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GEOLOGICAL SURVEY OF CANADA / COMMISSION GÉOLOGIQUE DU CANADA

LEGEND

Bedrock in southwestern 2/3 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. Rift of Charlotte Lake.*

Metamorphic rocks

JURASSIC

MIDDLE - LATE JURASSIC (metamorphic age)

MLgn — *Amphibolite facies mafic gneiss, with biotite leucosome; also commonly present as lenticular screens and inclusions in eLJt and eLJd.*

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

TJmv — *Greenschist facies mafic, intermediate, and felsic felsic metavolcanic schist; minor metarhyolite (TJmy) and metacarbonate (TJmj); local felsic metavolcanic epiclastic 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 eLJt.*

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.*

ETg — *Trumpeter Pluton; muscovite-biotite granite; coarse grained, locally pegmatitic; locally contains anomalous garnet.*

CRETACEOUS

LATE CRETACEOUS

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 eLJgn and TJmv.*

MLJd — *Mount Ada diorite; biotite-hornblende diorite, quartz diorite, and gabbro; locally strongly foliated; locally abundant inclusions and screens of eLJgn.*

Surficial deposits in NE part of map area

QUATERNARY

QGLt — *Terraced glaciolacustrine sediments*

QGFr — *Reworked glaciofluvial sediments; local esker deposits*

QGFb — *Blanketed glaciofluvial sediments; meltwater channel deposits*

QMb — *Blanketed glacial till; local crevasse deposits*

QMh — *Hummocky glacial till*

QMr — *Revonted glacial till*

Geology by: P. van der Heyden, 1989-1992, P. van der Heyden, A. Calderwood, and B. Ickert, 1993

Geochronology by: P. van der Heyden and V. McNicoll, 1990-1994

Surficial Geology by D.H. Huntley, 1992

Geologic compilation by: P. van der Heyden, 1994

Digital geological cartography by N. Gosling, B. Pratt, P. van der Heyden

Electrostatic plot produced by the Geological Survey of Canada

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map from Geomatics Canada published at the same scale. Generalized and modified by the Geological Survey of Canada

Copies of the topographical edition of this map may be obtained from the Canada Map Office, Natural Resources Canada, Ottawa, Ontario K1A 0E9

Magnetic declination 1994, 20°52' E, decreasing 7.7' annually

Elevations in feet above mean sea level

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) obscures 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 (TJmy) and metacarbonate (TJmj); 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 rocks in the study area form several large, generally northwest 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. The 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, the main pluton forms the eastern boundary of the Middle to Late Jurassic Ahnahko Complex (van der Heyden, 1990, 1991). The Wilderness Mountain Pluton is separated by a 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 McClinchy Pluton intudes the Wilderness tonalite east of McClinchy Lake, and an offset part(?) of the pluton intrudes a metavolcanic screen east of Whitton Creek.

4) A distinct Early Tertiary two-mica granite (ETg) 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 Anahko River. Zircons from these distinct phases yielded ca. 58.7 Ma (monazite and zircon), 58.5 Ma (zircon), and 55 Ma (zircon) U-Pb zircon 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 and Early Tertiary plutons (LKgd, ETg), 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 surficial deposits are talus and felsenmeer mantles on bedrock; below this elevation, locally derived till veneers bedrock. Along valley floors, re-worked 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 moutonnés, glacial grooves, drumlins, and crag and tail features. These landforms indicate a northeast ice flow 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 landform in the area and lies on trend with regional NW-SE lineaments. This lake drains into the Anahko 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 ice flow indicators preserved in places including drumlins and grooves, indicate northeast and southeast ice flow. Tipper (1969) suggests that the dominant ice flow direction throughout the Fraser glaciation was northeasterly, with a later northwesterly readvance from the Anahim Lake area. However, mapping provided evidence for only one glaciation, during which ice lobe interaction occurred between glaciers derived from the southwest and northwest of Charlotte Lake. Till is locally reworked (QMr), overlain by esker (QGFr) and crevasse (QMfm) deposits. The glacial deposits and landforms are eroded and incised by meltwater channels that drain to Charlotte Lake and Dean River. Glaciofluvial deposits in these channels (QGFb, QGFr) are laterally transitional with terraced glaciolacustrine 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 Anahko River is locally marked by chalcopyrite, chalcocite, 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 porphyry system hosted by tonalite of the Wilderness Mountain Pluton. An area encompassing about 9 square kilometers in size is characterized by quartz-feldpar porphyry dykes and at least five intrusion breccia zones with a fine biotite quartz diorite matrix. The breccias are crackled and veined by drusy quartz with chalcopyrite, bornite, and minor molybdenite; the country rocks are moderately 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 sulfide bearing drusy quartz veins. This area and the adjacent older plutonic rocks are probably underlain by the same porphyry system as the McClinchy Lake showings. A small area east 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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Overview and preliminary results for the Interior Plateau Program, Canada-British Columbia Agreement on Mineral Development 1991-1995; in Current Research, Part E; Geological Survey of Canada, Paper 93-1E, p. 73-79.

SYMBOLS

Outcrop extent

Stratigraphic or intrusive contact (defined, approximate, assumed)

High angle fault (defined, approximate, assumed)

Anticline (measured)

Strike and dip of bedding (tops known, tops unknown, overturned)

Strike and dip of foliation in gneissic rocks / penetrative cleavage in lenticularly to gneissic layer metamorphic rocks

Gneissic lineation in amphibolite facies metamorphic rocks

Fracture (first set, second set, third set)

Vein, dike

Lineation (mineral, stretching, slickenside)

Minor brittle fault trace and sense of movement (unknown, dextral, sinistral, normal, reverse)

Minor brittle shear zones and sense of movement (unknown, dextral, sinistral, normal, reverse)

Fold hinge trend and plunge (unknown, 1 vergence, 2 vergence)

Radiometric Age (Ma)
(1) Ar/Ar, K/Ar or K/Ar date (hornblende, biotite, whole rock)
(2) Rb / Sr (WR = whole rock, plagioclase date (hornblende, biotite)
(3) U-Pb (zr = zircon, mz = monazite)
(4) Pb/Pb (zr = zircon, sphene(sphene), carb, epidote(epidote), carb, microcline(microcline, carb, microcline(carb, carb, epidote(epidote)

Mineral deposit and MINFILE number (Note 4)

Park boundary

Limit of mapping

SURFICIAL GEOLOGICAL FEATURES

Drumlin

Glacial groove

Esker (true direction known, unknown)

Meltwater channel

Hillyard terrace

REGIONAL TECTONIC HISTORY

		Lithostratigraphic units	Deformation and metamorphism	Intrusive events and mineralization
TERTIARY	Pliocene			
	Miocene			
	Oligocene		NW and NE trending strike slip - normal faulting	55-59 Cu-Mo; ca. 59; ca. 58
	Eocene			
	Paleocene			
	65 Ma			
CRETACEOUS	Maastrichtian	Powell Creek Volcanics		
	Campanian			
	Santonian			
	Coniacian			
	Turonian			
	Cenomanian			ca. 67
	Albian			wide range; 128-111
	Aptian			
	Barremian			
	Hauterivian			
	Valanginian		NE trending ductile fabrics	
	Berriasian			ca. 145-165
	146			
	Tithonian			ca. 160 - 165
	Kimmeridgian			
	Oxfordian			
	157			
JURASSIC	Callovian			
	Bathonian			
	Bajocian			
	Aalenian			
	Toarcian			
	Pliensbachian			
	Sinemurian			
	Hettangian			
	208			
TRIASSIC	Norian	ca. 190 Hazelton Group?		
	Carnian	Mosley formation		
	Ladinian	Mt. Moore formation		
	Anisian, Scythian			
	245			

Radiometric Age Controls
radiometric dating samples

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LOCATION MAP

Canada-British Columbia Mineral Development Agreement

Contribution by Canada / British Columbia Agreement on Mineral Development (1991-1995) to a subsidiary agreement under the Canada / British Columbia Agreement on Economic Diversification.

Contribution à l'Entente Canada / Colombie-Britannique de développement minéral (1991-1995) faisant ancillaire à une entente de l'Entente Canada / Colombie-Britannique de diversification économique et régionale.

BC ⚒ Canada

Canada

OPEN FILE 2984

PRELIMINARY GEOLOGICAL MAP

CHARLOTTE LAKE - JUNKER LAKE (EAST HALF)

BRITISH COLUMBIA

Scale 1:50 000 - Échelle 1/50 000

Kilometres 0 1 2 3 4 Kilometres

Transverse Mercator Projection — Projection transverse de Mercator

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93C/6	93C/5	93C/3
93C/4	93C/3	93C/2
	OF 2984	
92N/13	92N/14	92N/15
	OF 2957	

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ACCOMPANYING GEOLOGICAL SURVEY OF CANADA MAPS

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1994; Preliminary Geological Map: Charlotte Lake - Junker Lake (East Half), British Columbia; Geological Survey of Canada, Open File Report 2984, scale 1:50 000