LEGEND

Bedrock in southwestern 2/3 of map area ←

Surficial deposits in NE part of map area →

Volcanic and sedimentary rocks

CRETACEOUS

UPPER CRETACEOUS

CENOMANIAN - UPPER ALBIAN

uKPC — *POWELL CREEK VOLCANICS green, purple, maroon, and grey, subaerial andesitic agglomerate and breccia, lapilli tuff, rare flows; minor interbedded calcareous siltstone and sandstone NW of Charlotte Lake*

Metamorphic rocks

JURASSIC

MIDDLE - LATE JURASSIC (metamorphic age)

MLJgn — *Amphibolite facies mafic gneiss, with tonalitic leucosome; also commonly present as lenticular screens and inclusions in MLJt and MLJd*

LOWER JURASSIC - UPPER TRIASSIC(?) (protolith age)

TJmv — *Greenschist facies, mafic, intermediate, and lesser felsic metavolcanic schist; minor metarhyolite (TJrhy) and metacarbonate (TJlst); local minor well bedded waterlain tuff. Possibly partly correlative with Carnian and Norian Mt. Moore and Mosley formations and/or Early Jurassic Hazelton Group. Metamorphosed in Middle and Late Jurassic time. Also commonly present as screens and inclusions in MLJt*

Intrusive rocks

EARLY TERTIARY

ETqm — *Trumpeter pluton: biotite quartz monzonite, lesser granodiorite; fine grained; commonly quartz porphyritic and K-feldspar megacrystic*

ETgd — *Trumpeter pluton: biotite granodiorite, lesser quartz monzonite; medium grained*

CRETACEOUS

LATE CRETACEOUS

LKg — *Trumpeter pluton: muscovite-biotite granite; coarse grained, locally pegmatitic; locally contains accessory garnet*

LKgd — *McClinchy Pluton: granodiorite; lesser quartz monzonite and monzodiorite; locally plagioclase megacrystic*

JURASSIC

MIDDLE - LATE JURASSIC

MLJt — *Wilderness Mountain Pluton: biotite-hornblende tonalite and quartz diorite; locally strongly foliated to mylonitic orthogneiss; locally abundant inclusions and screens of MLJgn and TJmv*

MLJd — *Mount Ada diorite: biotite - hornblende diorite, quartz diorite, and gabbro; locally stongly foliated; locally abundant inclusions and screens of MLJgn*

QUATERNARY

QGLt — *Terraced glaciolacustrine sediments*

QGFr — *Reworked glaciofluvial sediments; local esker deposits*

QGFb — *Blanketted glaciofluvial sediments; meltwater channel deposits*

QMb — *Blanketted glacial till; local crevasse deposits*

QMh — *Hummocky glacial till*

QMr — *Reworked glacial till*

SHEET 2 of 2

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SYMBOLS

- *Outcrop extent*
- *Stratigraphic or intrusive contact (defined, approximate, assumed)*
- *High angle fault (defined , approximate, assumed)*
- *Airphoto lineament*
- *Strike and dip of bedding (tops known, tops unknown, overturned)* — 18, 18, 55
- *Strike and dip of foliation in granitoid rocks / penetrative cleavage or schistosity in greenschist facies metamorphic rocks* — 68
- *Gneissic layering in amphibolite facies metamorphic rocks* — 89
- *Fracture (first set, second set, third set)* — 32, 32, 32
- *Vein, dyke* — 27, 65
- *Lineation (mineral, stretching, slickenside)* — 13, 13, 13
- *Minor brittle fault trace and sense of movement (unknown, dextral, sinstral, normal, reverse)* — 56, 56, 56, 56, 56
- *Minor brittle shear plane and sense of movement (unknown, dextral, sinstral, normal, reverse)* — 76, 76, 76, 76, 76
- *Fold hinge trend and plunge (unknown vergence, Z vergence, S vergence)* — 28, 28, 28
- *Radiometric date (Ma)*
  Hb, Bi, Wr : K-Ar or Ar/Ar date (hornblende, biotite, whole rock)
  Hb or Bi Ar/Ar : multistep Ar/Ar plateau date (hornblende, biotite)
  Zr, Mn : U-Pb age (zircon, monazite)
  (p=pluton, d=dyke, mv=metavolcanic rock, mm=metamorphic rock, ogn=orthogneiss) — ● Hb 131.2 d
- *Mineral deposit and MINFILE number (Note 4)* — 001
- *Park boundary*
- *Limit of mapping*

SURFICIAL GEOLOGICAL FEATURES

- *Drumlin*
- *Glacial groove*
- *Esker (flow direction known, unknown)*
- *Meltwater channel*
- *Ridged terrain*

REGIONAL TECTONIC HISTORY

		Lithostratigraphic units	Deformation and metamorphism	Intrusive events and mineralization
TERTIARY	Pliocene, Miocene, Oligocene, Eocene, Paleocene		NW and NE trending strike slip / normal faulting — ca. 58	55-59 Cu-Mo
	65 Ma			ca. 59; mafic dykes
CRETACEOUS	Maastrichtian, Campanian, Santonian, Coniacian, Turonian, Cenomanian, Albian	? Powell Creek volcanics ?	?	ca. 115; mafic dykes; 128 -131
	Aptian, Barremian, Hauterivian, Valanginian, Berriasian			
	146		NE trending ductile fabrics — ca. 150	?
JURASSIC	Tithonian, Kimmeridgian, Oxfordian, Callovian, Bathonian, Bajocian, Aalenian, Toarcian, Pliensbachian, Sinemurian, Hettangian	? ca. 190 Hazelton Group?		ca. 145 - 150; ca. 160 - 165
	157		?	
	208	? Mosley formation		
TRIASSIC	Norian	? Mt. Moore formation	?	
	Carnian, Ladinian, Anisian, Scythian			
	245			

Radiometric Age Controls

radiometric dating samples

British Columbia
Mineral Development Agreement
Canada

Contribution to the Canada-British Columbia Agreement on Mineral Development (1991-1995), a subsidiary agreement under the Economic and Regional Development agreement.

Contribution à l'Entente Canada/Colombie-Britannique sur l'exploitation minérale (1991-1995), entente auxiliaire négociée en vertu de l'Entente Canada/Colombie-Britannique de developpement economique et

BC Province of British Columbia

Canada

NOTES

NOTE 1: SUMMARY OF GEOLOGY AND GEOCHRONOLOGY

The southwestern part of Charlotte Lake (93C/3) and Junker Lake east-half (93C/4E) map areas are underlain predominantly by granitoid and metamorphic rocks of the eastern Coast Belt. Extensive glacial drift and felsenmeer (ca. 80% of the total surface area) obscure relationships between 5 major map units:

1) Middle to Late Jurassic greenschist and amphibolite facies metamorphic and metaplutonic rocks, derived from Upper Triassic to Early Jurassic(?) volcanic (TJmv; also minor metarhyolite [TJrhy] and metacarbonate [TJlst]) and Middle to Late Jurassic plutonic (Mount Ada diorite MLJd; unnamed gneissic rocks MLJgn) protoliths, respectively. Metarhyolite from the metavolcanic succession along Charlotte Lake has yielded a minimum 190 Ma U-Pb zircon date. The Mount Ada diorite gave 162-168 Ma Pb/Pb zircon ages on somewhat discordant fractions. These oldest rock in the study area form several large, generally northeast striking pendants and widespread smaller screens and inclusions enclosed in:
2) Middle and Late Jurassic biotite hornblende tonalite and quartz diorite of the Wilderness Mountain pluton (MLJt), which gave 145 and 160 Ma U-Pb zircon ages; tonalitic leucosome from a gneissic screen west of McClinchy Lake yielded a 150 Ma U-Pb zircon age. The tonalite is commonly strongly foliated, and locally mylonitic, with steep dips and northeasterly strike. Two postkinematic mafic dykes in the Wilderness pluton gave ca. 131 and 128 Ma Ar/Ar dates on hornblende and biotite, respectively. Together with the older metamorphic and plutonic pendants, this matrix pluton forms the eastern boundary of the Middle to Late Jurassic Atnarko Complex (van der Heyden, 1990, 1991). The Wilderness Mountain pluton is separated by a prominent northwesterly trending fault (possibly a northwestern continuation of the Tchaikazan fault) from:
3) Medium grained, locally plagioclase megacrystic granodiorite to quartz monzonite of the Late Cretaceous McClinchy pluton (LKgd) (van der Heyden et al., 1994). The MClinchy pluton intrudes the Wilderness tonalite south of the present study area, and an offset part(?) of the pluton intrudes a metavolcanic screen east of Whitton Creek.
4) A distinct Late Cretaceous two-mica granite (LKg) and associated Early Tertiary granodiorite (ETgd) and megacrystic quartz monzonite (ETqm), collectively refered to as the Trumpeter pluton, which intrudes the Wilderness pluton south of the Atnarko River. Zircons from these distinct phases yielded ca. 58.7 Ma (monazite and zircon), 58.5 Ma (zircon), and 55 Ma (zircon) U-Pb ages, respectively. The Trumpeter pluton appears to have been disrupted by the main northwest trending fault, northwest of Little Charlotte Lake.
5) Late Cretaceous subaerial volcaniclastic rocks of the Powell Creek formation (LKPC) form two fault bounded domains, west of Clearwater Lake and northwest of Charlotte Lake, respectively. These were probably intruded by the Late Cretaceous plutons (LKgd, LKg), but present contacts are all steeply dipping faults.

Ductile fabrics in the study area are dominated by steep, north-northwest dipping foliations; this attitude is quite anomalous with respect to the regional northwesterly trends of the Coast Belt. The ductile fabrics are probably mostly Middle to Late Jurassic in age. A network of steeply dipping northeast, north, and northwest trending brittle shear zones and faults has affected most rock units in the study area. The northeast and northwest striking faults apparently postdate the youngest granitoid intrusions in the area, and are therefore Eocene or younger in age. Many of these faults and their associated fractures are locally coated with secondary Cu minerals related to late hydrothermal activity (see below). These faults may be related to Eocene and younger extension that has affected the Tatla Lake extensional metamorphic complex (Friedman and Armstrong, 1988), which is inferred to underlie Quaternary sediments along the extreme eastern boundary of the Charlotte Lake map area. The Yalakom fault may be buried beneath the northwest trending meltwater channel that includes Hooch Lake.

NOTE 2: SURFICIAL GEOLOGY

The southwest portion of the map area is dominated by an alpine landscape, deeply incised by northeast trending glaciated valleys, including Whitton and McClinchy creeks. Glacial erosion focussed in these valleys has emphasized prominent NE-SW structural lineaments. Above 1770 m asl., the dominant suficial deposits are talus and felsenmeer veneer on bedrock; below this elevation, locally derived till veneers bedrock. Along valley floors, reworked till and glacio-fluvial sediments predominate. Glacial scouring west of Charlotte Lake has exposed bedrock and emphasized the local fracture and fault pattern, producing roches moutonées, glacial grooves, drumlins, and crag and tail features. These landforms indicate a northeast iceflow from Whitton Creek.

The remainder of the map area is dominated by plateau terrain, lying between 1040 and 1540 m asl. Charlotte Lake is the major landorm in the area and lies on trend with regional NW-SE lineaments. This lake drains into the Atnarko River, which occupies a major north-northwest trending glacial trough northwest of the study area. The entire eastern part of the study area is blanketed by till (QMb, QMh). Directional iceflow indicators preserved in till, including drumlins and grooves, indicate northeast and southeast iceflow. Tipper (1969) suggested that the dominant iceflow direction throughout the Fraser glaciation was northeasterly, with a later southeasterly readvance from the Anahim Lake area. However, mapping provided evidence for only one glaciation, during which ice lobe interaction occured between glaciers derived from the southwest and northwest of Charlotte Lake. Till is locally reworked (QMr), overlain by esker (QGFr) and crevasse (QMh) deposits. The glacial deposits and landforms are eroded and incised by meltwater channels that drain to Charlotte Lake and Dean River.

Glaciovluvial deposits in these channels (QGFb, QGFr) are laterally transitional with terraced glaciolacustine sediments (QGLt) around Charlotte Lake. These terraces are interpreted as former stands of Charlotte Lake.

NOTE 3: ECONOMIC GEOLOGY

The contact zone between the Wilderness tonalite and the Trumpeter pluton south of the Atnarko River is locally marked by chalcocite, chalcopyrite, and bornite bearing quartz veins in an area that includes the Ada Cu showing (Minfile 093C-005). Disseminated chalcopyrite is locally present in very minor amounts near the contact in both Wilderness and Trumpeter plutons. The Cu sulphides are typically altered to assemblages of malachite, azurite, chrysocolla, and Cu pitch. Malachite and azurite are also commonly present along fractures in both plutons. The Cu bearing veins do not appear to be auriferous, but local pyrite bearing quartz veins near the Wilderness-Trumpeter contact may contain some Au.

Other exploration targets in the mapped area include the Copper Queen Cu-Mo (Minfile 093C-001) and the C,DK Cu (Minfile 093C-004) showings at the southwest end of McClinchy Lake. The Copper Queen showing may represent a fault-controlled, high structural level of a classic altered mineralized prophyry system hosted by tonalite of the Wilderness Mountain pluton. An area encompassing about 9 square kilometres in size is characterized by quartz-feldspar porphyry dykes and at least five intrusive breccia zones with a fine biotite quartz diorite matrix. The breccias are crackled and veined by druzy quartz with chalcopyrite, bornite, and minor molybdenite; the country rocks are modetely altered to propylitic and local phyllic and argillic assemblages. Au and Ag values associated with Cu mineralization are low. This mineralized area is here interpreted as the cap of an Early Tertiary Cu porphyry system, for which the Trumpeter pluton represents an example of a deeper level of unroofing.

The southeast and northwest margins of the large metavolcanic screen in the Wilderness tonalite, northwest of McClinchy Lake, are locally quite gossanous and contain numerous sulphide bearing druzy quartz veins. This area and the adjacent older plutonic rocks are possibly underlain by the same porphyry system as the McClinchy Lake showings. A small area at the extreme NE end of the metavolcanic screen was staked in 1993, apparently for the presence of Au. The entire screen margin deserves to be further prospected for the presence of precious metals and Cu mineralization.

NOTE 4: MINFILE MINERAL DEPOSITS

Locations are taken from British Columbia Geological Survey Branch MINFILE database; accuracies are uncertain.

MINFILE number, name (commodities)

001 Copper Queen (Cu, Mo)
004 C, DK (Cu)
005 Ada (Cu)

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