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GEOLOGY OF THE CHUTINE RIVER – TAHLTAN LAKE AREA, NORTHWESTERN BRITISH COLUMBIA (104G/12W AND 13)

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KEYWORDS: Regional geology, Stikine River, Chutine River, Tahltan Lake, Stuhini Group, Stikine assemblage, Limpoke pluton, Rugged Mountain pluton.

INTRODUCTION

The third summer of 1:50 000-scale geological mapping was conducted in the Chutine River (104G/12W) and Tahltan Lake (104G/13) map areas. This work adjoins and locally updates mapping in the Yehiniko Lake and Scud River areas (Brown and Gunning, 1989a, b; Brown and Greig; 1990, Brown *et al.*, 1990). The project objectives are to provide new 1:50 000-scale geologic maps accompanied by up-to-date geochemical and mineral occurrence data, and an assessment of the mineral potential of the area. Geological highlights of the 1991 field season include the discovery of previously unrecognized phyllitic Stikine assemblage rocks north of the Barrington River; subdivision of the Stuhini Group; and identification of two small, previously unmapped Alaskan-type ultramafic bodies. Included here is a summary of preliminary observations and ideas, and a simplified version of the 1:50 000-scale geology map to be released as Open File 1992-2.

The study area was accessed by helicopter and float plane from Telegraph Creek, approximately 30 kilometres to the east (Figure 1-15-1). Previous geologic mapping was conducted by Kerr (1948) in the Stikine and Chutine river areas and by Souther (1959, 1972), who completed the entire Telegraph Creek (104G) 1:250 000-scale map area. Recent nearby mapping at 1:50 000-scale includes that by Logan and Koyanagi (1989a, b), Logan *et al.* (1990a, b; 1992a, b; Figure 1-15-1).

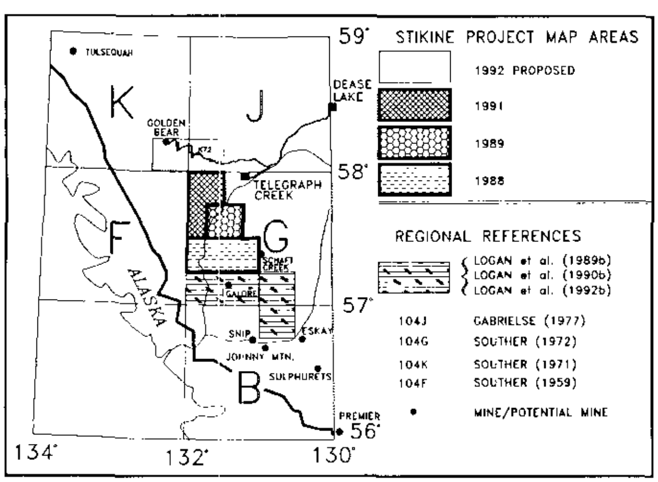

Figure 1-15-1. Location map for Stikine project with areas of previous work indicated.

The map area straddles the physiographic boundary between the dissected Tahltan Lake plateau on the east and the rugged, alpine-glaciated Coast Mountains on the west (Ryder, 1984). The plateau rolls gently between 1500 and 2000 metres elevation and is part of a large, late Tertiary erosional surface (Souther, 1971) covered by alpine vegetation and felsenmeer.

GENERAL GEOLOGIC SETTING

Strata of sedimentary and volcanic origin dominate the map area. They comprise the Paleozoic Stikine assemblage, eugeoclinal Late Triassic Stuhini Group and unnamed Miocene to Recent (?) rocks. In contrast, stratified rocks in the 1989 field area (Figure 1-15-1) to the southeast also include Early Jurassic Hazelton Group volcanic rocks, nonmarine clastic rocks of the Late Cretaceous to Tertiary (?) Sustut Group and continental volcanic rocks of the Eocene Sloko Group. Cutting these stratified rocks is a diverse suite of intrusive rocks ranging in age from Triassic to Eocene and in composition from granite to Alaskan-type ultramafite. For a more regional perspective of the geologic setting see Souther (1972) and Brown and Gunning (1989a).

STRATIGRAPHY

PALEOZOIC STIKINE ASSEMBLAGE (UNITS pPS, PS)

Four west-broadening structural culminations of Stikine assemblage rocks within the map area include those at Missusjay Creek, Chutine River, Barrington River and northwest of Little Tahltan Lake (Figure 1-15-2, 3). Two of those, Missusjay Creek and Chutine River are conspicuously outlined by thick, deformed Permian limestones. However, where these distinctive limestones are absent, correlation is less certain and based primarily on style and intensity of deformation which normally produces phyllitic fabrics and chevron folds in the sedimentary and volcanic rocks. Lithological and structural elements unique to each of these culminations are described below.

MISSUSJAY CULMINATION

The Missusjay culmination comprises a tight, southeast-verging syncline of Permian limestone underlain by phyllitic argillite, siltstone and siliceous siltstone (Unit pPSs; Brown *et al.*, 1990). The position of the contact and its relationship with Triassic rocks to the northwest remain uncertain.

CHUTINE ANTICLINE

The Chutine anticline was named by Kerr (1948) and is well exposed where dissected by the Chutine and Barring-

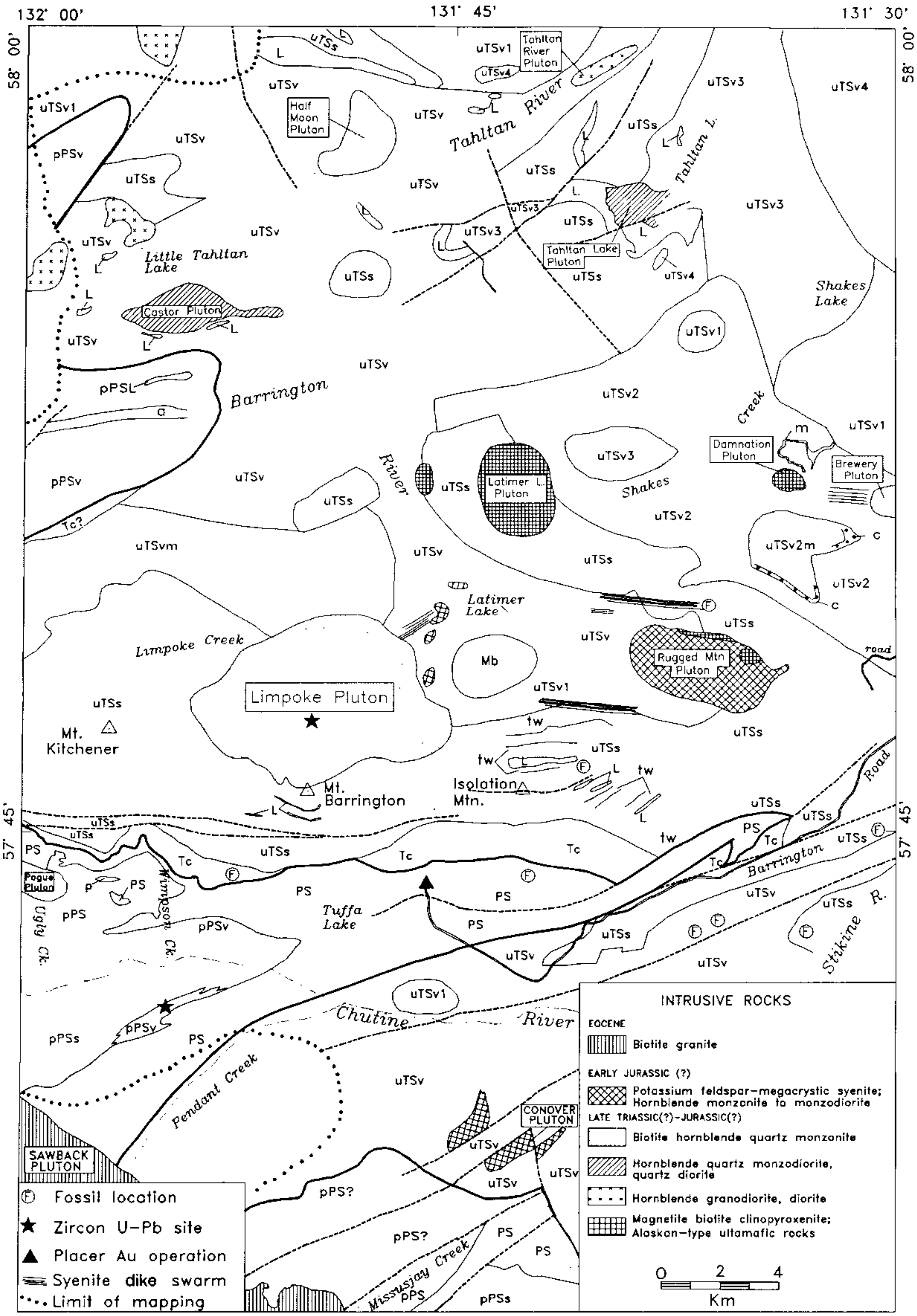

Figure 1-15-2. Simplified geology of the Chutine River – Tahltan Lake area (104G/12W and 13), for detailed map see Open File 1992-2. Geology shown beyond limits of mapping is from Souther (1972). Bolder contacts outline the Stikine assemblage.

STRATIFIED ROCKS

QUATERNARY

Qal | Unconsolidated deposits

Miocene(?)–Recent(?)

Mb | Basalt flows

UPPER TRIASSIC -- STUHINI GROUP

uTSs | Undifferentiated sedimentary rocks; L=limestone; tw = tuffaceous wacke

uTSv | Undifferentiated volcanic rocks; uTSvm = mafic volcanic and sedimentary rocks

1 | Mafic volcanic rocks, augite phyric

2 | Intermediate volcanic rocks; uTSv2m=maroon, c=conglomerate, m=marker unit

3 | Tuffaceous wacke

4 | Bladed plagioclase porphyry

L | Discontinuous grey calcarenite

TRIASSIC

Tc | Chert, siliceous siltstone, ash tuff

LOWER PERMIAN --STIKINE ASSEMBLAGE

PS | Grey calcarenite, minor argillite, siltstone

PERMIAN OR OLDER

pPS | Undifferentiated sedimentary and volcanic rocks
Sedimentary facies (pPSs)
Volcanic facies (pPSv); a=massive andesite, p=pillow basalt
Recrystallized limestone (pPSL; age unknown)

ton rivers. Chutine River exposures include northeast to east-trending Permian limestone structurally underlain by phyllitic volcanic and sedimentary rocks that form the core of the Chutine anticline. Complexly folded, well-bedded to massive, light and dark grey, recrystallized Permian limestone (Unit PS) forms conspicuous white cliffs north of the Chutine River. The simplified map pattern (Figures 1-15-2 and 3) resembles an east-striking anticline with an attenuated closure that extends east across the map area. In fact, lithologic units structurally above and below the limestone vary along strike, as does the thickness of the limestone itself, indicating structural and/or facies complications that are not addressed here. South of the Chutine River, green and maroon phyllitic plagioclase-rich andesitic lapilli tuff, a granitoid-bearing volcanic conglomerate (Unit pPSv), and argillite with siliceous siltstone layers (Unit pPSs) core the fold. Fabric intensity varies from schistose to unfoliated. The contact with Upper Triassic volcanic rocks along the southern limb is interpreted as a thrust fault (Brown *et al.*, 1990). The total structural thickness of Permian limestone, which is increased by folding and faulting, varies from less than 200 metres near Wimpson Creek to over 2800 metres east of Tuffa Lake. Locally the limestone contains rugose corals, brachiopods, bryozoans and crinoid stems. Conodonts, identified by M.J. Orchard (GSC, BCGS Report November, 1990), indicate an Early Permian (Artinskian - Sakmarian) age for the limestone.

A smaller structural culmination on the northwest limb of the Chutine anticline is here called the Ugly Creek anticline (Figure 1-15-3). It is outlined by Permian limestone which wraps around a core of rusty weathering, phyllitic siltstone, shale and minor, discontinuous, recrystallized limestone. It is an open fold, inclined to the north, with an amplitude of more than 150 metres (Plate 1-15-1).

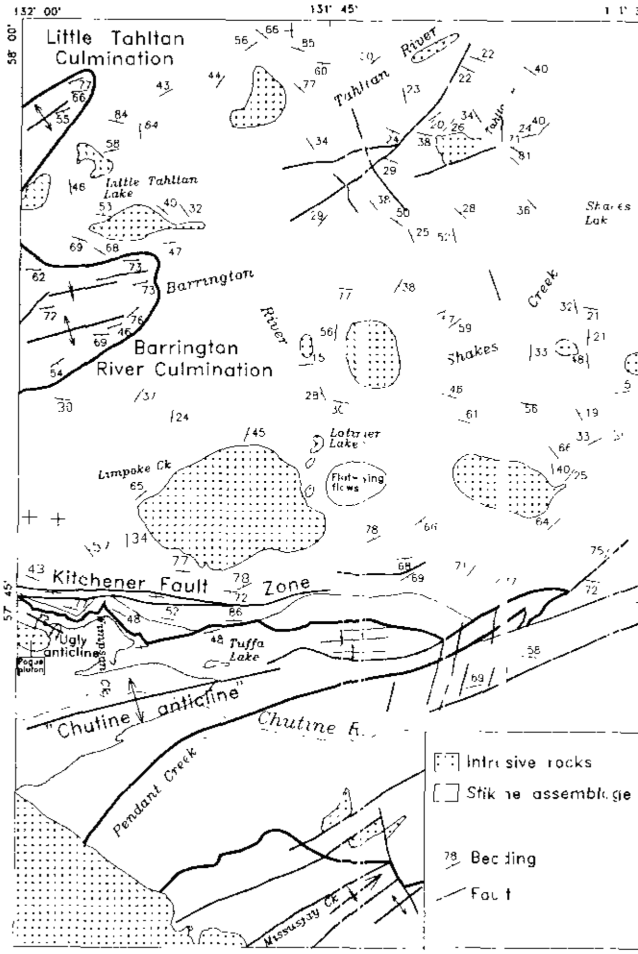

Figure 1-15-3. Structural elements of the Chutine River – Tahltan Lake area (104G/12W and 13), for detailed map see Open File 1992-2.

One kilometre farther southeast, brown-weathering pillow basalt, less than 50 metres thick, is intercalated with phyllitic sedimentary rocks and tuff (p in Figure 1-15-2). Individual pillows are up to 2 metres long, with amygdaloidal cores, well-preserved chilled margins and intrapillow micrite. These subaqueous flows may correlate with a much thicker accumulation of pillow basalt exposed 15 kilometres to the southwest, between Triumph Creek and the Chutine River (104F/9; *cf.* Westcott, 1989a).

BARRINGTON RIVER AND NORTHWEST OF LITTLE TAHLTAN LAKE

Phyllitic tuff, siltstone, andesite and limestone exposed in the Barrington River valley and northwest of Little Tahltan Lake are correlated with the Stikine assemblage on the basis of their fabric and fold geometry (Unit pPS). Alternating centimetre to millimetre-scale layers of green, dark grey, white and maroon rocks grade from chlorite schist to unfoliated ash, lapilli tuff and siltstone and argillite. Concordant

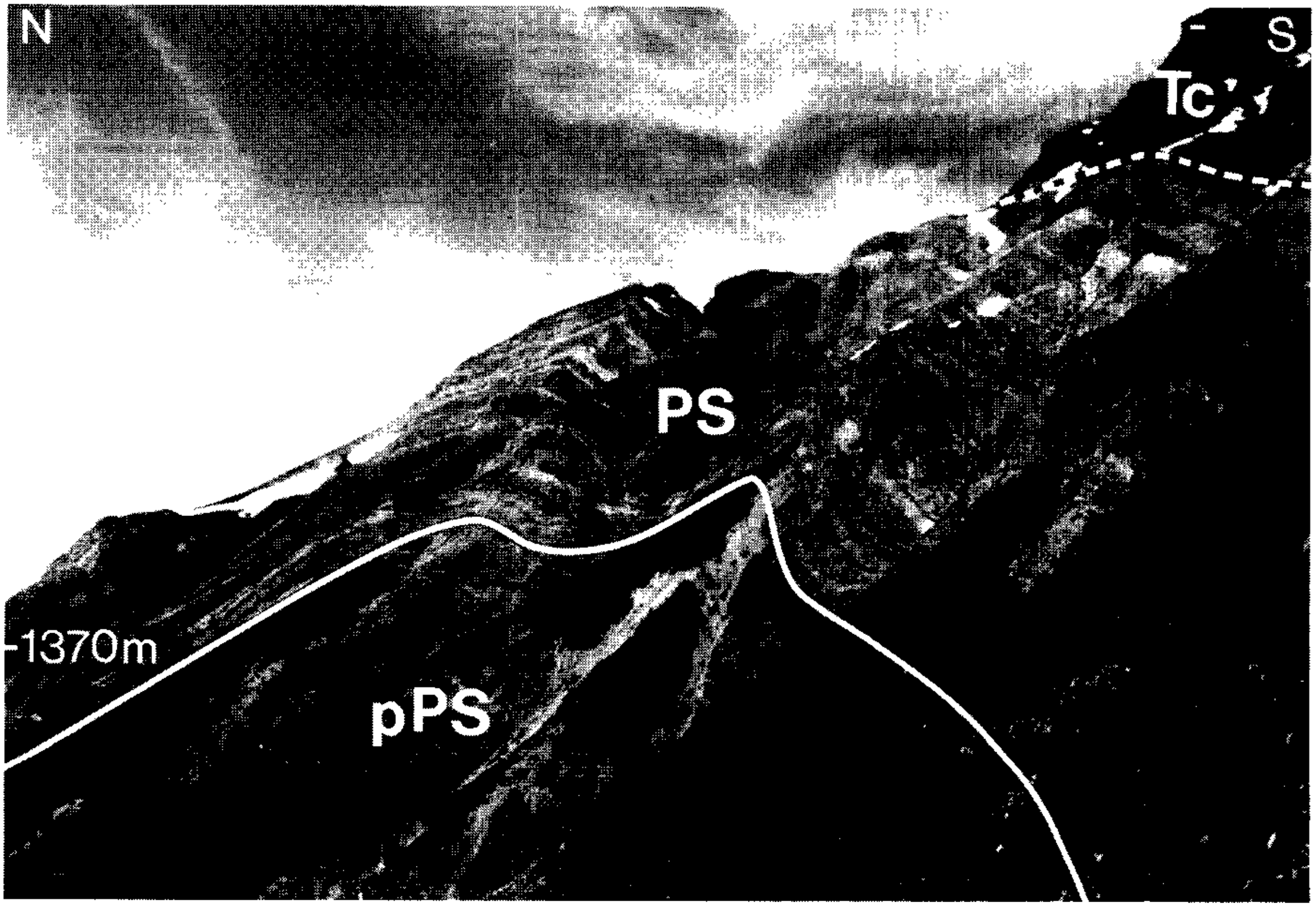

Plate 1-15-1. View to west of Ugly anticline. An open fold of well-bedded Permian limestone (**PS**) with a core of rusty weathering, phyllitic siltstone (**pPS**). Triassic chert (**Tc**) at the top right of the photograph, lies in steep fault contact to the north (dashed line).

and discordant, white quartz veins and sigmoidal quartz veins or pods are unique to these areas and are not present in other map units. They are presumably products of pre to syndeformational metamorphism. Locally, chlorite phyllite is intercalated and infolded with grey recrystallized limestone and limy tuff less than 75 metres thick. This pPS unit tends to form homogeneous, massive rounded outcrops, in contrast to the more irregular Stuhini Group exposures.

Although Barrington River and Little Tahltan Lake culminations have similar lithologies, their fold style and orientation differ significantly. Barrington River exposures display a uniform, south to southeast-dipping phyllitic fabric, fold closures are rare and cleavage commonly parallels bedding. Locally bedding-cleavage intersections suggest there is a major antiform somewhere along the valley, with secondary closures on the northern limb. In contrast, northwest of Little Tahltan Lake, phyllitic rocks are pervasively folded into moderately to steeply northwest-inclined folds with subhorizontal fold axes (Plate 1-15-2a, b). The centimetre to metre-scale, open to tight folds are north verging.

The eastern contact at the Little Tahltan culmination consists of a fault that places greenschist-grade, polydeformed phyllite against lower grade, steeply dipping Stuhini Group siltstone and volcanic rocks. Further investigation is required to determine whether the unmapped northern contact is an unconformity or a fault.

PERMO-TRIASSIC CONTACT RELATIONSHIPS

The Permo-Triassic contact is well exposed immediately north of the Ugly anticline, where it is sharp and believed to be a fault. At this location steeply north-dipping Permian limestone beds are overlain by concordant buff-weathering chert beds of Unit Tc (Plate 1-15-1). Farther east, near Tuffa Lake, the chert unit is absent and Stuhini Group tuffaceous wacke lies structurally on Stikine limestone. According to Kerr (1948) the limestone-chert contact may be unconformable where crossed by the Barrington River. However, at this locality, the competent chert is folded into chevrons, directly above the limestone.

TRIASSIC CHERT AND RELATED VOLCANO-SEDIMENTARY ROCKS (UNIT TC)

Unit Tc is dominated by buff, light to dark grey weathering chert but also includes siliceous siltstone and green and maroon ash tuff. These rocks crop out in four areas: near Wimpson Creek, east of Barrington River, along the Barrington road, and possibly on the southern limb of the

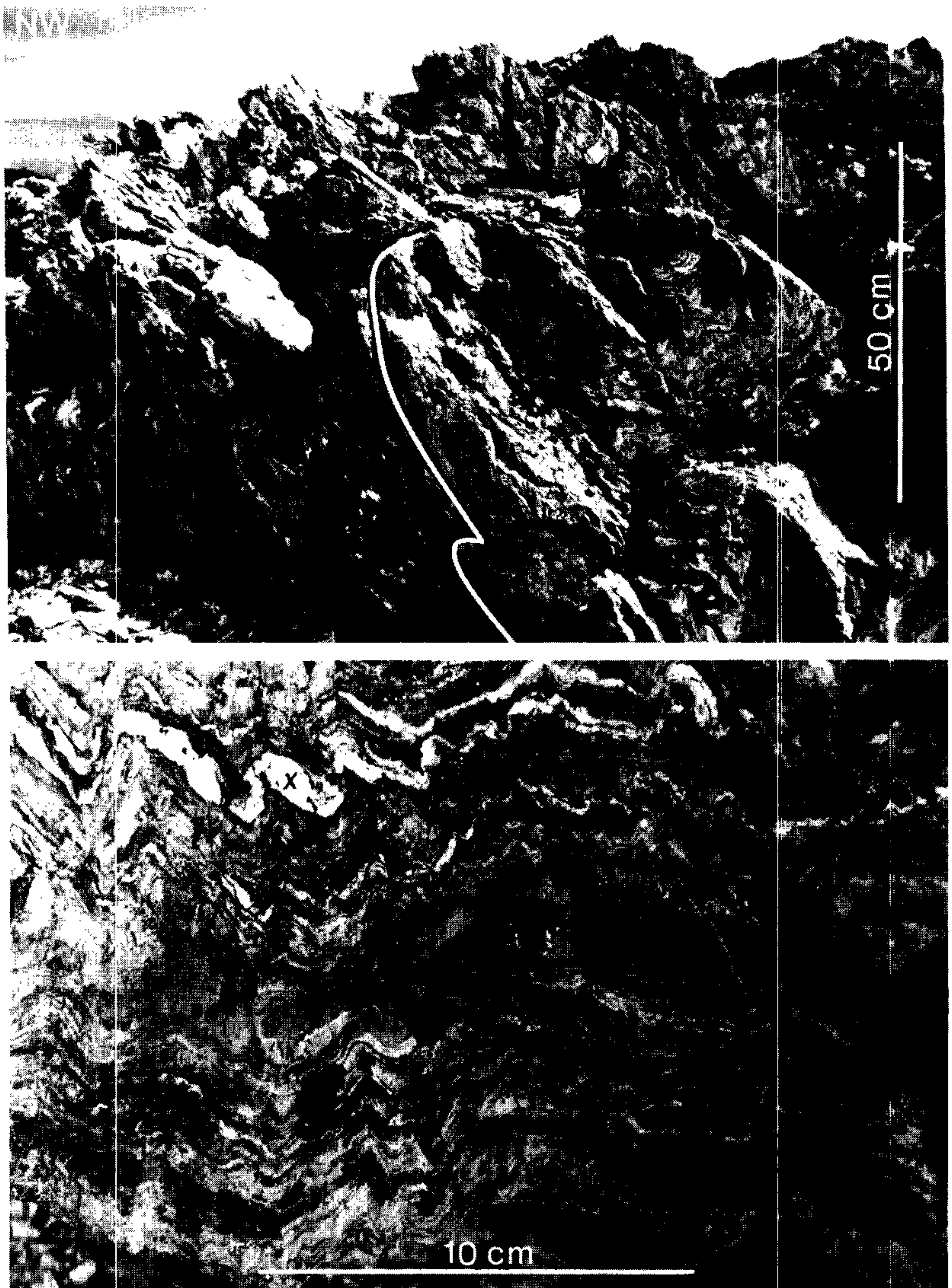

Plate 1-15-2. Characteristic deformation within Stikine assemblage phyllitic tuff in the Little Tahltan Lake structural culmination: (a) northwest-verging, tight, angular folds of green and grey phyllite, with axial planar cleavage and transposed bedding; (b) centimetre-scale, north-verging, rounded to chevron-style folds. The chlorite-sericite foliation (S_1) is coplanar to bedding (S_0) and both are folded, therefore, at least two phases of deformation are evident. Pre-deformation quartz vein that is parallel to bedding is shown in top left of the photograph (x).

Barrington River culmination. A maximum structural thickness of approximately 750 metres is exposed east of Wimpson Creek. Here the section is very well bedded, with parallel, centimetre-scale beds of chert separated by thin layers of chlorite and sericite phyllite. Barrington road exposures comprise bright green and red, laminated to bedded siliceous ash-tuff in thrust contact with overlying white Permian limestone. Prior to identification of Middle to Late Triassic radiolaria in the chert (early Ladinian-late Carnian; GSC Loc. No. C-167938; F. Cordey, personal communication, 1991), it was assumed to be Permian age because of the degree of deformation and the spatial association with Permian limestone.

Contacts with the Stuhini Group appear to be gradational. The chert unit becomes interbedded with progressively more tuffaceous wacke across the Kitchener fault zone (Figure 1-15-3). In the fault zone, the chert is characteristically deformed into chevron folds with up to 15-metre amplitudes. Where closures are not exposed, small bedding-cleavage intersection angles (<20°) also indicate tight folding. In contrast, folds are not evident in the monotonous tuffaceous wackes and they must have deformed by some other mechanism.

AGE OF DEFORMATION

Deformational events are currently being studied and interpreted. Preliminary observations suggest that although Stuhini strata dip more steeply than average near Stikine assemblage culminations, it is not certain that these structures are in fact post-Late Triassic. Chevron folded Unit Tc clearly indicates significant post-Ladinian-Carnian deformation. However, the difference in metamorphic grade, intensity of deformation and apparent truncation of phyllitic fabrics argues for a pre-Stuhini deformation. The minimum age of deformation is constrained by the Tertiary Sawback pluton that cuts all lithologies and structures (Figure 1-15-3), and possibly the unfoliated Pogue pluton, tentatively assigned a Late Triassic to Jurassic age, provides an older minimum age of deformation.

Upper Triassic Stuhini Group (Unit uTS)

Eighty per cent of the map area north of the Kitchener fault zone is underlain by the Stuhini Group, divided here into sedimentary and volcanic facies. The total thickness is at least 2500 metres. Sedimentary rocks include tuffaceous greywacke, siltstone, discontinuous limestone and minor shale. Volcanic-dominated facies are subdivided into mafic and intermediate flows and tuffs, tuffaceous wacke and bladed plagioclase porphyry. Contacts between units are gradational. Most, if not all, of the units are believed to be submarine, based on the presence of chert and limestone interbeds, and rare marine bivalves. No younger strata other than Miocene basalt flows (Unit Mb) overlie the Stuhini Group.

Fossil age control in the map area is meagre: Kerr (1948) collected Late Triassic bivalves, *Daonella* or *Halobia* (Figure 1-15-2) and 1989 collections from the immediate southeast, yielded late Carnian to early Norian and late Norian conodonts (M.J. Orchard, written communication, BCGS Report. November, 1990; *cf.* Brown *et al.*, 1990). However, 53 new samples were collected for microfossil extraction and six new macrofossil localities should constrain the age. Preliminary identification of a late Norian Monotis supports a Late Triassic age for this package (T. Poulton, personal communication, 1991).

SEDIMENTARY ROCKS (UNIT uTSs)

An east-trending belt of well-bedded sedimentary rocks, which has a maximum thickness of 1500 metres, extends from Mount Kitchener to Rugged Mountain. Other sediment-dominated areas shown in Figure 1-15-2 include Tahltan Lake, north of Little Tahltan Lake and north of Tahltan River. Sedimentary rocks are mainly brown weathering and are composed of thick to thin, parallel-bedded to laminated, tuffaceous siltstone, wacke and minor argillite and shale. Thinly interlayered tuffaceous wacke-siltstone and mudstone rhythmites, probably deposited as distal turbidites, are common. Trough crossbedding, normal grading and fining-upward volcaniclastic sequences occur throughout. Scour-and-fill structures, syndepositional growth faults, and angular argillite rip-up clasts point to an irregular paleodepositional surface. Several horizons of pale grey weathering, thick-bedded to massive, micritic limestone (up to 20 m thick) occur within the unit, between Mount Barrington and Isolation Mountain. Massive pyroxene crystal-lithic lapilli tuff, green ash-tuff and cherty tuff are subordinate to the sedimentary strata. Tuffaceous wacke and crystal-lithic lapilli tuff form massive, unbedded sections of the unit and increase in abundance to the east. Coarse, heterolithic pebble conglomerate contains siltstone, wacke, chert and limestone clasts. The limestone clasts are intraformational and not derived from the underlying Permian unit; successful extraction of conodonts from collected samples will help to verify this.

Stuhini Group rocks lack the penetrative fabrics that characterize the Paleozoic units. Structural deformation within Unit uTSs, in a gross sense, appears simple. For example, a monoclinal section is displayed between flat-lying strata at Mount Kitchener and vertical strata within the Kitchener fault zone. Locally, however, the unit is complexly deformed, such as south of the Damnation pluton where the strata are recumbently folded. Elsewhere bedding attitudes vary from gently to steeply dipping. Volcanic-dominated sections are generally massive and rarely foliated.

VOLCANIC ROCKS

Volcanic map units were differentiated on the basis of dominant lithology. Ubiquitous gradations between units require the subjective placement of many contacts. In general, Unit uTSs is overlain by intermediate volcanic rocks that grade upward and to the northeast into basaltic flows, breccia and tuff. Bladed plagioclase porphyry lies even farther to the north and northwest. All volcanic rocks are intermediate to mafic, no felsic units are apparent.

Mafic Volcanic Rocks (Unit uTSv1)

The most distinctive Stuhini Group lithology comprises mafic volcanic rocks, including clinopyroxene hornblende-phyric basaltic andesite flows and crystal-lithic lapilli tuff.

They are typically dark green, massive and contain distinctive, blocky clinopyroxene phenocrysts. Composition of the tuffs is similar to the flows. Lapilli to block size (2 to 75 cm) fragments are supported in a crystal-rich matrix. Monolithic amygdaloidal-basalt breccia, presumed to be autobrecciated flow, occurs locally. A pyroxenite clast in a lapilli tuff southwest of Shakes Lake suggests that the Latimer Lake ultramafic body, or a similar body, was unroofed and eroded during the deposition of this unit. Minor epidote-carbonate veinlets are common in the basalt.

Unlike typical orogenic andesites, basaltic flows and tuffs of Unit uTSv1 lack orthopyroxene, but they are clinopyroxene rich, which suggests a petrochemical tie to the Alaskan-type ultramafic bodies that are discussed later. Whole-rock major oxide data for rocks from the 1989 field area show that the clinopyroxenite-bearing flows are basalts with calcalkaline trends, that plot in the alkaline and subalkaline fields of Irvine and Baragar (1971).

Intermediate Volcanic Rocks (Unit uTSv2)

Massive, plagioclase-rich, andesitic block-tuff, tuff and flows dominate the section in the east-central part of the map area. Green and maroon, plagioclase-porphyritic andesite fragments are characteristic components. Andesitic compositions for the flows are inferred from the coexistence of plagioclase and hornblende. Crystal fragments of unstrained and embayed volcanic quartz found within an andesitic lapilli tuff are probably derived from dacitic rocks occurring somewhere in the sequence. This unit is similar to part of the Early Jurassic Unuk River Formation of the Hazelton Group, south of the Iskut River. However, diagnostic pyroxene-rich flows of the Stuhini Group overlie this unit, so it is thought to be Late Triassic in age.

Subunits include maroon volcanic rocks (uTSv2m) and a marker unit (m). Subunit uTSv2m has a lower division of brick-red, poorly sorted, heterolithic volcanic conglomerate (c) containing abundant limestone clasts and boulders, some measuring up to 10 metres in diameter (Plate 1-15-3). These are interpreted to be debris flows (lahars) that incorporated reefoidal limestone as it flowed down the flank of a Triassic stratovolcano.

A distinctive marker unit (m) comprises white to light grey, well-bedded, hornblende-rich epiclastic beds exposed on a ridge northwest of the Brewery pluton. Although the relatively flat-lying marker unit was not traced beyond this unnamed ridge, it provides distribution and attitude information about the otherwise massive strata in this area.

Tuffaceous Wacke (Unit uTSv3)

Olive-green medium-grained plagioclase-rich tuffaceous wacke forms massive outcrops from Shakes Lake to beyond the north edge of the map area. Like Unit uTSv2, it is massive and rarely bedded, but it lacks the lapilli and block size fragments. Contacts are gradational with intermediate volcanic rocks of Unit uTSv2.

Bladed Plagioclase Porphyry (Unit uTSv4)

Brown-weathering bladed plagioclase-phyric basalt or basaltic andesite flows dominate the northeast corner of the map area and form isolated exposures north of the Tahltan River. A bladed porphyry layer, interpreted to be a sill, is exposed on the cliff face 1 kilometre south of Tahltan Lake. A similar unit within the Takla Group of Quesnellia is discussed by Monger (1977).

Intercalated Mafic Volcanic and Sedimentary Rocks (Unit uTSvm)

This unit consists of interfingering sedimentary rocks (uTSs) and a mafic tuff (uTSv1), as exposed along the ridge north of Limpoke Creek. Here cliff faces are marked by prominent brown-weathering beds of sedimentary rocks which are intercalated with darker grey volcanic strata. This unit represents a south-to-north facies transition from a sediment to volcanic-dominated regime.

LIMESTONE HORIZONS (UNIT L)

Discontinuous fine-grained to aphanitic limestone units occur within both sedimentary and volcanic facies. They form prominent light grey outcrops in four areas: Mount Barrington - Isolation Mountain, west of Tahltan Lake, the Castor pluton area and north of the Tahltan River. Contacts are rarely exposed but they appear to be conformable. Unlike the Permian and older limestones, Late Triassic carbonate horizons are generally less than 30 metres thick and not recrystallized or foliated. West and south of Tahltan Lake the unit is uncharacteristically more than 100 metres thick, and here the limestone dips gently whereas in most other areas beds are steeply dipping. The limestone 25 metres thick that parallels the southern contact of the Castor pluton is well bedded and porcellaneous.

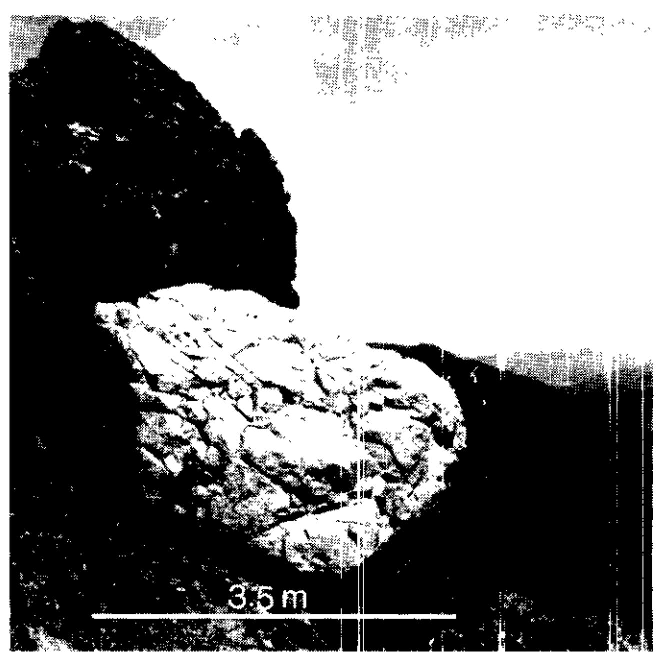

Plate 1-15-3. Huge angular limestone boulder, 3.5 metres in diameter, hosted in maroon volcanic conglomerate southwest of Brewery pluton. This boulder, too large to be transported by fluvial processes, must have been carried by a debris flow that incorporated reefoid limestone. Such deposits indicate a high-energy, unstable and cannibalistic setting, possibly on the flank of a stratovolcano.

DEPOSITIONAL HISTORY OF UNIT Tc AND STUHINI GROUP

A preliminary synopsis of Stuhini Group evolution is presented below; however, it may change upon receipt of results from fossil and geochemical analyses. The first record of Triassic strata is the accumulation of chert (Unit Tc) deposited unconformably on Early Permian limestone and older strata (Figure 1-15-4). These siliceous oozes probably accumulated in a low-energy, pelagic environment, below the carbonate compensation depth. In modern oceans this is about 4 kilometres below sea level (Berger, 1974), however, other factors including high plankton productivity are know to produce shallower water chert accumulations (F. Cordey, personal communication, 1991). The gradational west-to-east change from chert to maroon ash-tuff may signify eastward shallowing of a Triassic sea. The chert sequence was gradually overwhelmed by an influx of fine tuffaceous material from a distal arc. Thick tuffaceous sediments continued to accumulate in the west, whereas in the east, interfingering basaltic and andesitic flows were an important component. Fringing carbonate reefs formed where volcanic edifices rose to within the photic zone, presumably during periods of volcanic quiescence. Limestone deposition as found north of the Tahltan River occurred at a transition from volcanic to sediment-dominated settings. Eventually the coarser, eastern proximal facies of flows, volcanic breccia and tuff prograded over the distal facies. The western migration of volcanism may have produced emergent volcanic islands.

MIOCENE (?) OR RECENT (?) FLOWS (UNIT Mb)

Previously unmapped, flat-lying columnar-jointed potassic andesite flows form isolated, cliff-face exposures (Plate 1-15-4) and benches in a densely forested area 1.6 kilometres south of Latimer Lake. The brown-weathering, amygdaloidal flows contain unaltered biotite and clinopyroxene phenocrysts set in a green-brown plagioclase microlite groundmass. Amphibole and clinopyroxene also occur as xenocrysts. Amygdules of intergrown quartz and calcite comprise 10 per cent of the rock. The series of flows, over 340 metres thick, is intermittently exposed from 670 to 1000 metres elevation. Individual flows are 4 to 6 metres thick. Local red-brown interflow conglomerate suggests fluvial reworking of some lava flows during lulls in volcanic activity.

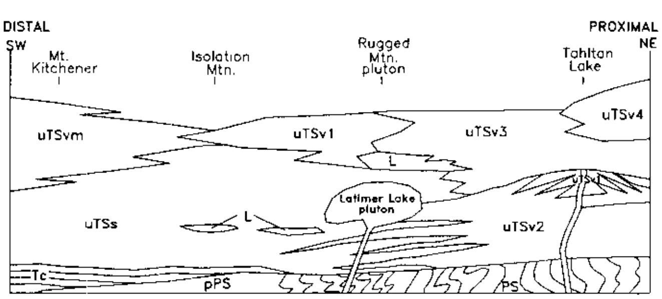

Figure 1-15-4. Schematic facies relationships of Stuhini Group strata in the map area. Map code descriptions are listed in the legend of Figure 1-15-2.

The closest correlative flows maybe the Recent Stikine River valley basalts (Souther, 1972), 20 kilometres to the east, or the Level Mountain flows (Gabrielse, 1977) 33 kilometres to the north-northwest. The source of the Latimer Lake flows is unknown.

QUATERNARY GEOLOGY

Cursory observations of glacial striations suggest at least three episodes of ice transport. A north-northwest or south-southeast ice movement above 1300 metres elevation contrasts with a north-northeast direction evident over the lower, rolling hills west of Shakes Lake. Large biotite granite erratics, probably derived from the Sawback pluton to the south, lie on a plateau at 1700 metres elevation and are probably the product of this northeasterly directed ice movement. Angular erratics of distinct tuff occur south of Tahltan Lake at 1000 metres elevation; they have been transported tens of metres from their source outcrop across a deep gully. This points to an additional period of southward-directed ice movement.

Broad, glaciated U-shaped valleys commonly display misfit drainages such as along the upper Tahltan River and demonstrate how Pleistocene glaciation has partially controlled the present drainage system. Clearly, more work is required to resolve the timing and limits of each ice advance and their Quaternary deposits. A study of the Quaternary geology is currently underway in the Telegraph Creek and Mount Edziza area by Ian Spooner, as part of a doctoral thesis at the University of Calgary.

INTRUSIVE ROCKS

Intrusive rocks underlie only 15 per cent of the project area. This is in marked contrast to the Scud River map area (104G/5, 6), where intrusions underlie about 75 per cent of the area. Furthermore, plutons in the Chutine River – Tahltan Lake area are quartz poor relative to those of Scud River. A maximum age limit for the plutonic rocks is provided by intrusive relationships with the Late Triassic Stuhini Group. It is difficult to determine minimum age constraints for the intrusions due to a lack of preserved younger strata. Uranium-lead and potassium-argon dating of the Limpoke pluton is in progress (Figure 1-15-2). Compositions of intrusive rocks were determined from cut, and potassium feldspar stained hand specimens and thin sections following the classification scheme of Streckeisen (1976). Plutons have been tentatively grouped into Late Triassic to Jurassic, Early Jurassic and Eocene episodes.

I-type plutonism (Pitcher, 1982) produced three Triassic to Jurassic calcalkaline plutonic suites and one Early Jurassic alkalic plutonic suite in the Chutine River – Tahltan Lake area (Figure 1-15-5). The two end-members probably represent separate, unrelated episodes, rather than a continuum or steadily evolving magma source. The calcalkaline plutons may be intrusive centres associated with island-arc volcanism. The more potassic, alkalic magma probably differentiated at relatively low crustal levels, and may be a

Plate 1-15-4. Flat-lying, columnar-jointed basalt flow, about 6 metres thick, 1.6 kilometres south of Latimer Lake. Tentatively correlated with the Level Mountain flood basalts.

product of crustal extension. In addition, in the central part of the map area, Alaskan-type ultramafic plutons are spatially associated with the alkaline suite.

Limpoke and Half Moon plutons (Suite A) are two-phase intrusions with biotite hornblende monzodiorite to biotite-hornblende quartz monzonite cores and hornblende-biotite quartz diorite to diorite border phases. The smaller, undifferentiated Pogue and Brewery plutons are included in this suite.

The Tahltan Lake and Castor plutons (Suite B) are also two-phase intrusions. They have a border phase of quartz diorite which grades into central cores of quartz monzonite (Tahltan Lake) to granodiorite-tonalite (Castor). They are quartz rich and potassic feldspar poor relative to Suite A. Hornblende is the only mafic mineral and is characteristically poikilitic. Skarns develop where these plutons intrude Stuhini limestone.

The Little Tahltan Lake and Tahltan River plutons (Suite C) have the broadest spectrum of compositions ranging from hornblende granodiorite to diorite. Biotite is locally present. Characteristically, carbonate and sericite replace feldspars and titanite (sphene) is abundant (1–2%). Small xenoliths of country rock are present.

LATE TRIASSIC (?) - JURASSIC (?)

LIMPOKE PLUTON

The Limpoke pluton, an oblate body approximately 8 kilometres long, underlies 27 square kilometres immediately south of Limpoke Creek. Around the southern border, including the peak of Mount Barrington, a prominent, rusty weathering pyritic halo has attracted recent exploration interest. This two-phase, texturally heterogeneous pluton is dominated by a border phase of pale grey, medium to fine-grained, equigranular biotite-hornblende quartz monzonite. The centre of the intrusion is characterized by a coarse to medium-grained plagioclase-megacrystic, biotite hornblende monzodiorite with plagioclase phenocrysts, 1 to 2 centimetres in length, set in a fine-grained groundmass of potassic feldspar. The percentage of mafic minerals increases toward the outer margins of the pluton, with the colour index (M') ranging from about 18 to 40. Hornblende is the dominant mafic mineral, but dark brown biotite and dark green hornblende coexist at some localities. Clinopyroxene occurs with hornblende and biotite in one outcrop of monzodiorite. The intrusion contains up to 2 per cent magnetite as fine-grained opaque granules which are spatially associated with crystals of biotite

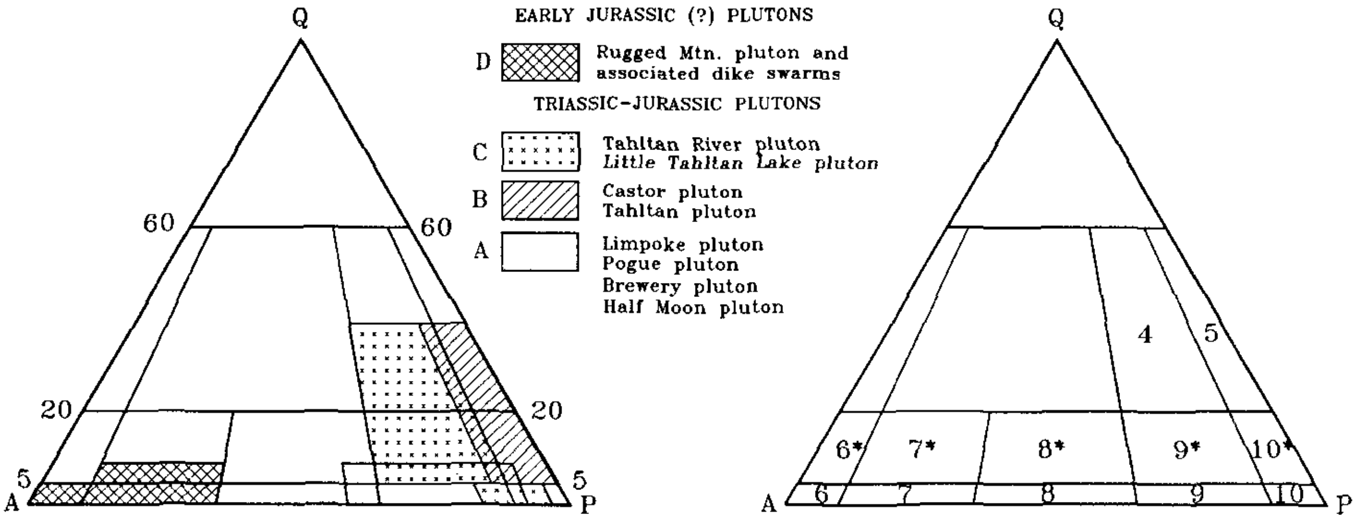

Figure 1-15-5. Comparison of compositions of plutons, plotted on Streckeisen (1976) diagram. Q=quartz, A=alkali-feldspar, P=plagioclase, 4=granodiorite, 5=tonalite, 6=alkali-feldspar syenite, 6*=quartz alkali-feldspar syenite, 7=syenite, 7*=quartz syenite, 8=monzonite, 8*=quartz monzonite, 9=monzodiorite, 9*=quartz monzodiorite, 10=diorite, 10*=quartz diorite.

and hornblende. Apatite is a common accessory mineral (up to 1%).

Dikes of varying composition cut the margins of the Limpoke pluton. Along the western contact, a set of aphanitic to coarse-grained pyroxene-biotite-hornblende granodiorite dikes have widths of up to 20 metres. The percentage of ferromagnesian minerals present increases with grain size; M′ is about 50 for the coarser grained dikes. Plagioclase is extensively altered to sericite and carbonate. These felsic dikes may represent a more hydrous phase of the Limpoke magma and they are probably similar in age to the pluton.

Leucocratic, potassium feldspar megacrystic syenite dikes intrude both the eastern and western borders of the Limpoke pluton and surrounding intercalated Late Triassic sedimentary and volcanic rocks. These dikes are analogous, both texturally and chemically, to syenite and alkali-feldspar syenite dikes that occur northwest of the Rugged Mountain syenite. The dikes are characterized by euhedral, tabular, potassium feldspar phenocrysts 1 to 2 centimetres long and smaller plagioclase laths, set in a groundmass of very fine grained interstitial potassium-feldspar. The phenocrysts are flow aligned, producing a subtrachytic texture. Hornblende and/or pyroxene (2 to 10%) occur as subhedral to euhedral prismatic grains.

HALF MOON PLUTON

The Half Moon pluton is a crescent-shaped body outcropping north of the Tahltan River. The centre of the pluton consists of equigranular medium to coarse-grained hornblende quartz monzodiorite. The quartz-poor and plagioclase-enriched border phase is composed of fine to medium-grained hornblende to hornblende-biotite quartz diorite. Mafic mineral contents range from 15 to 25 per cent. Plagioclase is saussuritized and chlorite alteration is pervasive though minor.

The waxy grey appearance of the plagioclase, the presence of biotite with hornblende, and the range in composition from quartz monzodiorite to quartz diorite are also characteristic features of the Limpoke pluton. These similarities suggest that the intrusions are related or share a common origin.

BREWERY PLUTON

The eastern edge of the map area is underlain by an isolated ridge of hornblende quartz monzodiorite which has been named the Brewery pluton. Further mapping is required to delineate its eastern boundary. The fresh surface has a colour index of 25 and an overall pinkish tone. Preliminary mapping suggests compositional affinities to the Limpoke pluton.

POGUE PLUTON

The Pogue pluton is a small, poorly exposed body southwest of the Limpoke pluton. It is composed of fine-grained, equigranular hornblende to biotite hornblende monzodiorite (M′=20). A subtrachytic texture defined by flow-aligned plagioclase is developed at the eastern contact. As with the Brewery pluton, compositional similarities suggest an affinity to the Limpoke pluton.

TAHLTAN LAKE PLUTON

The Tahltan Lake pluton underlies 3.5 square kilometres immediately west of Tahltan Lake. Hornblende quartz monzodiorite dominates the northern and western portions of the intrusion, while the eastern half is characterized by hornblende quartz diorite. Though compositionally varied, the fine to medium-grained, equigranular rocks are texturally homogenous.

Poikilitic hornblende is relatively unaltered and occurs as prismatic grains which enclose numerous, smaller equant plagioclase crystals. Colour index values range from 18 in the quartz monzodiorite to 30 in the quartz diorite. Oscillatory zoned plagioclase crystals are invariably saussuritized, giving a grey to greenish cast to the rocks. Accessory minerals include magnetite, apatite and zircon.

Hornblende granodiorite and diorite dikes cut sedimentary rocks adjacent to the southwestern edge of the coeval Tahltan Lake pluton. Distal dikes of crowded plagioclase-porphyritic *biotite-hornblende quartz monzonite* are exposed to the north and south of the pluton. White-rimmed, euhedral, equant and randomly oriented plagioclase crystals are set in an aphanitic groundmass. The textures are similar to those found in the Stuhini bladed plagioclase flows, possibly indicating that they are feeders to these flows. The third type of dikes adjacent to the pluton are composed of medium-grained, equigranular hornblende syenite. These outcrop to the south and southeast, and resemble those along the northern edges of the Castor and Rugged Mountain plutons.

CASTOR PLUTON

The Castor pluton is an eye-shaped, bimodal intrusion exposed north of the Barrington River and southeast of Little Tahltan Lake. It is dominated by a fine to medium-grained equigranular hornblende to biotite hornblende granodiorite. Along the eastern margin, the border phase is characterized by fine to medium-grained hornblende quartz diorite, to the west it is represented by fine-grained equigranular tonalite. The colour index ranges from 10 to 30 and plagioclase is weakly to moderately saussuritized. As in the Tahltan Lake pluton, hornblende poikilitically encloses smaller equant plagioclase crystals.

Several discrete, narrow mylonitic zones that consist of alternating foliated quartz diorite and chlorite schist occur along the southern margin of the Castor pluton. Adjacent Stuhini limestone and andesitic volcanics are also foliated. This local fabric may be a product of a larger east-trending fault system.

LITTLE TAHLTAN LAKE PLUTONS

The Little Tahltan Lake plutons are predominantly medium-grained, inequigranular hornblende granodiorite; most have medium to fine-grained quartz monzodiorite to hornblende diorite border phases. The colour index of the intrusive rocks directly northwest of Little Tahltan Lake ranges from 10 to 30. Hornblende is the dominant mafic mineral, accessory minerals include magnetite and titanite. Hornblende is altered to chlorite and epidote turbid, interlocking plagioclase laths and potassic feldspar crystals are completely replaced by carbonate and sericite. Overall, the intrusion is moderately to intensely altered. There is a faint foliation within the intrusion along its western margin; due west is a massive magnetite skarn which cuts adjacent Stuhini limestone and volcanic rocks.

TAHLTAN RIVER PLUTON

The Tahltan River pluton is an elliptical body that only outcrops along the banks of the Tahltan River, northwest of Tahltan Lake. It is a predominantly leucocratic, medium-grained equigranular hornblende to biotite-hornblende quartz monzodiorite (M′=10). Quartz and potassic feldspar are interstital. Alteration is moderate; hornblende is partially altered to chlorite, zeolites are present along joint surfaces and quartz-epidote veinlets crisscross parts of the outcrop.

The presence of small dioritic xenoliths, and accessory honey-coloured titanite and magnetite, in conjunction with the pluton's composition and degree of alteration, indicate affinities with the Little Tahltan Lake intrusions to the east.

ALASKAN-TYPE ULTRAMAFIC PLUTONS

Three small, Alaskan-type ultramafic plutons intrude Stuhini Group tuffaceous siltstone; two of these bodies had not been previously mapped. They form an east-trending group, 4 kilometres north and east of Latimer Lake, that parallels the Early Jurassic (?) Rugged Mountain pluton and related dike swarms. Their characteristics are well represented by the Latimer Lake pluton (Shakes iron deposit) which underlies a poorly exposed, forested area. Partially caved bulldozer trenches, from iron exploration in the 1960s (McIntyre, 1966), provide the only exposures of the pluton. The 1:50 000-scale aeromagnetic map of the area clearly outlines the pluton; it is the most anomalous feature in the map area (Map 9250G). The body consists of black, sugary textured, medium to fine-grained biotite magnetite clinopyroxenite. Cumulate clinopyroxenite and biotite are fresh and display faint millimetre-scale cumulate layering in thin section. Biotite also forms an intercumulate phase with magnetite. The clinopyroxenite is locally brecciated and infilled by potassium feldspar and coarse biotite. Part of the western flank of the Latimer Lake pluton includes intrusive breccia, consisting of pyroxenite fragments in hornblende diorite. Porphyritic syenite around the periphery of the body was noted by Souther (1972). A much smaller, unnamed satellitic ultramafic body, outcrops 2 kilometres farther west. The third body, the Damnation pluton is 10 kilometres to the east.

The intrusive relationships to the country rocks, absence of orthopyroxene and genetic association with syenite indicate that these bodies are Alaskan-type ultramafic plutons.

EARLY JURASSIC (?)

RUGGED MOUNTAIN PLUTON

The aptly named Rugged Mountain pluton, located immediately south of Rugged Mountain, covers about 14 square kilometres. It is a composite, pink to light grey, potassic body which intrudes Stuhini volcaniclastic rocks (Plate 1-15-5a). It is characterized by late phase, leucocratic, potassium feldspar megacrystic dike swarms (Plate 1-15-5b). Kerr (1948) referred to it as the "Shakes Creek mass" and described it in detail. Mapping and field observations during the 1991 field season will provide the basis for a B.Sc. thesis currently being undertaken by Ian Neill of The University of British Columbia.

The dominant phase consists of a biotite pyroxene alkali-feldspar syenite. Potassium feldspar phenocrysts range from

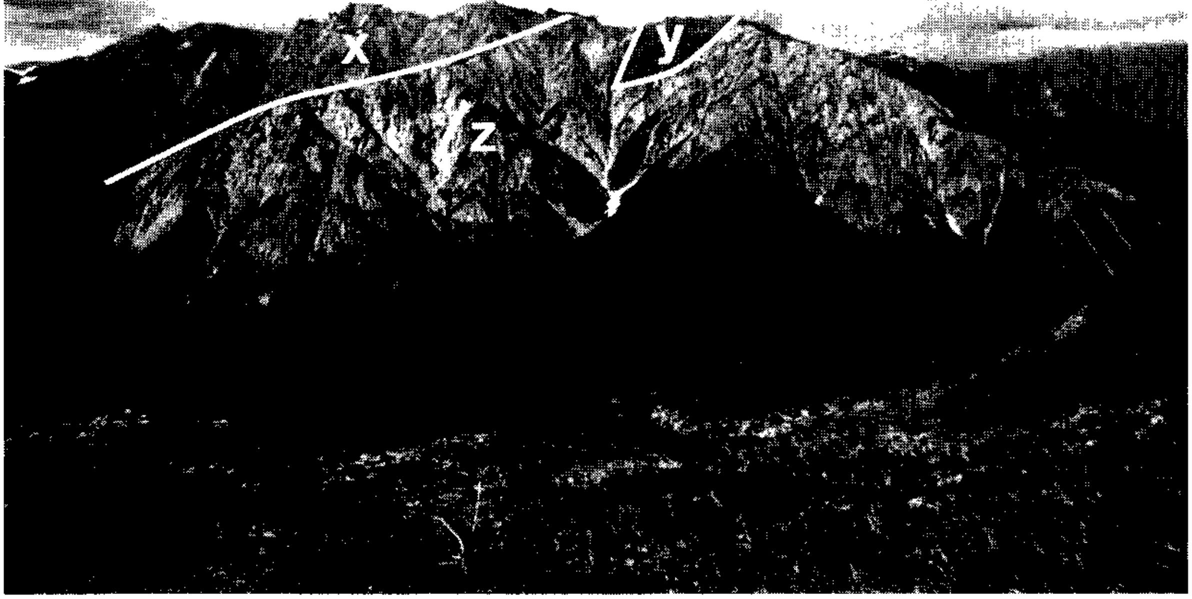

Plate 1-15-5. (a) View to northeast of Rugged Mountain syenite complex (z), dark mafic border phase (y) is partially preserved along the northern contact of the pluton, which intrudes Stuhini Group sedimentary rocks (x); (b) late-phase potassium feldspar megacrystic dike.

medium grained and equigranular to megacrystic. Mafic mineral contents range from 10 to 30 per cent in the central and eastern areas of the pluton, and increase from 50 to 80 per cent toward the border and western edge. Tabular and lath-shaped orthoclase phenocrysts range up to 7 centimetres in length. Ferromagnesian and accessory minerals, identified by Kerr, include biotite, aegirine-augite, bronzite, brown garnet and traces of magnetite, apatite and titanite. Pyroxenes are relatively fresh feldspars exhibit some sericite and chlorite alteration.

The Rugged Mountain alkali-feldspar syenite has a partially preserved biotite-clinopyroxenite border phase 10 to 15 metres wide, which outcrops along the northern edge of the intrusion. Similar material, with higher magnetite and biotite contents, occurs as a large, discrete body to the east (Plate 1-15-5a). Smaller pyroxenite bodies have also been mapped along the pluton's northeast and southeast borders. The contact between the pyroxenite and syenite is sharp and shows no evidence of faulting.

Forty kilometres to the northeast, the analogous Ten Mile Creek intrusion displays a better preserved clinopyroxenite border phase around a syenite core (Morgan, 1976). Pegmatitic syenite that cuts pyroxenite in this complex yields Early Jurassic K-Ar dates (Morgan, 1976), the Rugged Mountain pluton is thought to be coeval.

EOCENE

SAWBACK PLUTON

The Sawback pluton, exposed in the southwestern corner of the map area, is characterized by unaltered, medium to coarse-grained, massive biotite granite with well-developed joints. A Middle Eocene K-Ar date (48.0±1.7 Ma; biotite) was obtained for the pluton approximately 15 kilometres south of the present study area (Brown and Gunning, 1989b).

METAMORPHISM

Greenschist facies metamorphism has affected parts of the Stikine assemblage and, to a lesser extent, parts of the Stuhini Group. Most of the Stuhini Group rocks are zeolite facies or unmetamorphosed. Near the Damnation pluton, Stuhini basalts are metamorphosed to laumontite-prehnite grade; laumontite occurs in amygdules and in veinlets. Its stability limits the depth of burial for the Stuhini Group to less than 11 or 12 kilometres (Lion, 1971). The timing of metamorphism may be Middle to Late Jurassic, based on whole-rock K-Ar cooling ages.

STREAM-SEDIMENT GEOCHEMISTRY

Regional Geochemistry Survey (RGS) data were released for the Telegraph (104G) map sheet in July 1988 (RGS 104G) and include analyses of 141 silt and water samples collected from within the study area (Figure 1-15-6; Brown *et al.*, 1992). Numerous sample sites yielded anomalous geochemical results (i.e. exceeding the 95th percentile) that spurred a staking rush following the release. Subsequent follow-up exploration has located several and varied mineral occurrences, many peripheral to the Limpoke pluton.

MINERAL OCCURRENCES

There are eight mineral occurrences recorded in MINFILE for the Tahltan River map area (104G/12); they can be divided into six broad types: an actively mined placer gold deposit, porphyry copper showings, quartz-carbonate veins, gold-bearing massive sulphide zones, skarns and a cumulate magnetite deposit (Figure 1-15-6). Table 1-15-1 summarizes their geologic settings and lists key references. The occurrences that continue to be attractive exploration targets include; Barrington placer, Goat/Tuff, Poker and showings around the Limpoke pluton.

BARRINGTON RIVER PLACER OPERATION (MINFILE 104G 008)

Placer gold accumulations immediately south of the Barrington River canyon have been worked intermittently since the late 1920s. Reported gold recovery in 1933 was 3.1 kilograms and 6.8 kilograms in 1935 (B.C. Annual Reports 1933, 1935). More recently, Barrington Gold Ltd. purchased the placer claims from Integrated Resources Ltd. and now operates the deposit on a seasonal basis. Test mining in 1990 produced 12.4 kilograms of gold from about 36 000 cubic metres of gravel (Integrated Resources Ltd., News Release, October 21, 1991) . The gold occurs as flakes less than 5 millimetres in diameter. Exploration for the lode source of the gold, thought to be within the Barrington River or Limpoke Creek drainages and probably associated with marginal phases of the Limpoke pluton, is continuing.

GOAT/TUFF (MINFILE 104G 121)

The Goat claims (formerly Tuff property) are located due north of Tuffa Lake, near the headwaters of Cave Creek. In 1980, Du Pont of Canada Exploration Limited detected strongly anomalous gold in a heavy-mineral concentrate taken in the course of a regional stream-sediment sampling program in the region. A small massive sulphide pod (Little Cave Creek showing) was subsequently found and carried over 40 grams per tonne gold (Strain, 1981; Korenic, 1982a); numerous other pods have since been discovered. In 1986, Integrated Resources Ltd. restaked the area as the Goat claim group and has since conducted stream-sediment and soil sampling, geophysical surveys, prospecting, geologic mapping and some drilling (Van Angeren, 1991). Styles of mineralization include massive sulphide pods dominated by pyrrhotite with minor chalcopyrite; quartz-carbonate veins with pyrite and subordinate arsenopyrite and chalcopyrite; pluton-hosted massive magnetite with minor chalcopyrite veins (Lehtinen, 1989; Van Angeren, 1991).

POKER

A quartz-sulphide boulder train was traced from the Limpoke Creek valley to the southern edge of the Limpoke Glacier by Cominco Ltd. in 1988. Three types of mineralized boulders were identified - quartz-sulphide, massive pyrrhotite-pyrite-chalcopyrite-sphalerite-galena, and zinc-bearing quartz-carbonate (Westcott, 1989b). In 1990, Kee-

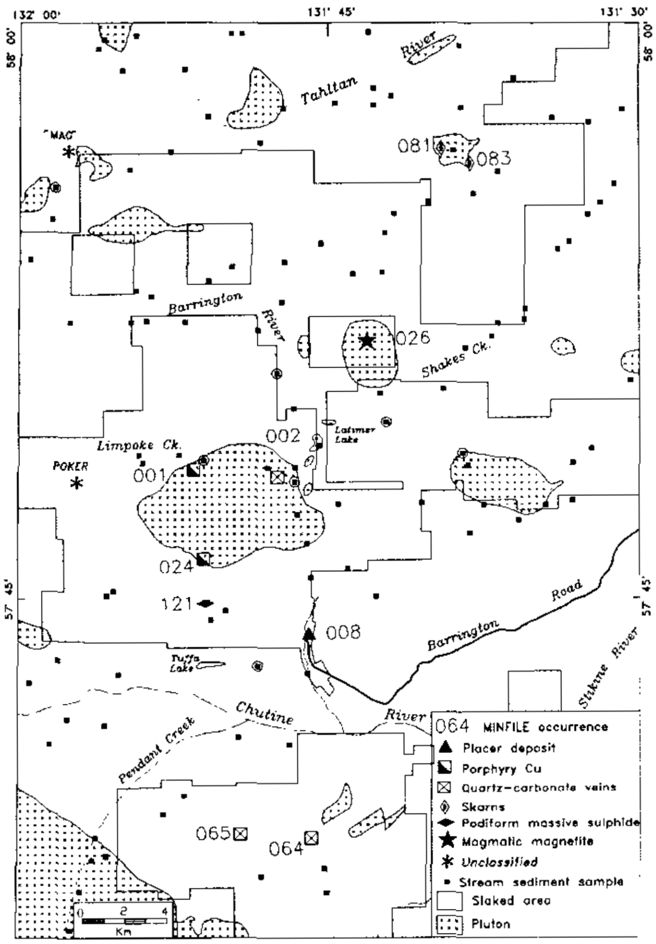

Figure 1-15-6. Mineral occurrence localities as recorded in the MINFILE database, approximate claim boundaries (October, 1991), RGS sample locations and British Columbia assessment report numbers in the Chutine River and Tahltan Lake map area. Solid squares denote RGS silt sample locations, encircled squares indicate gold anomaly sites (95th percentile). Mineral occurrences are grouped according to Table 1-15-1.

watin Engineering Inc. explored the south side of Limpoke Glacier and completed geochemical and geophysical surveys, geological mapping programs and four diamond-drill holes (Aspinall *et al.*, 1990).

Showings Peripheral to Limpoke Pluton

The Gordon showing (MINFILE 104G 002), located at the Limpoke Creek – Barrington River confluence, was examined by Kennco Explorations (Western) Ltd. (Hallof, 1966) and more recently (1990) by Homestake Mineral Development Company. Kennco conducted an induced polarization survey and prospected the area. The base metal mineralization is reported to consist of disseminated pyrite with minor chalcopyrite, bornite and malachite. Homestake's search for precious metal mineralization yielded geochemically low values (Marud, 1990c). The Poke showing was explored earlier by Kennco (Hallof, 1963).

Other Showings

The Tahltan Lake copper skarns (MINFILE 104G 081, 082) comprise a large alteration system 400 metres wide by 800 metres long (Marud, 1990a). Exoskarns and endoskarns consist of garnet, epidote, actinolite and diopside with smaller, rusty weathering patches of chalcopyrite, pyrite, magnetite and specular hematite. The northern portion of the skarn contains specular hematite while the southern part is principally magnetite with minor pyrite (Marud, personal communication, 1991). This gradation from reduced conditions close to the intrusive contact, to an oxidized regime distal to the intrusion is analogous to the Craigmont copper deposit (Rennie, 1962). At Craigmont some of the best copper grades occurred where both magnetite and hematite coexist in equal amounts (Rennie, *ibid*). Sulphide-bearing zones are 1 to 2 metres wide and up to 5 metres long (Marud, 1990a). The property was first staked and explored in 1973 by AMAX Exploration Inc. (Hodgson and LeBel, 1974) and is now owned by Homestake (Southam, 1991). A smaller skarn occurrence, VB 12 (MINFILE 104G 083), occurs near the lake shore.

Fifteen kilometres to the south, at Rugged Mountain, anomalous but relatively low copper and gold values are reported from the discontinuous clinopyroxenite border phase of the intrusion and isolated rusty weathering pyrite-malachite alteration zones (up to 2.32% Cu and 1.57 g/t Au; Marud, 1990b). Similarities to the setting of the Galore Creek alkaline porphyry copper-gold deposit prompted exploration of this body. However, the low geochemical values, combined with the lack of significant alteration zones at Rugged Mountain as compared to the Galore Creek deposit, suggest that the body has low mineral potential.

A new magnetite iron skarn ("MAG", Figure 1-15-6) was located in the northwest corner of the map area, where an altered granodiorite pluton intrudes Stuhini limestone and volcanic rocks. The massive magnetite pod is over 6 metres wide and 30 metres long.

MINERAL POTENTIAL AND EXPLORATION ACTIVITY

Mineral potential in the study area is varied and has been incompletely evaluated. Renewed interest in porphyry deposits and their peripheral vein systems has attracted mineral exploration companies to the region. Targets like the Galore Creek complex, the Wolverine showing on the edge of the Golden Bear road, and the Kaketsa Mountain porphyry system, suggest there is potential for copper-gold mineralization in the area. The contact zones around the Limpoke pluton remain prime exploration targets with silicified and pyritized float and placer gold reported in the area. Several RGS stream-sediment anomalies and small showings warrant further exploration.

Prominent iron-carbonate alteration zones between Tahltan and Shakes lakes appear attractive, however, sampling by industry has yielded poor results (Kasper, 1990). Similarly, a prominent rusty weathering syenite dike swarm on the northeast flank of Isolation Mountain has returned discouraging results (Dunn, 1990).

TABLE 1-15-1
GEOLOGY AND DESCRIPTIONS OF MINERAL OCCURRENCES

MINFILE No.	NAME	UTM Zone 9	MAP UNIT	DESCRIPTION	KEY REFERENCES
Placer gold occurrences:					
104G 008	Barrington River	335200E 6402600N	Qal	Placer gold deposits occur within unconsolidated gravel of the lower section of the Barrington River. Kerr (1948) suggested that the source of gold maybe related to the intrusive rocks which outcrop upstream along the Barrington River and Limpoke Creek.	EMPR AR 1925, '29, '31-3[illegible], '35; Kerr (1948)
Porphyry copper occurrences related to the marginal phase of the Limpoke pluton:					
104G 001	Poke	329920E 6410757N	uTSv	Disseminated chalcopyrite mineralization occurs along fracture zones within altered Stuhini Group volcanic rocks adjacent to the marginal phase of the Limpoke pluton.	EMPR AR 1963, '65; Halk (1963), Folk (1981) Kerr (1948), Souther (197[illegible])
104G 002	Gordon	334119E 6410365N		Disseminated chalcopyrite mineralization is found throughout alkali feldspar syenite dike swarms which outcrop to the northeast of the Limpoke pluton.	EMPR AR 1930, '66; Halk (1966) Marud (1990c), Kerr (1948), Souther (1972)
104G 024	New Limpoke	330116E 6406383N		Disseminated chalcopyrite occurs predominantly within altered quartz monzonite to monzodiorite of the Limpoke pluton. Pyrite, pyrrhotite and molybdenite are also present in minor amounts.	EMPR AR 1965 Kerr (1948), Souther (197[illegible])
Quartz - carbonate vein occurrences:					
104G 064	Conover Mt.	334512E 6392515N	uTSv	Slight evidence of mineralization, in the form of quartz, calcite and chalcopyrite veins has been observed at the contact between the Conover intrusions and surrounding volcanic rocks.	Kerr (1948), Davis (1988)
104G 065	Mist	331200E 6392700N	uTSv	Quartz veins associated with felsic and dioritic dikes intrude Stuhini Group mafic to intermediate volcanic rocks, cherts and siltstone,and contain minor pyrite, pyrrhotite and chalcopyrite. Gold is present in detectable but uneconomic quantities.	Eccles (1981), Korenic (1982b) Kerr (1948)
Skarn mineralization:					
104G 081, 082	VB 20, VB 5	342250E 6425670N	uTSs,L	Geologic setting and mineralization are similar for MINFILE 104G 081, 082, 083. Magnetite-pyrrhotite-chalcopyrite mineralized garnet, epidote, actinolite, and diopside-bearing skarns occur within Stuhini Group limestone and volcaniclastic rocks which have been intruded by a Triassic-Jurassic (?) hornblende diorite pluton. Pyrite and specular hematite mineralization is also present A smaller skarn occurs near the lake (104G 083, VB 12)	EMPR GEM 1974; Hodgson et al. (1974) Marud (1990a), Southam (1991)
Podiform gold-bearing massive sulphide occurrences:					
104G 121	Tuff, Goat	331080E 6404200N	uTSs	Massive sulphide pods occur in Stuhini volcanics over an area of about 1200 x 1200 metres. These pods average less than 10 centimetres in width and are from 1 to 20 metres long. They are composed of pyrite with lesser arsenopyrite, chalcopyrite and pyrrhotite.	Strain (1981), Korenic (1982a) Lehtinen (1989), Van Angeren (1991) Kerr (1948)
Cumulate magnetite occurrences:					
104G 026	MH, Shakes Creek	338500E 6416500N	uTSv	Tuffaceous siltstone and andesite are intruded by magnetite-rich clinopyroxenite. Magnetite occurs interstitially throughout the rock as grains and blebs. The magnetite content varies but averages 15-19% Two pyrite veins, 30 to 40 centimetres wide, cut the occurrence and carry minor chalcopyrite mineralization Ultramafic intrusion is referred to as the Latimer Lake pluton.	EMPR AR 1965, '66; McIntyre (1966) Souther (1972) EMPR MP CORPFILE (Stikine Iron Mines Ltd., North Pacific Mines Ltd.)

Abbreviation: EMPR AR = Energy, Mines and Petroleum Resources Annual Report, GEM = Geology, Exploration and Mining.

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