bearing quartz veins. The claims are underlain by Lower Cambrian interbedded limestone and phyllite (lCls-ph), along with minor limestone (lCls) and dolostone (lClds).

The Hat claims are underlain by Lower Cambrian limestone (lCls) in the vicinity of the Kechika Fault Zone. Karsting and quartz stockwork breccias are present.

4.8 Description of Mineral Occurrences, Daughney Lake map area (105B-2)

Figure 4-13 illustrates current mineral claims staked on Daughney Lake map area (105B-2). The following section presents a discussion of the major mineral occurrences and basis for additional claim staking on 105B-2.

4.8.1 TROY

Gear Mine & Oil Ltd.
Copper
105B-2
60°04'N, 130°45'W

References: National Mineral Inventory (105B02 Cu 001).

Claims: TROY 1-20

Source: Above reference

Description: The claims are underlain by granite (Kgt) of the Cretaceous Cassiar Batholith. Chalcopyrite was observed in hairline fractures in granite talus on a northerly sloping hillside.

4.8.2 SHILSKY

Copper
105B-2
60°11'N, 130°36'W

References: National Mineral Inventory (105B02 Cu 002).

Claims: JAKE (?)

Source: Above reference

Description: The mineralization occurs in a small roof pendant in the Cassiar Batholith. Minor amounts of chalcopyrite are reported to occur in massive pyrite and pyrrhotite which has been traced for 800 m and reaches widths of 30 m.

4.8.3 GOAT

Canadian Occidental Petroleum Ltd.
W Skarn, lead-zinc vein
105B-2
60°10'N, 130°37'W

References: DIAND (1982, p. 102) and assessment report 090632 by M.J. Crandall

Claims: Goat 1-86

Source: Property visit in 1985, DIAND (1982, p. 102) and assessment report 090632

History: The Goat 1-36 claims were staked in 1979 to cover the headwaters of streams reported by the GSC-URP to contain anomalous uranium (Geological Survey of Canada, 1978). The Goat 37-84 claims were added to the northeast in 1980 to cover scheelite-bearing skarn float, and Goat 85-86 were added near the end of the season to cover a galena-sphalerite occurrence.

Description: Sedimentary strata (1Cls-ph, 1Cls) are metamorphosed to marble (1Cma) and occur as roof pendants within intrusive rocks (Kgt) of the Cassiar Batholith. Small skarns are abundant and some contain pyrrhotite or pyrite along with minor scheelite, chalcopyrite and molybdenite. Also narrow pyrite-galena-sphalerite-fluorite bearing pegmatite veins occur in northeast (060°) trending shear zones in granite (Kgt).

4.8.4 WOLF

McCrory Holdings Ltd.
Silver, lead, zinc vein
105B-2
60°10'N, 130°35'W

Claims: WOLF 1-76

Source: Property visit in 1985

History: Claims were staked on July 16, 1985.

Description: The property is underlain by Lower Cambrian interbedded limestone and phyllite (lCls-ph) which occur as roof pendants within the Cassiar Batholith. Several limonite and manganese stained gossans are exposed in trenches. Mineralization consists of galena-bearing quartz veins which parallel an east-west trending joint and fracture zone.

4.8.5 ALAN

Klondike Silver Mines
Silver, lead, zinc vein (?)
105B-2
60°02'N, 140°35'W

References: DIAND (1984, p. 148)

Claims: S 1-4, Reg 1-4, Baby P 1-6, Bru 1-36

Source: Above reference

History: During the early 1970's, B. Poulin constructed a tote trail to the property and blasted some small trenches.

Description: Granite of the Cassiar Batholith is weakly altered to chlorite and sericite over an undetermined area. Within the altered zone, limonite stained patches are exposed in several closely spaced pits. Quartz and pyrite content of the granite is higher within the stained patches. Assay values of samples taken from these patches ranged from 0.77 g/t Ag to 24.26 g/t Ag.

4.8.6 HOLLIDAY (SWITCHBACK)
Klondike Silver Mines Ltd.
Silver, lead, zinc vein
105B-2
60°00'N, 130°33'W

References: DIAND (1984, p. 141), Abbott (1984)

Claims: TONI 1-4, Willy 1-4, ROLLY 1-8, ANT 13-64, BULL 1-8, A 1-4, REG 5-8, PHIL 5-8

Source: Property visits in 1985 and DIAND (1984, p. 141)

History: Several veins including the Discovery (Switchback), Shipment (Chinese Trench), Pit, Saddle and Lake veins are located at the headwaters of Freer Creek near the B.C./Yukon border.

The claims were first staked in 1947 upon the discovery of two galena-bearing quartz veins (Discovery and Shipment) by Allan F. Holliday and Roy R. Rouson. The property was optioned by Yukon Ranges Exploration Syndicate in 1948. 4.5 tonnes of ore assaying 1.37 g/t Au, 1.374.98 g/t Ag, 65.4% Pb and 1.5% Zn was mined and shipped to the Trail Smelter. Since 1959, the showings have been staked by Bruno Poulin of Klondike Silver Mines. A road was completed in 1979, connecting the property to the Alaska Highway. In 1979 and 1980, Poulin trenched the Switchback and Pit prospects, and shipped 14 tonnes of high grade ore to the Trail Smelter. The shipment assayed 1.30 g/t Au, 532.01 g/t Ag, 0.16% Cu, 29.1% Pb and 13.9% Zn.

Description: The Discovery Vein is exposed in a series of switchback bulldozer trenches, and in outcrop, 300 m southwest and 275 m above the trench. The vein strikes 027° and dips 55°E and contains argentiferous galena, sphalerite and pyrite in a quartz gangue. A vein exposed in a lower series of trenches was measured during the 1985 field season and found to parallel jointing that strikes 280°and dips 80°N. Pegmatite float was discovered in the trench. Veins occur in granite (Kgt) of the Cretaceous Cassiar Batholith. Granite may be altered for a distance of 30 m around the showings. Alteration minerals include chlorite, sericite and kaolinite. Mafic dykes (Tmd) parallel some veins.

4.8.7 POG

Klondike Silver Mines Ltd.
Silver, lead, zinc vein
105B-2
60°01'N, 130°33'W

References: DIAND (1984, p. 145), Abbott (1984)

Claims: WILLY 5-8

Source: Property visits in 1985 and DIAND (1984, p. 145)

History: Chuck Willman was granted a five year lease on the Willy 5-8 claims in 1980. The lease was cancelled in 1981. An adit was collared in 1982 but not driven far.

Description: A galena-sphalerite bearing quartz vein (up to 0.5 m wide) is exposed in an east-west facing cirque wall in granite (Kgt) of the Cretaceous Cassiar Batholith. The vein strikes 255° and dips 85°N, paralleling an east-west joint direction. The vein is exposed for 60-90 m vertically and for an unknown horizontal distance and may be a continuation of the Dale Vein, located on strike, 4 km to the east. Mineralization consists of rhythmic and symmetric crustiform bands of sphalerite-siderite-pyrite-quartz-galena; and erratically distributed coarse-grained galena and sphalerite in a vuggy white quartz gangue. The vein-wall rock contact is sharp. Black oxides coat fracture planes. The enclosing granite is intensely fractured for about 50 cm on either side of the vein. These fractures parallel both the vein and an east-west joint direction which is pervasive throughout the granite. A mafic dyke (up to 1 m wide) occurs several metres from the vein and parallels the same east-west fracture system.

4.8.8 LENA

Canadian Occidental Petroleum
Lead, zinc, silver vein
105B-2
60°10'N, 130°31'W

References: DIAND (1982, p. 105), DIAND (1984, p. 140), Abbott (1984)

Claims: Gary 1-4

Source: Property visits in 1985 and DIAND (1984, p. 140)

History: The claims were staked in 1981 by G. Aylward.

Description: This property is underlain by interbedded limestone-phyllite (lCls-ph) and marble (lCma) and intruded by the Cassiar Batholith (Kgt) along its western margin. Boulders of quartz veins containing coarse-grained sphalerite, galena, pyrite and chalcopyrite are exposed in trenches. Mineralization was not seen in place and its setting is not known. Several prominent north-trending lineaments cross the property and may be faults related to mineralization.

4.8.9 NEW SHOWING

Silver, lead, zinc vein
105B-2
60°03'N, 130°55'W

Claims: Unstaked

Source: Field observations in 1985

Description: A 30 cm wide quartz vein containing disseminated galena, sphalerite and pyrite occurs in Carboniferous mylonite (Mpmy). The vein strikes 045° and dips 85° southeast. A grab sample assayed 6800 ppm Zn, 13 ppb Au and 48 ppm Cd.

4.8.10 CARLICK

H. Hibbing
Quartz vein with pyrite
105B-2
60°03'N, 130°50'W

References: DIAND (1984, p. 142)

Claims: Kirk 1-4

Source: Property visit in 1985 and DIAND (1984, p. 142)

History: Hibbing staked the Kirk 1-4 claims in 1974, and later explored with bulldozer trenching.

Description: A 1 m wide quartz vein containing veinlets of coarse-grained pyrite occurs in graphitic phyllonite of unknown age. The vein strikes 145° and dips 50° southwest paralleling foliation in phyllonite. The showing occurs within the Cassiar Fault zone. Granite (Kgt) is locally tectonized and altered to orthogneiss (Kog) and possibly mylonite. Granitic rocks are highly argillitized. Grab samples of the quartz vein obtained in 1985 assayed 210 ppb Au, 63.2 ppm Sb, 1270 ppm As, 14 ppm Ag, and 300 ppm Zn.

4.8.11 LICK
Canadian Occidental Petroleum Ltd.
Lead, zinc, silver vein
105B-2
60°02'N, 130°45'W

References: DIAND (1982, p. 101)

Claims: LICK 1-8, 11-16, 23-28, 40-55

Source: Property visit in 1985, DIAND (1982, p. 101) and assessment report 090865 by M.J. Crandall.

History: The property was staked in 1979 to cover a reported uranium-silver stream sediment anomaly (Geological Survey of Canada, 1978). The Lick 40-56 claims were added to the south and west in 1980.

Description: A small showing (4cm by 30cm) of galena with disseminated pyrite was found in a quartz vein paralleling a shear zone in granite (Kgt) which strikes 060°-090° and dips steeply to the south. A hand sample from the showing assayed 1.16% Pb, 495 ppm Zn, and 15.0 ppm Ag. Limonite staining occurs along the shear zone for 10 m from the showing, and other inaccessible limonite stains may indicate further mineralization.

4.8.12 BLACK ROCK

Silver, lead, zinc, copper vein
105B-2
60°00'N, 130°47'W

References: National Mineral Inventory (105B02 Pb 001)
Claims: BLACKSTONE 1-16

Source: Above reference

History: Conwest Explorations Ltd. staked the ground as the BLACK ROCK claims in 1957 and carried out some prospecting.

Description: A silver-lead-zinc-copper vein occurs in undifferentiated Carboniferous quartzite (MPqt). The claims lie within the Cassiar Fault zone.

4.8.13 Additional Claims

The Aurex claims cover the area around Porcupine Creek and lie within the Cassiar Fault Zone on strike with the Carlick showing. The claims are underlain by Carboniferous quartzite and mylonite (MPqt and MPmy).

The Spencer and Hunter claims cover stream sediment geochemical anomalies along Spencer Creek. The claims are proximal to the Kodiak, Wolf and Fiddler properties and are underlain by Lower Cambrian sediments.

REFERENCES

ABBOTT, J.G.
1984: Silver-bearing veins and replacement deposits of the Rancheria District; in Yukon Exploration and Geology, 1983, DIAND, p. 34 to 41

BILLINGS, M.P.
1972: Structural Geology. Third Edition Prentice-Hall, Inc. 606 p.

BOSTOCK, H.S.
1948: Physiography of the Canadian Cordillera, with special reference to the area north of the fifty-fifth parallel; Geological survey of Canada, Memoir 247, 106p.

BOYLE, R.W.
1965: Geology, Geochemistry and Origin of the Lead-Zinc Silver Deposits of the Keno Hill Galena Hill area, Yukon Territory; Geol. Surv. Can., Bull. 111.

CAMPBELL, R.B.
1967: Geology of Glenlyon map-area, Yukon Territory (105L); G.S.L. Mem 352, 92 p.

CHRISTOPHER, P.A., WHITE, W.H., and HARAKAL, J.E.
1972: Age of molybdenum and tungsten mineralization in northern British Columbia; C.J.E.S., v. 9, p. 1727-1734.

CRAIG, D.B. and LAPORTE, P.J.
1972: North of 60 - Mineral Industry Report 1969 and 1970. Vol. 1 - Yukon Territory and southwestern sector, District of MacKenzie; Canada, Dept. of Indian Affairs and Northern Development, Northern Economic Development Branch, Report EGS 1972-1.

CRAIG, D.B. and MILNER, M.W.
1975: North of 60 - Mineral Industry Report 1971 and 1972, Yukon Territory; Vol. 1 of 3. Canada, Dept. of Indian Affairs and Northern Development, Northern Natural Resources and Environment Branch, Report EGS 1975-76.

CRANDALL, M.J.
1981: Assessment Report 090977. Report on Goat claims for Canadian Occidental Petroleum Ltd.

CRANDALL, M.J.
1981: Assessment Report 090865. Report on Lick claims for Canadian Occidental Petroleum Ltd.

D.I.A.N.D.
1981: Yukon Geology and Exploration, 1979-80; Dept. of Indian Affairs and Northern Development, Geology Section Publication, 364 pp.

D.I.A.N.D.
1982: Yukon Exploration and Geology 1981; Dept. of Indian Affairs and Northern Development, Geology Section Publication, 282 pp.

D.I.A.N.D.
1983: Yukon Exploration and Geology 1982; Dept. of Indian Affairs and Northern Development, Geology Section Publication, 259 pp.

D.I.A.N.D.
1984: Yukon Exploration and Geology 1983; Dept. of Indian Affairs and Northern Development, Geology Section Publication, 317 pp

FRITZ, W.H.
1980: Two new formations in the Lower Cambrian Atan Group, Cassiar Mountains, north-central British Columbia; in Current Research, Part B, Geology Survey of Canada, Paper 80-1B, p. 217-225.

FURNEAUX, B. and WHITE, G.E.
1983: Assessment Report 091501. Report on VP claims for Butler Mountain Mineral Corp. Closed report.

GABRIELSE, H.
1963: McDame map-area, Cassiar District, British Columbia, GSC Memoir 319.

GABRIELSE, H.
1969: Geology of Jennings River map-area, British Columbia; G.S.C. Paper 68-55.

GABRIELSE, H.
1985: Major dextral transcurrent displacements along the Northern Rocky Mountain Trench and related lineaments in north-central British Columbia; Geol. Sur. Am. Bull., V. 96, p. 1-14.

GABRIELSE, H., TEMPELMAN-KLUIT, D.J, BLUSSON, S.L. and CAMPBELL, R.B.
1980: MacMillan River, Yukon - District of MacKenzie - Alaska, Sheet 105, 115. Geological Survey of Canada, Map 1398A.

HARDING, T.P.
1974: Petroleum traps associated with wrench faults; The Am. Ass. of Petrol. Geol. Bull., V. 58, p. 1290-1304.

HARMS, T.
1985: Pre-emplacement thrust faulting in the Sylvester Allochthon, northeast Cry Lake map area, British Columbia; in: Current Research, 1985, G.S.C. Paper 85-1A, p. 301-324.

HARRIS, F.R.
1971: Assessment Report 060680. 1971 Property examination Silver Seven Tungsten property. Amax Vancouver Office.

HYNDMAN, D.W.
1972: Petrology of Igneous and Metamorphic Rocks. McGraw-Hill Book Company.

KLASSEN, R.W.
1982: Surficial geology of Wolf Lake, Yukon Territory. Geological Survey of Canada, Map 14-1982.

KLASSEN, R.W. (in press).
The Tertiary-Pleistocene stratigraphy of the Liard plan, southeastern Yukon. Can. J. Earth Sci.

GEOLOGICAL SURVEY OF CANADA
1978: Regional stream sediment and water geochemical reconnaissance data, Yukon Territory. Geological Survey of Canada, Open File 563.

GREEN, L.H.
1966: The mineral industry of Yukon Territory and southwestern District of MacKenzie, 1965; Geol. Surv. Can., Paper 66-31.

GREEN, L.H., RODDICK, J.A., and BLUSSEN, S.L.
1966: Frances Lake map-area, G.S.C., Map 6-1966.

LORD, C.S.
1944: Geological reconnaissance along the Alaska Highway between Watson Lake and Teslin River, Yukon and B.C.; Geol. Surv. Can., Paper 44-25 (Includes Preliminary Map 44-25A).

MULLIGAN, R.
1963: Teslin Map Area; G.S.C., Memoir 326.

MULLIGAN, R.
1969: Metallogeny of the Region Adjacent to the Northern Part of the Cassiar Batholith, Yukon Territory and B.C. (Pts. of 104-O, P, and 105-B); Geol. Surv. Can., Paper 70-1A.

MULLIGAN, R.H.
1975: Geology of Canadian tin occurrences; Geol. Surv. Can., Geol. Rept. No. 28, 155 pp.

NATIONAL MINERAL INVENTORY
A file maintained by the Mineral Policy Section, Department of Energy, Mines and Resources, Government of Canada.

POOLE, W.H.
1956: Geology of the Cassiar Mountains in the vicinity of the Yukon-British Columbia boundary. Unpublished Ph.D. thesis, Princeton University.

POOLE, W.H., RODDICK, J.A., and GREEN, L.H.
1960: Wolf Lake; G.S.C., Map 10-1960.

RODGERS, D.A.
1980: Analysis of pull-apart basin development produced by en echelon strike-slip faults; International Assoc. of Sedimentologists; in P.G. Ballance and H.G. Reading, Sedimentation in Oblique slip-mobile zones, spec. Publ 4, p. 27-42.

SINCLAIR, W.D. (in press)
Potassium argon age determination, Yukon. in Age determinations and geological studies, potassium-argon isotoic ages, Geological Survey of Canada, Paper.

SYLVESTER, A.G. and SMITH, R.R.
1976: Tectonic transpression and basement-controlled deformation in San Andreas Fault Zone, Salton Trough, California; A.A.P.G., Bull. 60, p. 173-194.

TCHALENKO, J.S.
1970: Similarities between shear zones of different magnitudes; G.S.A., B. v. 81, p. 1625-1640.

TEMPELMAN-KLUIT, D.J.
1977: Quiet Lake and Finlayson Lake map-areas, G.S.C., Open File Rept 486.

TEMPELMAN-KLUIT, D.J.
1979: Transported cataclasite, ophiolite and granodiorite in Yukon: evidence of arc-continent collision. Geological Survey of Canada Paper 79-14, 27 p.

TEMPELMAN-KLUIT, D.J.
1981: Geology and mineral deposits of southern Yukon; in Yukon Geology and Exploration, 1979-1980, DIAND, p. 7-31.

WHEELER, J.D., GREEN, L.H. and RODDICK, J.A.
1960: Finlayson Lake map-area, G.S.C., map 8-1960.

WHITE, G.E.
1972: Assessment Report 060112. Report on Luck mineral claims for Core Mountain Mines Ltd. Open Report.

WILCOX, R.E., HARDING, T.P. and SEELY, D.R.
1973: Basic Wrench Tectonics; AAPG B V. 57, P. 74-96.

SHEET 105B-2

LATITUDE 60°00' To 60°15'
LONGITUDE 130°30' To 131° 00'

CANADA
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
NORTHERN ADMINISTRATION AND LANDS BRANCH
LANDS DIVISION

SCALE: ½ MILE To 1 INCH

ISSUED UNDER THE AUTHORITY OF THE MINISTER
OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

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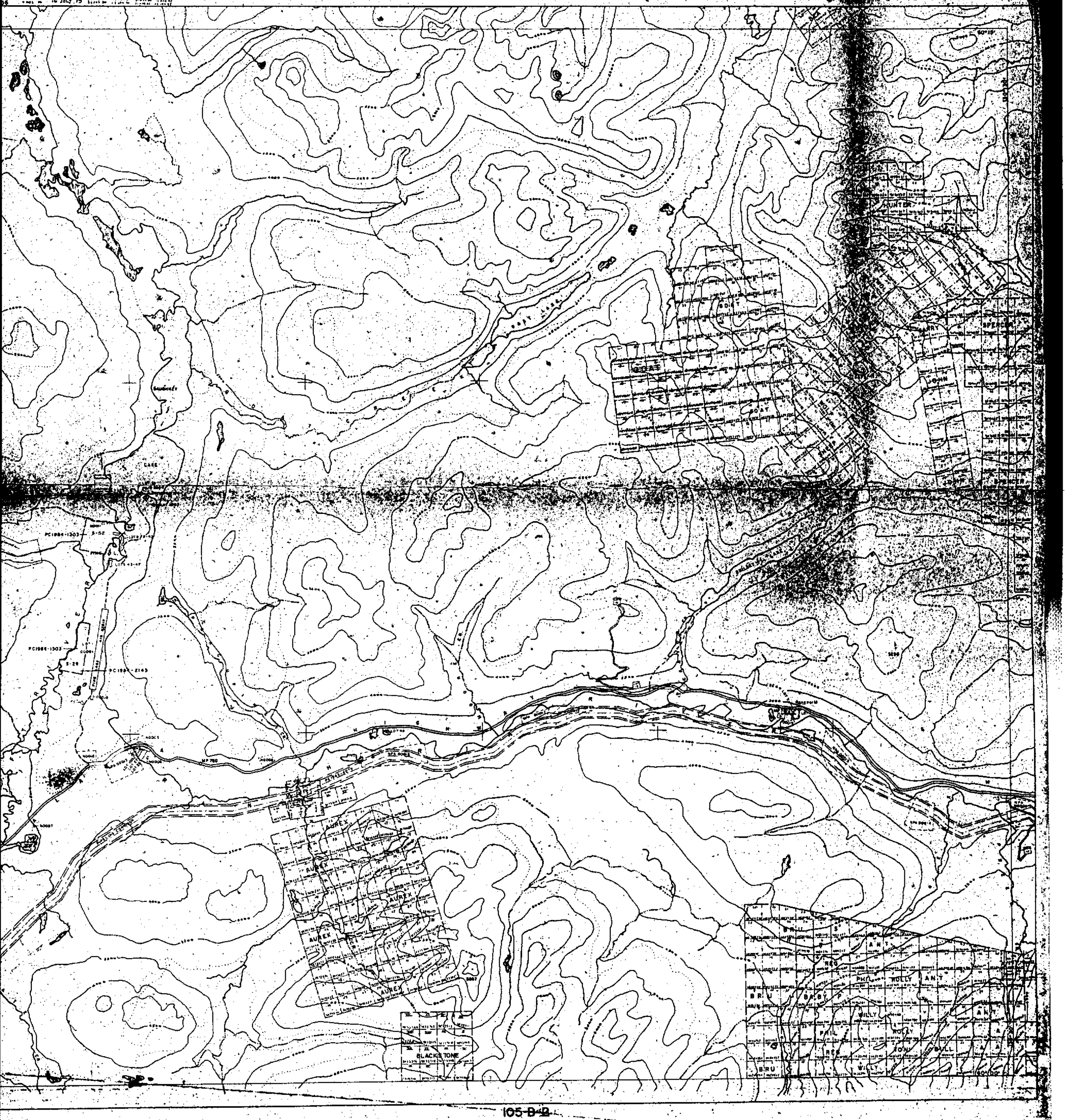
WHATSOEVER.

Note: Entry on certain Lands is withdrawn from Staking by P.C.1984-2143 & P.C.1984-1303 to facilitate the settlement of Native Land Claims without prejudice to Existing Surface and Subsurface Rights.



105-B-2

SHEET 105-B-1

LATITUDE 60°00' TO 60°15'
LONGITUDE 130°00' TO 130°30'

CANADA
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
NORTHERN ADMINISTRATION AND LANDS BRANCH
LANDS DIVISION

SCALE 1/2 MILE TO 1 INCH

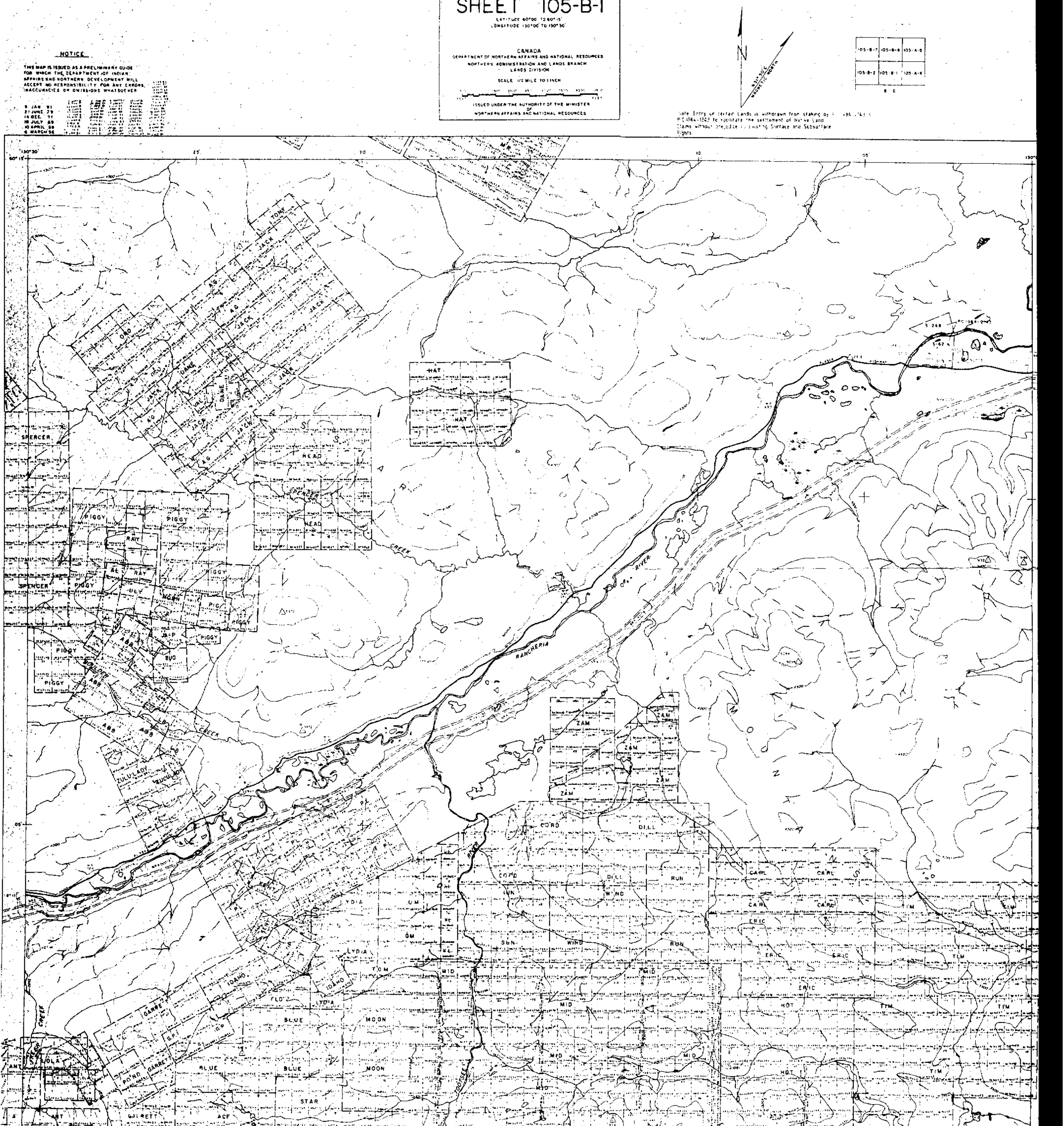
ISSUED UNDER THE AUTHORITY OF THE MINISTER
OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

NOTICE

THIS MAP IS ISSUED AS A PRELIMINARY GUIDE FOR WHICH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT WILL ACCEPT NO RESPONSIBILITY FOR ANY ERRORS, INACCURACIES OR OMISSIONS WHATSOEVER

8 JAN 81
21 JUNE 79
14 DEC. 77
18 JULY 69
10 APRIL 68
6 MARCH 56

Note: Entry on certain Lands is withdrawn from staking by P.C. 1984-1763 & P.C. 1984-1303 to facilitate the settlement of Native Land Claims without prejudice to existing Surface and Subsurface Rights



105-B-1

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

LEGEND

QUATERNARY
Pleistocene and Recent

*****
Q unconsolidated glacial, glaciofluvial, glaciolacustrine, alluvial and soil deposits.
Qbt basalt: porphyro-aphanitic with light green, 0.5 to 1 mm olivine phenocrysts in a light to dark brown groundmass; subaerial flows 2 to 5 m thick, flow tops marked by vesicular ropy basalt; columnar jointing locally present.

TERTIARY
Eocene (?)
Tmd mafic dykes: porphyro-aphanitic with biotite and rarely augite phenocrysts in a dark green groundmass; up to 1 m thick.
Tfd felsic dykes: porphyro-aphanitic with quartz and albite phenocrysts in a light grey groundmass; up to 1 m thick.
Tqv quartz veins: light grey; generally coarsely crystalline; associated minerals may include feldspar, pyrite, galena, sphalerite, siderite and lepidolite; generally less than 0.5 m thick.

CRETACEOUS

K
unsubdivided granite, granodiorite, orthogneiss and sheared and tectonized granite.
Kgt granite: speckled light grey or light red and dark black; phaneritic, medium to coarsely crystalline and equigranular to porphyritic with up to 5 cm long orthoclase phenocrysts; of 40% alkali feldspar, 30% quartz, 20% plagioclase and 10% biotite and/or muscovite. Minor amounts of granodiorite locally present.
Kog orthogneiss: medium to dark grey and speckled light grey or light red and dark black; consists of augen of albite in a cataclastic matrix of quartz, feldspar and mica. Minor amounts of sheared and tectonized granite are present.

JURASSIC (?) and CRETACEOUS

******
JKdt diorite: light grey-green to dark black; phaneritic, medium crystalline and equigranular; consists of 60% plagioclase, 20% biotite and 20% hornblende (?).

MISSISSIPPIAN and PENNSYLVANIAN (?)

MP
unsubdivided mylonite, breccia, quartzite and dolostone
MPds dolostone: light grey; very finely crystalline dolomite; massive.
MPmy mylonite: interlayered light and dark laminae of very finely crystalline quartz.
MPqt quartzite: light grey-green; modal grain size is fine grained sand; mineralogically a quartzarenite with minor chlorite and muscovite.

MISSISSIPPIAN

******
Mat,ch intercalated andesite agglomerate and chert: andesite agglomerate is porphyro-aphanitic with 1 to 2 mm long hornblende phenocrysts in a light to medium green groundmass; andesite blocks range from 1 to 30 cm in length. Chert is medium green; horizontally laminated and bedded. Minor amounts of medium red argillite are locally present.

DEVONIAN and MISSISSIPPIAN

** **uDIM**
unsubdivided quartzite, metaconglomerate, phyllite, argillite and schist.
uDIMqt,mc interbedded quartzite and metaconglomerate: quartzite is dark grey; modal grain size is medium grained sand; mineralogically a litharenite. Metaconglomerate is dark grey; modal grain size is fine to coarse pebble gravel; mineralogically a chert pebble lithrudite. Minor amounts of black argillite and plant fragments are locally present.
uDIMph phyllite: medium black; thin interbedded quartzite beds are present. Minor amounts of schist and argillite are locally present.

DEVONIAN

** **mD**
unsubdivided limestone and minor amounts of dolostone.
mDls limestone: light to dark grey; finely crystalline; massive or horizontally bedded; poorly preserved fossils (spaghettistone) are present. Minor amounts of interbedded black fetid dolostone and limestone are locally present.

SILURIAN and DEVONIAN

** **mSD**
unsubdivided dolostone, siltstone, quartzite and limestone
mSDls limestone: medium grey; finely crystalline; horizontally laminated and bedded.
mSDqt quartzite: medium to dark grey; modal grain size is medium sand; mineralogically a quartzarenite with zircon and tourmaline common; horizontally laminated and bedded. Minor amounts of phyllite are locally present.
mSDds,st dolostone and siltstone: light to medium grey, weathers medium grey to light brown; finely crystalline massive or thin bedded; trace fossils are present.

CAMBRIAN and ORDOVICIAN

u€O
unsubdivided phyllite, hornfels and minor limestone
u€Oph phyllite: light to medium grey, weathers light silver-grey; highly folded; minor amounts of black argillite and rare amounts of limestone are locally present.
u€Ohs hornfels: light grey brown, weathers light red-brown; thinly laminated; magnetite and pyrite present along fractures. Minor amounts of marble and skarn are locally present.

CAMBRIAN

l€c
unsubdivided carbonates, includes interbedded limestone and phyllite, limestone, dolostone, marble and minor schist.
l€ma marble: light grey; coarsely to very coarsely crystalline; laminated and bedded. Minor amounts of schist are present.
l€ds dolostone: light grey, weathers light red; ranges from fine to coarsely crystalline; generally massive; pisolites are locally present.
l€ls limestone: medium grey; finely crystalline to bioclastic; archaeocyathids are locally abundant and trilobite fragments, oolites and pisolites may be present.
l€ls-ph interbedded limestone and phyllite: limestone is light grey and weathers light grey-brown; finely crystalline; massive or horizontally laminated. Phyllite is medium grey. Both limestone and phyllite beds are generally less than 10 cm thick and highly folded. Minor amounts of marble and schist are locally present.

l€s
unsubdivided siliciclastics, including quartzite and phyllite and minor amounts of limestone.
l€ph phyllite: medium brown; thin interbedded quartzite beds and rare limestone beds are locally present.
l€qt quartzite: light grey to medium brown; modal grain size is medium sand; mineralogically a quartzarenite with zircon rare; massive. Minor amounts of dark brown argillite are locally present.

* unconsolidated deposits on the map are represented by the unsubdivided part of the lithostratigraphic units and lie outside of the outcrop symbol

** not exposed within this map area (see map area 105B/1)

SYMBOLS

area of bedrock outcrop	⁘
float	⊗
geological boundary, observed	───
geological boundary, interpreted	— —
fault, observed	━━┳━━
fault, assumed (dot indicates down thrown side, arrows indicate horizontal movement)	⇄ ━━
thrust fault, assumed	▲▲ ▲▲
lineament, from air photographs	━ ━ ━
F$_1$ structures	
bedding (S$_0$), inclined	┴
slaty cleavage (S$_1$), inclined	┴
F$_2$ structures	
crenulation cleavage (S$_2$) inclined, vertical	╧ ╪
multiple folds, arrows indicate fold axis (f$_2$)	⇝
F$_3$ structures	
jointing (S$_3$), inclined	╧
small-scale folds, arrow indicates plunge of fold axis (f$_3$)	→
anticline	━◆━
syncline	━⧗━
jointing (in plutonic rocks), inclined	└
fossil locality	⊕
locality where age has been determined in million of years	⊗ 52
sinkhole, cave	⊛
breccia	▲▲
dyke or vein	▬
mineral deposit or prospect	● 1
mineral locality	X
magnetite	mt
pyrite	pt
specularite	st
fluorite	ft
goethite	gt
silver	Ag
lead	Pb
zinc	Zn
tin	Sn
copper	Cu
tungsten	W
molybdenum	Mo
gold	Au
primary road	───
secondary road	- - - -

Geology by G.W. Lowey and J.F. Lowey, 1985.

Open File no. 1986-1

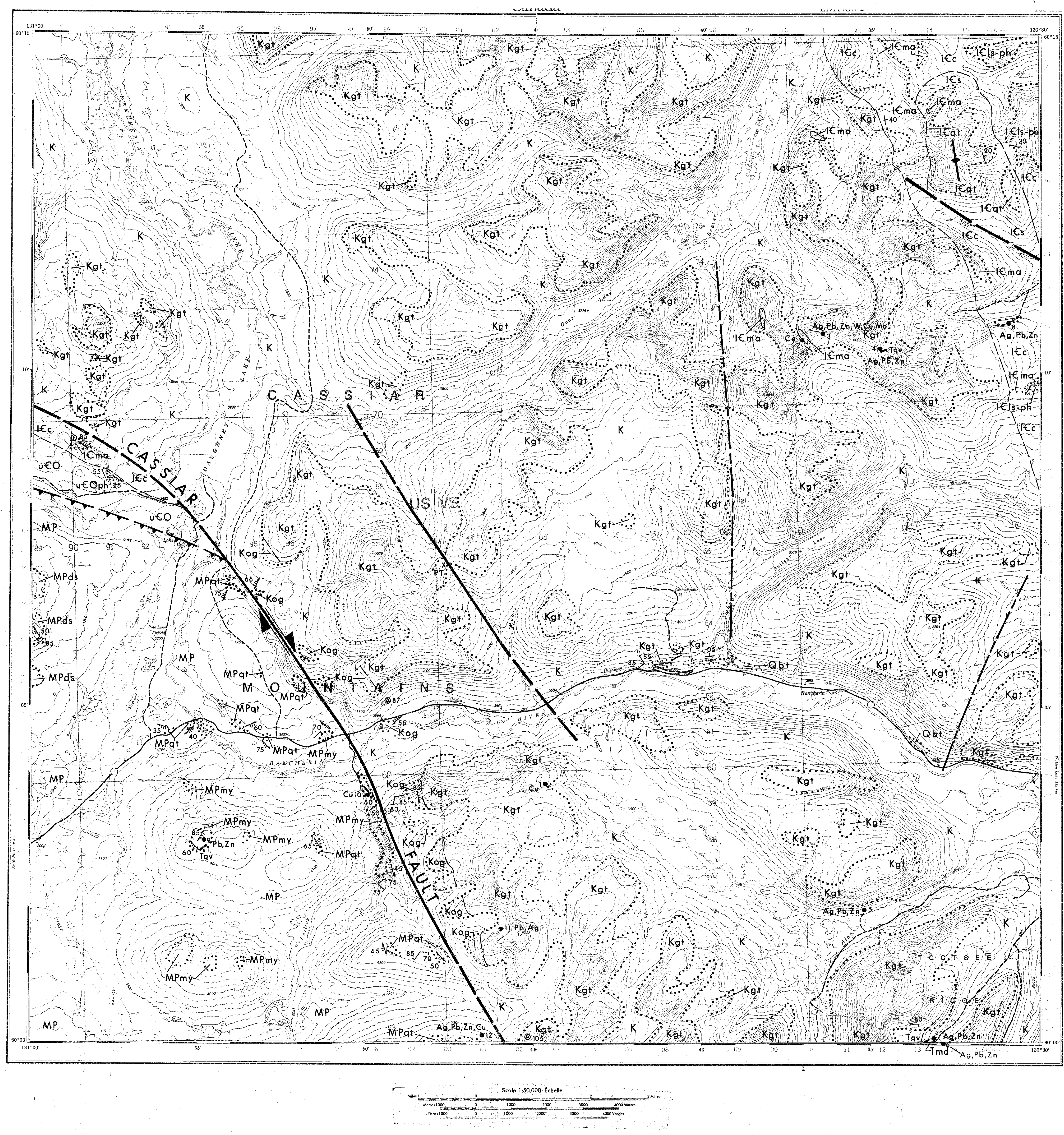
Drawn by the N.A.P. Drafting section

Approximate magnetic declination in 1985 was 30°27' east and decreasing 4.5' west annually.

Elevations in feet above mean sea level, contour interval 100 feet.

This map accompanies the following report:
Lowey, G.W. and Lowey, J.F., 1986. Geology of Spencer Creek (105B/1) and Daughney Lake (105B2) map areas, Rancheria district, southeast Yukon; Exploration and Geological Division, Yukon, Indian and Northern Affairs Canada. Open File Report 1986-1 with two 1:50,000 scale maps with marginal notes.

Funded by Canada-Yukon Economic Development Agreement (Contract YEDA-85-01).



GEOLOGY OF THE DAUGHNEY LAKE MAP AREA (105B/2), RANCHERIA DISTRICT, SOUTHEAST YUKON

MINERAL OCCURRENCES

Ten previously known and two new mineral occurences are described. The following information is compiled from annual Mineral Industry Reports and Yukon Exploration and Geology Reports, D.I.A.N.D., the National Mineral Inventory (Energy, Mines and Resources Canada); Assessment Reports 090865 and 090632 by M.J. Crandall; and from field observations made during 1985.

(1) Troy Cu
Chalcopyrite is reported in hairline fractures in granitic (Kgt) talus of the Cretaceous Cassiar Batholith.

(2) SHILSKY Cu
Mineralization occurs in a small roof pendant in the Cassiar Batholith. Minor amounts of chalcopyrite are reported to occur in massive pyrite and pyrrhotite which have been traced for 800 m and reach widths of 30 m.

(3) GOAT Ag, Pb, Zn, W, Cu, Mo
Sedimentary strata (lC) occur as roof pendants within intrusive rocks (Kgt) of the Cretaceous Cassiar Batholith. Small skarns are abundant and some contain pyrrhotite or pyrite along with minor scheelite, chalcopyrite and molybdenite. Also, narrow pyrite-galena-sphalerite-fluorite pegmatite veins occur in northeast trending shear zones in granite (Kgt).

(4) WOLF Ag, Pb, Zn
The property is underlain by Lower Cambrian interbedded limestone and phyllite (l€ls-ph) which occur as roof pendants within the Cassiar Batholith. Several limonite and manganese stained gossans are exposed in trenches. Mineralization consists of galena-bearing quartz veins which parallel an east-west trending joint and fracture plane.

(5) ALAN Ag, Pb, Zn
Granite (Kgt) of the Cassiar Batholith is weakly altered to chlorite and sericite over an undetermined area. Within the altered zone, limonite stained patches are exposed in several closely spaced pits. Quartz and pyrite content of the granite is higher within the stained patches. Assay values of samples taken from these patches range from 0.77 g/t Ag to 24.26 g/t Ag (D.I.A.N.D., 1984, p. 148).

(6) HOLLIDAY (SWITCHBACK) Ag, Pb, Zn
Mineralization consists of several galena-sphalerite bearing quartz veins localized along steeply dipping northeast to east trending faults and fracture zones in granite (Kgt) of the Cassiar Batholith. Mafic dykes (Tmd) parallel some veins. Alteration minerals include chlorite, sericite and kaolinite and occur for up to 30 metres around veins. Drill hole intersections at the Discovery Vein assayed 42.51 g/t Ag, 3.24% Pb and 0.24% Zn over 0.2 m (D.I.A.N.D., 1984, p. 142).

(7) POG Ag, Pb, Zn
A quartz vein (up to 0.5 m wide) is exposed in an east-facing cirque wall in granite (Kgt) of the Cassiar Batholith. The vein strikes 255° and dips 85° N, paralleling an east-west joint direction which is pervasive throughout the granite. Mineralization consists of rhythmic and symmetric crustiform bands of sphalerite-siderite-pyrite-quartz-galena; and erratically distributed coarse-grained galena and sphalerite in a vuggy white quartz gangue. The vein-wallrock contact is sharp. Black oxides coat fracture planes. A mafic dyke (Tmd) occurs several metres from the vein and parallels the same east-west fracture system.

(8) LENA Ag, Pb, Zn, Cu
This property is underlain by interbedded limestone-phyllite (l€ls-ph) and marble (l€ma) and is intruded by the Cassiar Batholith along its western margin. Boulders of quartz veins containing coarse-grained sphalerite, galena, pyrite and chalcopyrite are exposed in trenches. Several prominent north-trending lineaments that cross the property may be faults related to mineralization.

(9) NEW SHOWING Pb, Zn
A 30 cm wide quartz vein containing disseminated sphalerite, galena and pyrite occurs in Carboniferous mylonite (MPmy). The vein strikes 045° and dips 85° SE. A grab sample assayed 6800 ppm Zn, 13 ppb Au and 48 ppm Cd.

(10) CARLICK Cu
A 1 m wide quartz vein containing veinlets of coarse-grained pyrite and copper staining occurs in graphitic phyllonite of unknown age. A grab sample assayed negligible gold. The vein strikes 145° and dips 50° SW, paralleling foliation in phyllonite. The showing occurs within the Cassiar Fault Zone. Granite (Kgt) is locally tectonized and altered to orthogneiss (Kog) and mylonite. Granitic rocks are highly argillized.

(11) LICK Pb, Ag
A small showing (4 cm by 30cm) of galena with disseminated pyrite was found in a quartz vein that parallels a shear zone in granite (Kgt) which strikes 060°-090° and dips steeply to the south.

(12) BLACKROCK Ag, Pb, Zn, Cu
A silver-lead-zinc-copper vein occurs in quartzite (MPqt).

Canada

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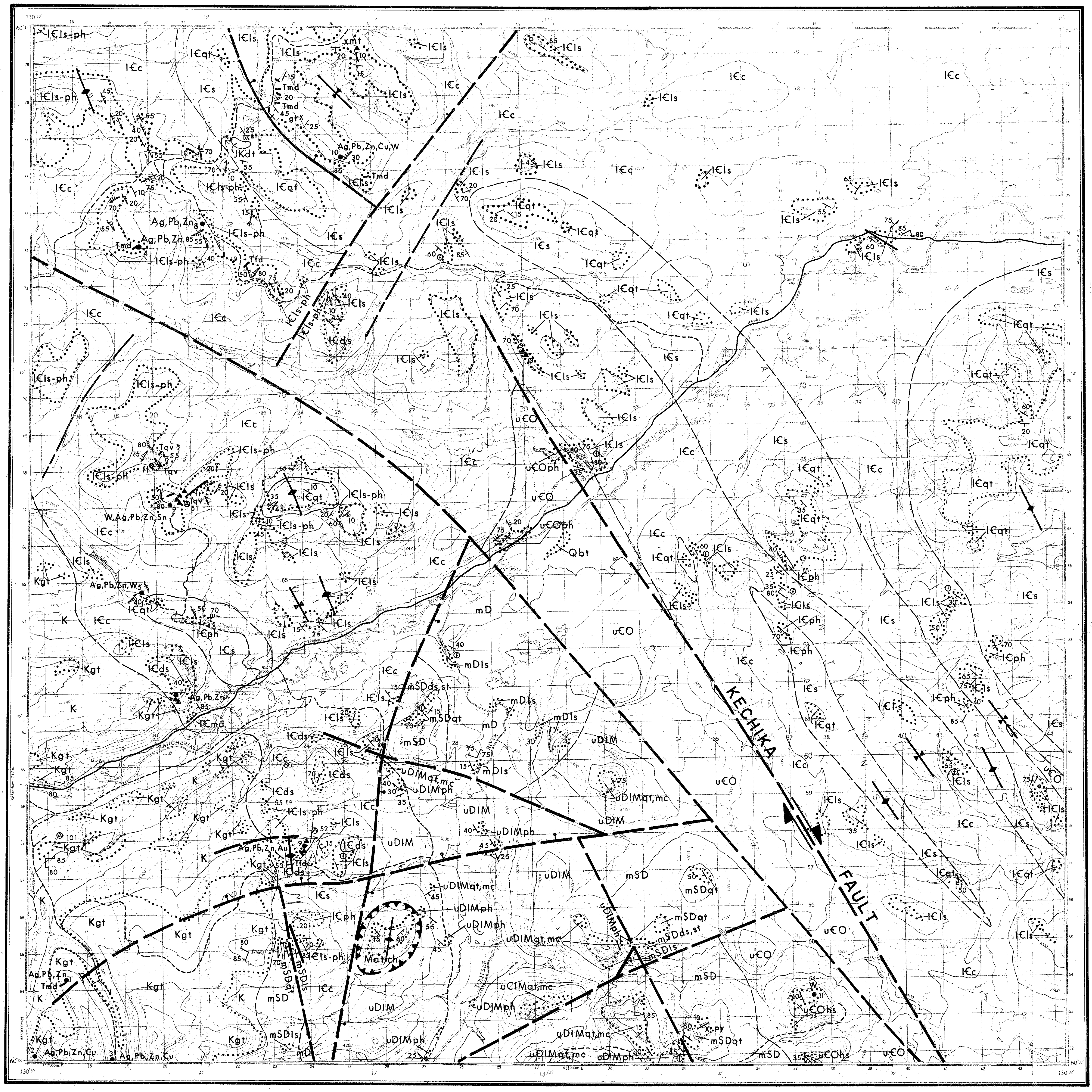

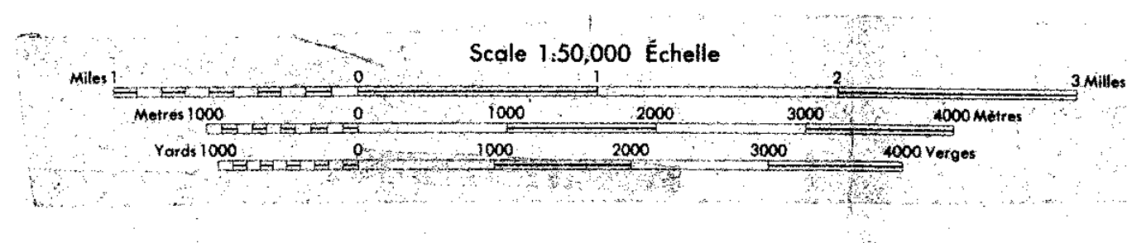

SYMBOLS

area of bedrock outcrop	⋯
float	⊗
geological boundary, observed	——
geological boundary, interpreted	— —
fault, observed	━━
fault, assumed (dot indicates down thrown side, arrows indicate horizontal movement)	⇄ ━ ━
thrust fault, assumed	▲▲ ▲▲
lineament, from air photographs	━ ━ ━
F_1 structures bedding (S_0), inclined	⊥
slaty cleavage (S_1), inclined	⊥
F_2 structures crenulation cleavage (S_2) inclined, vertical	
multiple folds, arrows indicate fold axis (f_2)	
F_3 structures jointing (S_3), inclined	
small-scale folds, arrow indicates plunge of fold axis (f_3)	
anticline	◆
syncline	⧗
jointing (in plutonic rocks), inclined	└
fossil locality	Ⓕ
locality where age has been determined in million of years	Ⓐ52
sinkhole, cave	⊕
breccia	▲▲
dyke or vein	▬
mineral deposit or prospect	●1
mineral locality	X
magnetite	mt
pyrite	pt
specularite	st
fluorite	ft
goethite	gt
silver	Ag
lead	Pb
zinc	Zn
tin	Sn
copper	Cu
tungsten	W
molybdenum	Mo
gold	Au
primary road	——
secondary road	- - - -

Geology by G.W. Lowey and J.F. Lowey, 1985.

Open File 1986-1

Drawn by the N.A.P. Drafting section

Approximate magnetic declination in 1985 was 30°27′ east and decreasing 4.5′ west annually.

Elevations in feet above mean sea level, contour interval 100 feet.

This map accompanies the following report: Lowey, G.W. and Lowey, J.F., 1986. Geology of Spencer Creek (105B/1) and Daughney Lake (105B/2) map areas, Rancheria district southeast Yukon; Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada. Open File Report 1986-1 with two 1:50,000 scale maps with marginal notes.

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LEGEND

[*]

QUATERNARY
Pleistocene and Recent
Q unconsolidated glacial, glaciofluvial, glaciolacustrine, alluvial and soil deposits.
Qbt basalt: porphyro-aphanitic with light green, 0.5 to 1 mm olivine phenocrysts in a light to dark brown groundmass; subaerial flows 2 to 5 m thick, flow tops marked by vesicular ropy basalt; columnar jointing locally present.

TERTIARY
Eocene (?)
Tmd mafic dykes: porphyro-aphanitic with biotite and rarely augite phenocrysts in a dark green groundmass; up to 1 m thick.

Tfd felsic dykes: porphyro-aphanitic with quartz and albite phenocrysts in a light grey groundmass; up to 1 m thick.

Tqv quartz veins: light grey; generally coarsely crystalline; associated minerals may include feldspar, pyrite, galena, sphalerite, siderite and lepidolite; generally less than 0.5 m thick.

[K]

CRETACEOUS
unsubdivided granite, granodiorite, orthogneiss and sheared and tectonized granite.
Kgt granite: speckled light grey or light red and dark black; phaneritic, medium to coarsely crystalline and equigranular to porphyritic with up to 5 cm long orthoclase crystals; consists of 40% alkalie feldspars, 30% quartz, 20% plagioclase and 10% biotite and/or muscovite. Minor amounts of granodiorite locally present.

Kog orthogneiss: medium to dark grey and speckled light grey or light red and dark black; consists of augen of albite in a cataclastic matrix of quartz, feldspar and mica. Minor amounts of sheared and tectonized granite are present.

[**]

JURASSIC (?) and CRETACEOUS
JKdt diorite: light grey-green to dark black; phaneritic, medium crystalline and equigranular; consists of 60% plagioclase, 20% biotite and 20% hornblende (?).

** [MP]

MISSISSIPPIAN and PENNSYLVANIAN (?)
unsubdivided mylonite, breccia, quartzite and dolostone
MPds dolostone: light grey; very finely crystalline dolomite; massive.

MPmy mylonite: interlayered light and dark laminae of very finely crystalline quartz.

MPqt quartzite: light grey-green; modal grain size is fine grained sand; mineralogically a quartzarenite with minor chlorite and muscovite.

[**]

MISSISSIPPIAN
Mat,ch intercalated andesite agglomerate and chert: andesite agglomerate is porphyro-aphanitic with 1 to 2 mm long hornblende phenocrysts in a light to medium green groundmass; andesite blocks range from 1 to 30 cm in length. Chert is medium green; horizontally laminated and bedded. Minor amounts of medium red argillite are locally present.

[uDIM]

DEVONIAN and MISSISSIPPIAN
unsubdivided quartzite, metaconglomerate, phyllite, argillite and schist.
uDIMqt,mc interbedded quartzite and metaconglomerate: quartzite is dark grey; modal grain size is medium grained sand; mineralogically a litharenite. Metaconglomerate is dark grey; modal grain size is fine to coarse pebble gravel; mineralogically a chert pebble lithrudite. Minor amounts of black argillite and plant fragments are locally present.

uDIMph phyllite: medium black; thin interbedded quartzite beds are present. Minor amounts of schist and argillite are locally present.

[mD]

DEVONIAN
unsubdivided limestone and minor amounts of dolostone.
mDls limestone: light to dark grey; finely crystalline; massive or horizontally bedded; poorly preserved fossils (spaghettistone) are present. Minor amounts of interbedded black fetid dolostone and limestone are locally present.

[mSD]

SILURIAN and DEVONIAN
unsubdivided dolostone, siltstone, quartzite and limestone
mSDls limestone: medium grey; finely crystalline; horizontally laminated and bedded.

mSDqt quartzite: medium to dark grey, modal grain size is medium sand; mineralogically a quartzarenite with zircon and tourmaline common; horizontally laminated and bedded. Minor amounts of phyllite are locally present.

mSDds,st dolostone and siltstone: light to medium grey, weathers medium grey to light brown; finely crystalline massive or thin bedded; trace fossils are present.

[u€O]

CAMBRIAN and ORDOVICIAN
unsubdivided phyllite, hornfels and minor limestone
u€Oph phyllite: light to medium grey, weathers light silver-grey; highly folded; minor amounts of black argillite and rare amounts of limestone are locally present.

u€Ohs hornfels: light grey brown, weathers light red-brown; thinly laminated; magnetite and pyrite present along fractures. Minor amounts of marble and skarn are locally present.

[l€c]

CAMBRIAN
unsubdivided carbonates, includes interbedded limestone and phyllite, limestone, dolostone, marble and minor schist.
l€ma marble: light grey; coarsely to very coarsely crystalline; laminated and bedded. Minor amounts of schist are present.

l€ds dolostone: light grey, weathers light red; ranges from fine to coarsely crystalline; generally massive; pisolites are locally present.

l€ls limestone: medium grey; finely crystalline to bioclastic; archaeocyathids are locally abundant and trilobite fragments, oolites and pisolites may be present.

l€ls-ph interbedded limestone and phyllite: limestone is light grey and weathers light grey-brown; finely crystalline; massive or horizontally laminated. Phyllite is medium grey. Both limestone and phyllite beds are generally less than 10 cm thick and highly folded. Minor amounts of marble and schist are locally present.

[l€s]

unsubdivided siliciclastics, including quartzite and phyllite and minor amounts of limestone.
l€ph phyllite: medium brown; thin interbedded quartzite beds and rare limestone beds are locally present.

l€qt quartzite: light grey to medium brown; modal grain size is medium sand; mineralogically a quartzarenite with zircon rare; massive. Minor amounts of dark brown argillite are locally present.

* unconsolidated deposits on the map are represented by the unsubdivided part of the lithostratigraphic units and lie outside of the outcrop symbol

** not exposed within this map area (see map area 105B/2)

MINERAL OCCURRENCES

Eleven previously known minerals occurrences are described. The following information was compiled from annual Mineral Industry Reports and Yukon Exploration and Geology Reports of D.I.A.N.D.; the National Mineral Inventory (Energy Mines and Resources Canada); Assessment Report 06068 by F.R. Harris and field observations made during 1985.

(1) DALE Ag, Pb, Zn

A 20 cm wide galena-bearing quartz vein is exposed in a trench for a strike length of 20 m in granite (Kgt) of the Cassiar Batholith. The vein strikes 245° and dips 60° N. A 1.5 m wide mafic dyke (Tmd) parallels the vein and cuts it in one place. An envelope of poorly developed argillic alteration occurs around the vein. Drill intersections of 199.9 g/t Ag, 4.31% Pb and 2.68% Zn have been reported (D.I.A.N.D., 1984, p. 140).

(2) LUCK (FREER) Ag, Pb, Zn, Cu

Argentiferous galena, sphalerite and minor chalcopyrite occur in quartz veins and lenses in fracture zones in granite (Kgt) which strike 085°-090° and dip 75°-85° S. Four veins occur in the Yukon and a fifth occurs on the B.C. side. The granite is also cut by northerly trending mafic dykes (Tmd) up to 5 m wide. Chlorite, sericite and argillic alteration envelopes occur in granite for several metres around the showings. A grab sample of galena in quartz assayed 564.2 g/t Ag, 8.4% Pb and trace Au (National Mineral Inventory)

(3) LUCKY (ANT) Ag, Pb, Zn, Cu

At least six trains of granitic boulders (Kgt) containing fine-grained argentiferous galena and lesser amounts of sphalerite, chalcopyrite, bornite and pyrite occur in talus of the Cassiar Batholith. Forty-three assays from different mineralized boulders average 9.25 g/t Ag, 57.9% Pb and 0.74% Zn (D.I.A.N.D., 1984, p, 146).

(4) HARDTACK Ag, Pb, Zn

Gossans of black iron oxides (goethite) and possibly manganese oxides occur along a contacts between mafic dykes (Tmd) and Lower Cambrian interbedded limestone and phyllite (l€ls-ph). Mafic dykes strike 075° and dip 80° S, paralleling an east-west joint direction and cutting across bedding. Two or more parallel quartz-calcite veins up to 15 cm wide with a strike length of 210 m have been reported. Veins strike 060°, cut across bedding and are manganese stained near surface. Mineralization consists of galena and sphalerite and a chip sample across 15 cm assayed 1305.1 g/t Ag, 65.5% Pb and 0.9% Zn (National Mineral Inventory).

(5) LUCK (A+B) Ag, Pb, Zn, W

Disseminated sphalerite, pyrite and pods of galena occur in interbedded limestone and phyllite (l€ls-ph) in an east-trending lens-shaped zone, 1 to 12 m wide and approximately 100 m long. Sulphides occur as replacement lenses and narrow, irregular veinlets. The mineralized outcrop is highly fractured and replacement occurs along a 270° striking 40° S dipping joint and fracture plane. The northern contact of the mineralized zone is marked by an east-trending calcite-scheelite vein which was emplaced along a fault. Detailed sampling indicated an averagd of 261.2 g/t Ag, 8.51% Pb and 9.9% Zn over 10 m (Craig and Laporte, 1972, p. 136).

(6) FIDDLER W, Ag, Pb, Zn, Sn

A series of northeast striking quartz veins (up to 0.8 m wide) occur in Lower Cambrian interbedded limestone and phyllite. Quartz veins contain variable concentrations of wolframite, galena, scheelite, fluorite and minor amounts of cassiterite, stannite, sphalerite, chalcopyrite and pyrite. Samples of the main vein assayed 516.3 g/t Ag, 0.2% Cu, 3.34% Pb and 0.67% W over 1 m (Harris, 1971). A quartz breccia striking 060° and dipping steeply south is exposed 500 m east of the wolframite-bearing quartz veins for a strike length of 600 m and width of 40 m. The breccia contains unevenly disseminated scheelite and minor fluorite and assayed up to 0.54% W over 1.5 m (Harris, 1971). Limited exposures of massive galena occur in shear zones at the Pete and North showings.

(7) STERLING (ZULU LADY) Ag, Pb, Zn

The Sterling property is underlain by Lower Cambrian dolostone (l€ds) near the western contact with the Cretaceous Cassiar Batholith (Kgt). The main showing consists of irregular pods of coarse-grained galena, sphalerite and pyrite associated with a north-trending dolostone-limestone breccia. The breccia is exposed in a trench over a 2 by 4 m area and is in sharp contact with marble to the west and dolostone to the east (Ron Stack, pers. comm. 1985). A 1 m wide carbonate vein trending 065° is exposed for approximately 60 m at the upper showing. The vein contains sparsely disseminated galena and is enveloped by a fine-grained dolomite breccia.

(8) KODIAK Ag, Pb, Zn, Cu

Narrow galena-bearing carbonate veins parallel northeast to east-trending fault and fracture zones; and replacement lenses parallel limestone-phyllite contacts near fault and fracture zones. The host rock is Lower Cambrian interbedded limestone and phyllite (l€ls-ph). Surface exposures are oxidized to a black or rust colored wad. Mafic dykes (Tmd) occur locally and trend northeast to east. A chip sample taken across a 7.5 to 10 cm wide vein assayed 1376 g/t Ag, 37.3% Pb, 6.1% Zn, 0.6% Cu and 0.06 g/t Au (National Mineral Inventory).

(9) YP (BUTLER MTN:) Ag, Pb, Zn, Au, Cu

Massive sulphide lenses and quartz veins containing variable percentages of pyrrhotite, pyrite, marmatite (black sphalerite), chalcopyrite, galena and arsenopyrite are associated with a north-trending zone of steeply dipping felsic dykes (Tfd) and breccias. Sulphide mineralization occurs adjacent to felsic dykes and within breccias and sedimentary rocks (l€c). Drill intersections of 15.26 g/t Au over 3.4 m and 337.37 g/t Ag over 2.2 m have been reported (D.I.A.N.D., 1984, p. 139).

(10) KERNS Ag, Pb, Zn, Cu, W

A gossan approximately 2 m wide is exposed in trenches in Lower Cambrian limestone (l€ls). The gossan contains iron and possibly manganiferous oxides; x-ray diffraction identified goethite as the principal oxide. The gossan strikes 230°, paralleling an east-west joint direction and cutting across bedding. Quartz veins containing galena and minor sphalerite, chalcopyrite and scheelite have been reported. Grab samples taken over 0.7 m average 117.8 g/t Ag, 4.2% Pb and 0.7% Zn. Copper assayed as high as 0.9% and tungsten as high as 0.1% (National Mineral Inventory).

(11) HOT W

The claims are underlain by Upper Cambrian and Ordovician hornfels, argillite, minor skarn and marble (u€Ohs) of the Kechika Group and are intruded by small dykes. Scheelite occurs finely disseminated in metamorphic rocks and may be accompanied by pyrrhotite and minor pyrite.

GEOLOGY OF THE SPENCER CREEK MAP AREA (105B/1), RANCHERIA DISTRICT, SOUTHEAST YUKON

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