

LEGEND

Southwest of Yakalom Fault

Northeast of Yakalom Fault

Sedimentary and Volcanic Rocks

CRETACEOUS

UPPER CRETACEOUS

CENOMANIAN - UPPER ALBIAN

uKpc POWELL CREEK VOLCANICS green, purple, grey, andesitic conglomerate and breccia, rare flows; interbedded carbonaceous siltstone and fine sandstone in lower 100 m

uKsq SILVERQUICK CONGLOMERATE: sandstone; coarse to fine arkosic arenite, immature; interbedded pebble - boulder conglomerate of igneous clasts; carbonaceous silty mudstone in upper 100 m, rare plant fragments

UPPER ALBIAN and YOUNGER(?)

KTC TAYLOR CREEK GROUP: sandstone, siltstone, carbonaceous mudstone, minor pebble conglomerate; common plant fragments; KTCv volcanic subunit; felsic volcanic flows, breccia, intermediate flows, breccia, rare pillowed volcanics

LOWER CRETACEOUS

HAUTERIVIAN

iKcd CLOUD DRIFTER formation: sandstone, siltstone, minor conglomerate; sandstone commonly contains abundant detrital hornblende; conglomerate clasts dominantly felsic and intermediate volcanic rocks and quartzose granitoid rocks

UPPER JURASSIC(?) to LOWER CRETACEOUS

HAUTERIVIAN(?)

iKo OTTARASKO formation: green volcanic breccia and tuff, rare flows, minor siltstone and shale; volcanic rocks are dacite and andesite with subordinate but locally abundant basalt and rhyolite; poorly stratified and poorly sorted

UPPER TRIASSIC

NORIAN

uTm MOSLEY formation: red and grey volcanoclastic sandstone, red siltstone, limestone wackestone/packstone

uTm1 mappable lenses up to 150m thick of fossiliferous limestone wackestone and packstone

UPPER CARNIAN and(?) LOWER NORIAN

uTmm MT. MOORE formation: maroon and green, basaltic to andesitic volcanic breccia, lesser volcanogenic sandstone and massive greenstone, rare carbonate; volcanic rocks commonly augite-phyric

Intrusive Rocks

LATE CRETACEOUS - TERTIARY

LKT Klinaklini Pluton (south map area) McClinchy Pluton (NW map area)

LKTt tonalite **LKTgd** granodiorite **LKTqm** quartz monzonite **LKTqd** quartz diorite

LKt unnamed pluton (south of Perkins Peak): tonalite, minor quartz diorite

MIDDLE - LATE JURASSIC

MLJt Wilderness Mountain Pluton: tonalite

LATE TRIASSIC - EARLY JURASSIC

LJt Sapeye Creek Pluton and unnamed plutons east of Tchaikazan Fault: tonalite, minor quartz diorite

Tatla Lake Metamorphic Complex

LOWER PLATE - DUCTILELY SHEARED ASSEMBLAGE

JURASSIC AND CRETACEOUS

LKoe One Eye Tonalite: nonfoliated to weakly foliated biotite-hornblende tonalite

Kgsi Biotite granodiorite sills

og Mylonitic orthogneiss: quartz diorite to granodiorite augen gneiss (not present in map area)

JKog2 Biotite tonalite augen gneiss

og3 Biotite tonalite to granodiorite augen gneiss

Jog4 Biotite - muscovite tonalite to granodiorite augen gneiss

Jms Foliated to mylonitic Jurassic (?) metasedimentary rocks (not present in map area)

Jmsq Quartzofeldspathic schist, minor amphibolite

Jmv Foliated to mylonitic Jurassic (?) metavolcanic rocks (not present in map area)

Jmv1 Chlorite-actinolite-quartz-albite schist

Jmv2 Hornblende-quartz-oligoclase schist

LOWER PLATE - GNEISSIC CORE

CRETACEOUS AND (?)OLDER

gg1 Medium to coarse grained hornblende-biotite granoblastic gneiss

mg Migmatitic gneiss

SYMBOLS

Outcrop extent

Stratigraphic or intrusive contact (defined, gradational, approximate, assumed)

Thrust fault (defined, approximate, assumed)

High angle fault (defined, approximate, assumed)

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

Strike and dip of foliation in granitoid or metamorphic rocks / penetrative cleavage in volcanic or sedimentary rocks

Schistosity and gneissic layering

Fracture, fracture cleavage (first set, second set, third set)

Joint, vein, dyke

Elongation lineation (mineral, stretching, slickenside)

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

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

Fold hinge line trend and plunge (unknown vergence, Z vergence, S vergence)

Trace of fold axial surface (anticline, syncline, overturned syncline, overturned anticline)

Fossil locality and GSC Locality Number; letter in parentheses indicates macrofossil (m), conodont (c), or plant fossil (p) (Note 3)

Radiometric date (Ma ± 2 sigma)

bk: K-Ar on biotite

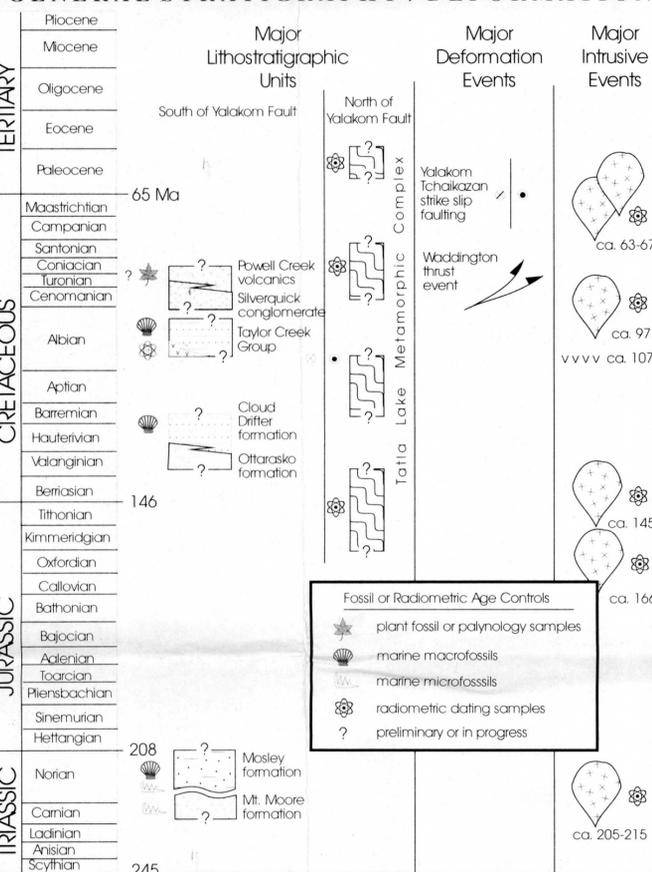
hk: K-Ar on hornblende

mk: K-Ar on muscovite

zu: U-Pb on zircon

Mineral deposit and MINFILE number (Note 4)

GENERAL STRATIGRAPHY / DEFORMATION



REFERENCES

- Friedman, R.M. and Armstrong, R.L.**
1988: Tatla Lake Metamorphic Complex: An Eocene metamorphic core complex on the southwestern edge of the Intermontane Belt of British Columbia; Tectonics, v. 7, p. 1141-1166.
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1988: Geology and geochronology of the Eocene Tatla Lake metamorphic core complex, western edge of the Intermontane Belt, British Columbia; Ph.D. thesis, University of British Columbia, Vancouver, British Columbia, 348 p.
- Jeletzky, J.A.**
1968: Stratigraphy and Paleontology of Lower Cretaceous and Upper Jurassic rocks of northeastern corner of Mount Waddington map-area, British Columbia, in Report of Activities; Part A, Geological Survey of Canada, Paper 68-1, p. 103-106.
- Mustard P.S. and van der Heyden, P.**
1994: Stratigraphy and sedimentology of the Tatla Lake-Bussel Creek map areas, west-central British Columbia; in Current Research, 1994-A, Geological Survey of Canada, p. 95-104.
- Tipper, H.W.**
1969: Mesozoic and Cenozoic geology of the northeast part of Mount Waddington map-area (92N), Coast District, British Columbia; Geological Survey of Canada, Paper 68-33, 103 p.
- Van der Heyden, P., Mustard, P., and Friedman, R.**
1994: Northerly continuation of the Eastern Waddington Thrust Belt and Tyaughton Trough, Tatla Lake-Bussel Creek map areas, west-central British Columbia; in Current Research, 1994-A, Geological Survey of Canada, p. 87-94.

NOTES

NOTE 1: SUMMARY

Principal goals of this mapping project are: 1) to define the northern extent of the East Waddington Thrust Belt and Tyaughton Basin, 2) to document the stratigraphy and tectonic setting of Mesozoic supracrustal units, and 3) to provide radiometric age constraints on the timing of magmatism and deformation along this segment of the eastern Coast Belt. The map area can be divided into four fault-bounded, west to northwest trending tectonostratigraphic domains. From SW to NE these domains comprise:

1) The Coast Belt magmatic arc, consisting of locally mylonitic "mid" Cretaceous tonalite and poorly stratified, dominantly felsic volcanoclastic rocks in the SW (unit LKt: 96 Ma unnamed tonalite; unit KTCv: 107 Ma Taylor Creek volcanics), and locally strongly mylonitic Middle to Late Jurassic granitoid rocks in the NW (unit MLJt: 160 and 145 Ma Wilderness Mountain composite pluton). The SW portion is thrust to the NE over:

2) An imbricate zone, 3-8 km wide, consisting of multiple thrust slices of Upper Triassic arc volcanic and sedimentary rocks (units uTMM and uTM: late Carnian to early Norian Mt. Moore formation and late Norian Mosley formation), correlative with Stikine terrane. The Mt. Moore formation is intruded by several plutons ranging in age from 190 to 215 Ma (units LTJt: the Sapeye Creek Pluton and unnamed plutons east of the Tchaikazan Fault). These Late Triassic and possibly Early Jurassic rocks appear to underlie Tyaughton Basin between Yakalom and Tchaikazan faults. These imbricate zone units are thrust to the NE over:

3) Early Cretaceous strata of Tyaughton Basin: units iKO and iKCD: Hauterivian or older volcanoclastic Ottarasko formation and overlying Hauterivian sedimentary Cloud Drifter formation; unit KTC: Albian Taylor Creek Group sedimentary rocks. These units were in part derived from a westerly, mixed volcanic-plutonic source region. The Early Cretaceous units are in turn thrust to the NE over Late Cretaceous non-marine strata (units uKSO and uKPC: Cenomanian and younger (?) sedimentary Silverquick and volcanic Powell Creek formations) that record the final stages in the evolution of Tyaughton Basin. The Coast Belt in the NW corner of the study area (Wilderness Mountain pluton) is thrust easterly, directly on non-marine Silverquick formation conglomerate and coarse immature sandstone. In this area the imbricate zone is largely missing and marine strata of Tyaughton Basin are absent. Detrital zircons dates (145-160 Ma) from westerly derived Silverquick arkose indicate tectonic unroofing of the Wilderness Mountain pluton provided detritus directly to the Silverquick clastic wedge.

4) The area northeast of Yakalom fault is underlain by mid-crustal crystalline rocks of the Eocene Tatla Lake Metamorphic Complex. It consists of a core of Cretaceous granoblastic and migmatitic gneiss (units gg1 and mg), overlain by a 1 to 2.5 km thick Eocene ductile extensional shear zone containing mylonitic orthogneiss (unit Jog4), amphibolite facies metasedimentary rocks (unit Jms), and structurally overlying greenschist facies metavolcanic rocks (unit Jmv, present to northeast of map area). The transition from amphibolite facies metavolcanic rocks marks the location of ca. 10 km of missing or strongly attenuated structural section.

The East Waddington Thrust Belt postdates the 96 Ma unnamed pluton in the SW part of the study area, and is intruded by the 67 Ma McClinchy pluton (unit LKTgd) and the 63.5 Ma Klinaklini pluton (unit LKTqd).

NOTE 2: ECONOMIC GEOLOGY

Newmac Claim Group (Porphyry Cu, Au)

The Newmac properties comprise thick packages of andesitic volcanic breccia and flows with lesser tuffaceous layers and felsic flows and tuff. Minor conglomerate, arkosic sandstone, and a single coral-bearing limestone bed are also present. Separate large quartz diorite plutons intrude the volcanic package to the north, south and west of the properties. Dioritic and felsic dykes and stocks intrude the volcanic rock within the claims. All rocks are fractured with strongly developed northwest and northeast trending sets and some minor faults.

The claims were staked due to minor placer gold (including one nugget) in the main drainage, copper-gold soil anomalies, high I.P. responses, and presumed similar host (thought to be Early Cretaceous) and intrusive age (thought to be Late Cretaceous to Tertiary) to the Fish Lake copper-gold porphyry. A total of 9 diamond drillholes were drilled in 1988 and 1991. Elevated copper grades were recovered in some drill core sections and rarely minor gold values were present. Results were not sufficiently encouraging for continued drilling after the 1991 drill program.

U-Pb dating of zircons from plutons which intrude the host volcanic-volcanoclastic package on the west side of Bluff Lake and at the south margin of the property provides latest Triassic (ca. 215 Ma) and earliest Jurassic ages (ca. 205 Ma) for the plutons. Thus the volcanic-volcanoclastic unit is not Early Cretaceous in age and is most likely Late Triassic. It is somewhat similar to and correlated with the Carnian to early Norian Mount Moore formation present in the map area to the west and in map area 92N/10 to the southwest.

Perkins Peak (Vein Au)

The Perkins Peak properties (also known as Mountain Boss, Commodore, Mountain King) contain gold- and silver-bearing arsenopyrite-quartz veins and silicified argillite zones which have been variously drilled and explored by adits and open pits since the 1930s. Currently, several hundred metres of tunnelling from two adits is in place and active underground drilling and minor gold recovery from the vein systems is continuing.

Quartz veins and silicified argillite occur in both Cretaceous sedimentary rock of the Cloud Drifter fm and in quartz diorite stocks and dykes of probable Late Cretaceous to early Tertiary age which cut the sedimentary package. The sedimentary succession and mineralized zones occur within a generally southwest dipping thrust plate, part of the northeast vergent, Late Cretaceous Waddington thrust system. The sedimentary rocks are folded into northeast vergent, inclined anticline-syncline pairs. Several well-developed sets of fracture systems and minor faults occur in distinctive east, northwest, and northeast trends and mineralized zones are slightly offset by some faults. The auriferous quartz veins may be late-stage extension fractures that formed perpendicular to thrust faults during relaxation of compressional stress.

Other Mineral Prospects

South of Perkins Peak the imbricate zone is extremely gossanous and pyritic schist is common; much of the valley south of Perkins Peak is covered with strongly oxidized ferrocorte breccia. The iron alteration of this area is locally associated with stratiform hematite replacement and quartz-specularite veining in Upper Triassic volcanoclastic rocks (BRITON Fe prospect, Minfile # 092N-011). Sheared quartz-calcite-magnetite-malachite-azurite and chlorite-epidote-magnetite veins are locally present in thrust-related shear zones.

Bornite-chalcopyrite-chalcocite-malachite mineralized float and disseminated chalcopyrite and malachite in altered Upper Triassic volcanic rocks southeast of Perkins Peak (PIN copper showing, Minfile # 092N-053), is also associated with shear zones of the imbricate zone. Several auriferous quartz veins in the study area (ORWILL Au-Ag-Cu-Zn-Pb-Sb-Bi prospect, Minfile # 92N-033; GOLDEN ROSE Au-As showing, Minfile # 92N-046) also appear to be spatially associated with thrust faults of the imbricate zone.

A satellitic granodiorite stock of the 63.5 Ma Klinaklini pluton (unit LKTqd), southeast of Perkins Peak, has a strongly silicified and pyritized contact aureole; pyrite-galena-quartz boulders found in float near the contact are probably derived from veins related to this intrusion.

NOTE 3: FOSSIL LOCALITIES

Fossil collections with GSC Locality Numbers were made during the present mapping project. Identifications are by Cordilleran Division paleontologists (J. Haggart, M.J. Orchard, H.W. Tipper, and E.T. Tozer, 1993, 1994, unpublished GSC internal reports and personal communication). All other collections were made by H.W. Tipper and party in 1967 (Tipper, 1968; Jeletzky, 1968).

NOTE 4: MINFILE MINERAL DEPOSITS

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

MINFILE number, name (commodities)

- 10 Mountain Boss (Au, Ag, Cu)
- 11 Briton (Fe)
- 12 Bluebell (Au)
- 22 Klin (Au)
- 33 Orwill (Au, Ag, Cu, Zn, Pb, Sb, Bi, S)
- 46 Golden Rose (Au, As)
- 53 Pin (Cu)
- 55 Newmac 1 (Au, Ag)

Recommended Citation

Mustard, P.S. van der Heyden, P., and Friedman, R.
1994: Preliminary Geologic Map: Tatla Lake - Bussel Creek (East Half); Geological Survey of Canada, Open File Report 2913, 1:50,000 map

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