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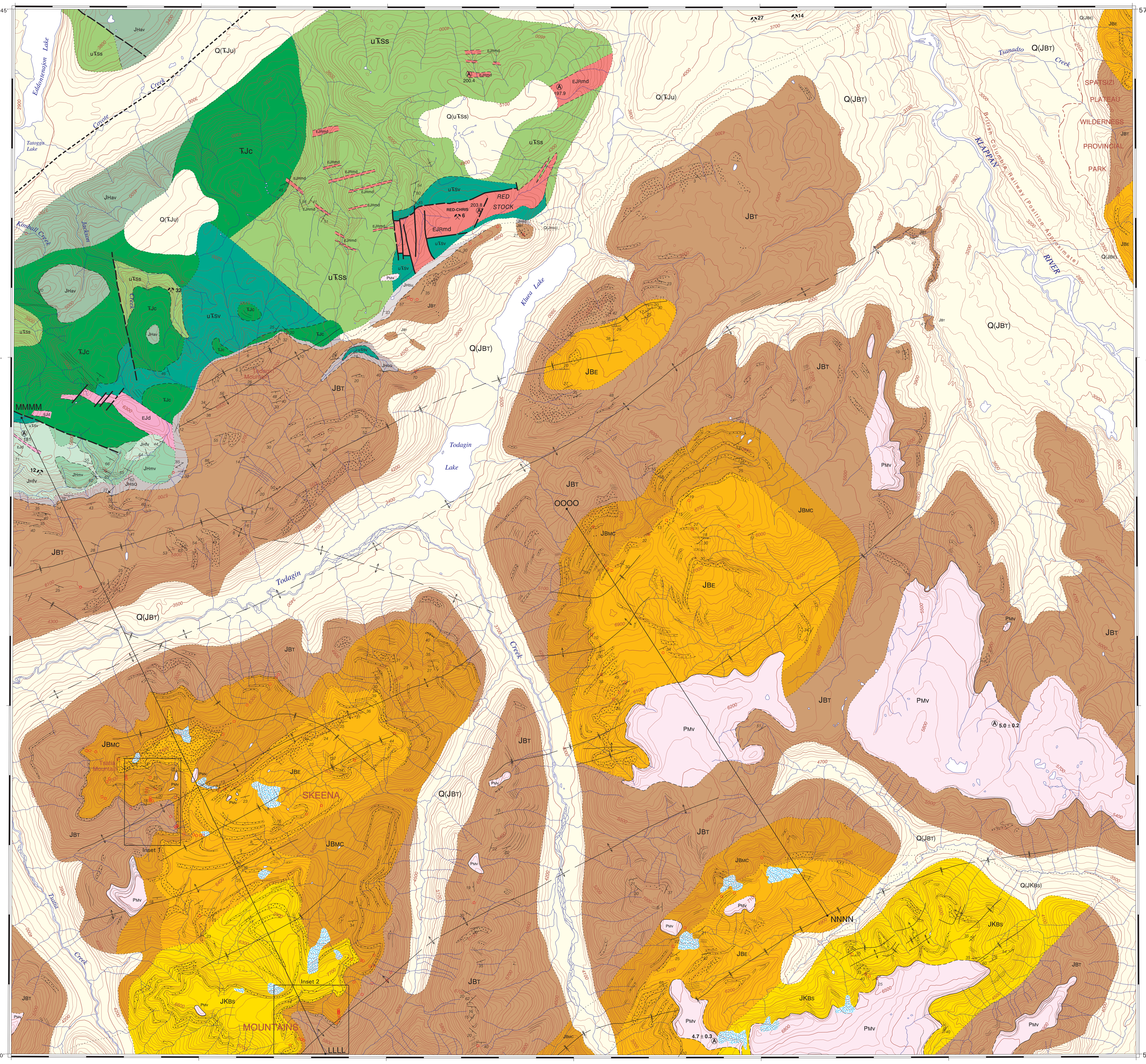


## LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT

**Q** — *Glacial till, alluvium, and colluvium; unit designators in parentheses are the inferred underlying bedrock units.*

TERTIARY
PLIOCENE

**PMv** — *MAITLAND VOLCANICS: olivine basalt flows; columnar jointed, with rare pillows and breccia; 5.2 to 4.6 Ma (K-Ar; dated rocks are in 104 H/5, /12, /13).*

MESOZOIC

JURASSIC AND CRETACEOUS
UPPER JURASSIC AND LOWER CRETACEOUS
BOWSER LAKE GROUP (unit JKBs)

**JKBs** — *SKELHORNE ASSEMBLAGE (deltaic assemblage): thinly intermixed and varicoloured siltstone, sandstone, and conglomerate (with or without coal), commonly arranged in coarsening- and thickening-upward cycles; common features of sandstone are parallel bedding, crossbedding, ripples, burrows, bivalve coquina, and brown-, green-, and grey-weathering; conglomerate is rusty- and grey-weathering, but constitutes a lower proportion (15–30%) of the unit than in the Eaglenest assemblage; conglomerate units, up to 50 m thick, cap cycles up to 70 m thick, and tops locally have megaripples; plant and marine fossils are ubiquitous, and trace fossils including* Skolithus *and* Diplocraterion *are present, as are tree fragments several metres long.*

JURASSIC
MIDDLE TO UPPER JURASSIC
BOWSER LAKE GROUP (units JBT–JBE)

**JBE** — *EAGLENEST ASSEMBLAGE (deltaic assemblage): conglomerate, sandstone, siltstone, mudstone, and rare coal; arranged in coarsening- and fining-upward cycles of mudstone to pebble or cobble conglomerate; prominently rusty-weathering and 30 to 80% conglomerate; sheets of conglomerate, up to 50 m thick, include planar beds, tabular-planar cross-stratification, and trough cross-stratification, with sets locally up to tens of metres thick; sandstone is green-, brown-, and grey-weathering, and has planar cross-stratification and hummocky cross-stratification; sparse marine fossils, but abundant plant fossils, including silicified tree fragments.*

**JBMC** — *MUSKABOO CREEK ASSEMBLAGE (shelf assemblage): sandstone, siltstone, and conglomerate; primary lithofacies is sandstone, forming laterally continuous, thin- to thick-bedded sheets; less common are siltstone interbedded with sandstone, and lenses of conglomerate; sandstone is green-, brown-, and grey-weathering, thin- to thick-bedded, and locally arranged in coarsening-upward cycles; includes burrows, bivalve coquina, and other marine fossils, common ripple marks and crossbedding, and local hummocky cross-stratification; conglomerate increases in proportion and thickness upsection.*

**JBT** — *TODAGIN ASSEMBLAGE (slope assemblage): siltstone, fine-grained sandstone, and conglomerate; mainly laminated siltstone and/or fine-grained sandstone, which is dark grey- to black-weathering and includes thin, orange-weathering claystone beds and syndepositional faults and folds; chert-pebble conglomerate occurs as lenses; marine fossils.*

LOWER AND MIDDLE JURASSIC
HAZELTON GROUP (units JHmv–JHSQ)
PLIENSBACHIAN TO BAJOCIAN
*SPATSIZI FORMATION (units* JHSu and JHSQ*)*

**JHSQ** — *QUOCK MEMBER: siliceous, well bedded, (?)tuffaceous siltstone, siltstone, and limy siltstone; black-, cream-, rusty-, and pink-weathering.*

**JHSu** — *Undivided Spatsizi Formation: siltstone, siliceous siltstone, calcareous siltstone, mudstone, fine-grained sandstone.*

PLIENSBACHIAN TO TOARCIAN

**JHfv** — *Felsic volcanic, volcaniclastic, and epiclastic rocks: includes breccia, conglomerate, feldspathic wacke, felsic volcanic sandstone, dark mudstone, and welded lapilli, ash, and dust tuffs; volcanic rocks aphyric to locally quartz-feldspar-phyric, locally flow-banded (massive rhyolite is ca. 181 Ma, U-Pb).*

**JHav** — *Andesitic volcanic breccia and conglomerate: feldspar-hornblende–porphyritic, andesitic to dacitic debris flows and lahars, minor flows; includes intercalated green and maroon epiclastic conglomerate and crystal lithic wacke; locally altered to epidote-chlorite-calcite or chlorite-calcite.*

**JHmv** — *Mafic to intermediate volcanic rocks: plagioclase microphyric amgdaloidal flows and pillow breccia; massive and columnar-jointed flows; local pillowed flows; includes intercalations of feldspathic wacke and siltstone.*

EARLY JURASSIC

**EJd** — *Massive, equigranular pyroxene diorite.*

**EJRmd** — *Red Stock and related intrusions: hornblende monzonite, quartz monzonite porphyry; 203.8 ± 1.3 Ma (U-Pb); dykes (197.9 Ma, U-Pb) are hornblende quartz diorite, monzodiorite, and monzonite.*

UPPER TRIASSIC TO LOWER JURASSIC
(?)CARNIAN AND (?)NORIAN TO HETTANGIAN AND/OR LOWER SINEMURIAN

**TRJc** — *Conglomerate, sandstone, shale, mafic to intermediate volcanic breccia, and olistostrome: conglomerate clasts are mainly hornblende and plagioclase porphyry andesite, but include augite-phyric mafic lava and other volcanic rocks, felsic to intermediate granitoid rocks, and limestone.*

**TRJu** — *Undivided Stuhini Group, unit TRJc, and Griffith Creek volcanics; may include Cold Fish Volcanics; unit only inferred on this map to underlying unit Q.*

TRIASSIC
UPPER TRIASSIC
(?)CARNIAN TO NORIAN
STUHINI GROUP (units uTRSs and uTRSv)

**uTRSv** — *Mafic lava flows, mainly aphyric to augite-phyric; minor conglomerate, sandstone, mudstone, limestone, and olistostrome.*

**uTRSs** — *Mudstone, shale, sandstone, and olistostrome: minor conglomerate and mafic lava.*

*Geological boundary (defined, approximate, assumed or inferred beneath unit Q)*

*Trace of individual beds from ground observation and airphoto interpretation*

*Fault, unknown displacement (defined, approximate, assumed or inferred beneath unit Q)*

*Anticline, trace of axial surface (defined, approximate); arrow on line indicates direction of plunge*

*Syncline, trace of axial surface (defined, approximate); arrow on line indicates direction of plunge*

*Open, inclined anticline, trace of axial surface (defined, approximate); long arrow points in direction of dip of axial surface*

*Open, inclined syncline, trace of axial surface (defined, approximate); long arrow points in direction of dip of axial surface*

*Cross-section location. The cross-sections for this map area are shown in Figure 173 of GSC Bulletin 577 (Evenchick and Thorkelson, in press)* — A B

*Bedding (inclined, vertical)* — 30

*Cleavage (inclined, vertical)* — 20

*Fold axis* — 10

*Fossil location*

*Mineral occurrence* (from *British Columbia MINFILE;* see *Table 1 below)* — 25

*Radiometric age (in Ma)* — 200 (A)

*Conglomerate*

*Icefield*

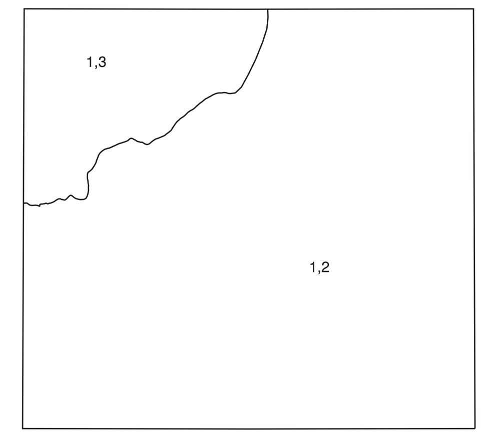


Figure 1. Reference map for NTS 104 H/12

Sources of information for this compilation are geological mapping by 1) C.A. Evenchick and G.M. Green, 1989, 1990, Green (1992); 2) H. Gabrielse and H.W. Tipper, 1979, 1981 (most of the fieldwork by T. England and R. Hughes in 1981) (1984); and 3) Ash et al. (1997). Geology of the Red-Chris deposit is generalized and modified after Schink (1977), who inferred contacts beneath unit Q based on surface trenches and drill data, and from recent mapping by Ash et al. (1997).

U-Pb ages of units JHfv and EJRmd from Friedman and Ash (1997) and Ash et al. (1997).

Dates in parentheses are years of publications. Other dates are years of fieldwork from which fieldnotes are the source of information.

Previous geological maps of the region are by Geological Survey of Canada (1957) and Gabrielse and Tipper (1984). Geology of the surrounding region (NTS 104 H) and descriptive notes are given by Evenchick and Thorkelson (in press).

## REFERENCES


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**Friedman, R.M. and Ash, C.H.**
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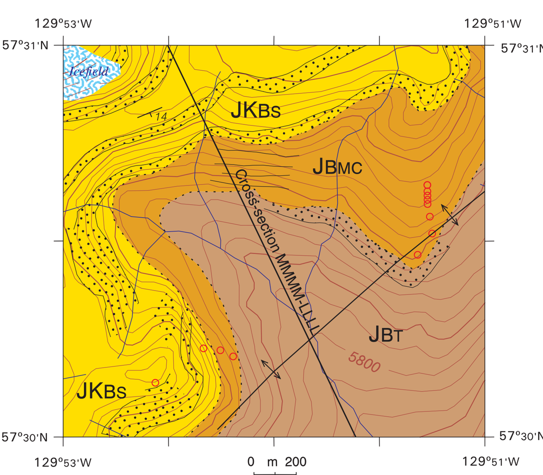
1984: Bedrock geology of Spatsizi map area (104 H); Geological Survey of Canada, Open File 1005, scale 1:125 000.

**Geological Survey of Canada**
1957: Stikine River area, Cassiar District, British Columbia; Geological Survey of Canada, Map 9-1957, scale 1:253 440.

**Green, G.M.**
1992: Detailed sedimentology of the Bowser Lake Group, northern Bowser basin, north-central British Columbia; M.Sc. thesis, Carleton University, Ottawa, Ontario, 197 p.

**Schink, E.A.**
1977: Geology of the Red-Chris porphyry copper deposit, northwestern British Columbia; M.Sc. thesis, Queen's University, Kingston, Ontario, 211 p.

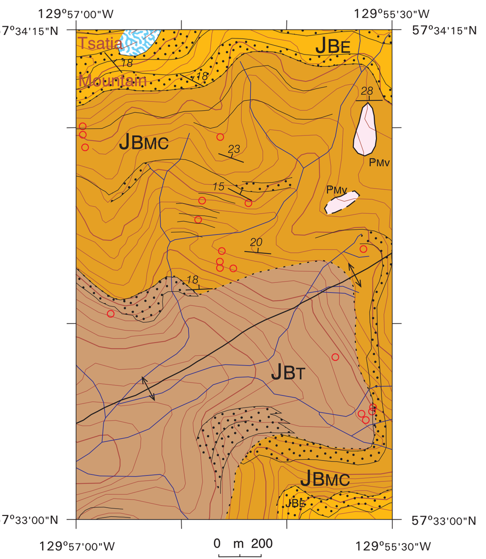
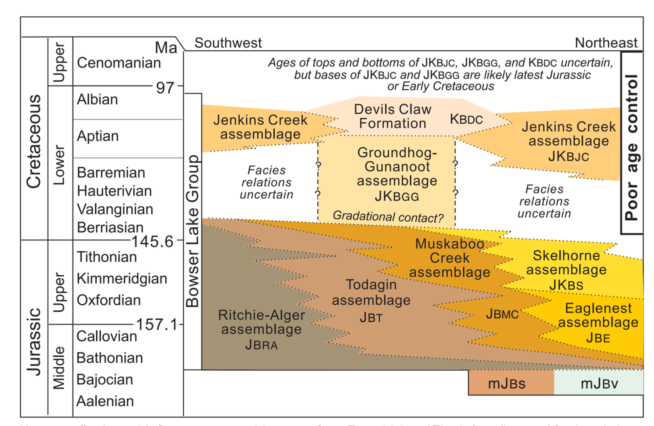




**Figure 2.** Detail of areas with high density of fossil locations




Note: not all units on this figure appear on this map; refer to Evenchick and Thorkelson (in press) for descriptions

Figure 3. Approximate ages and relationships of units in the Bowser Lake Group

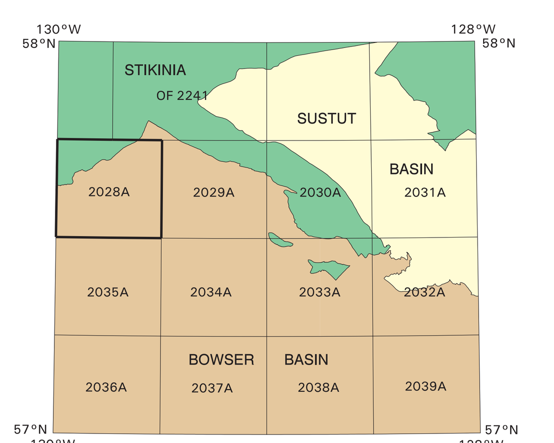



Figure 4. Tectonic elements of Spatsizi River map area (NTS 104 H) and location of NTS 104 H/12 (Map 2028A)

| ID | MINFILE | NAMES | EASTING | NORTHING | COMMODITY | STATUS |
|---|---|---|---|---|---|---|
| 6 | 104H 005 | RED-CHRIS; MAIN; EAST; CHRIS; RED; SUS; WINDY; MONEY; WINDY 1-12 | 452200 | 6395440 | Cu, Au, Pb, Zn, Mo | Developed prospect |
| 12 | 104H 011 | RAM; RAM 1-10 | 441000 | 6388750 | Mo | Showing |
| 14 | 104H 013 | BONANZA | 461240 | 6400660 | Cu, Au, Pb, Zn, Mo | Showing |
| 27 | 104H 026 | ELDORADO | 460150 | 6400600 | Cu, Au, Pb, Zn, Mo | Showing |
| 32 | 104H 031 | GIN | 444542 | 6393563 | Cu, Au, Ag, Pb, Zn, As, Hg, Sb | Showing |

Table 1. Mineral occurrence data for Kluea Lake area.


Copies of this map may be obtained
from the Geological Survey of Canada:
601 Booth Street, Ottawa, Ontario K1A 0E8
3303-33rd Street, N.W., Calgary, Alberta T2L 2A7
101-605 Robson Street, Vancouver, B.C. V6B 5J3


LOCATION MAP

Canada


*Geology by C.A. Evenchick (1985, 1989, 1990) and G.M. Green (1989)*

*Map compilation by C.A. Evenchick*

*Digital geological cartography by C.L. Wagner and R. Cocking, Earth Sciences Sector Information Division (ESS Info), D. Dunn and C. Evenchick, Geological Survey of Canada*


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

MAP 2028A

GEOLOGY

# KLUEA LAKE

BRITISH COLUMBIA

Scale 1:50 000/Échelle 1/50 000

kilometres 1 0 1 2 3 4 kilomètres

Universal Transverse Mercator Projection
North American Datum 1927

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1927



*Digital base map from data compiled by Geomatics Canada, modified by the ESS Info*

*Mean magnetic declination 2004, 23°48´E, decreasing 15.4´ annually*

*Elevations in feet above mean sea level*

*Contour interval 100 feet*

| | | |
|---|---|---|
| 104 G/16 | 104 H/13 | 104 H/14 |
| 104 G/9 | 104 H/12 2028A | 104 H/11 2029A |
| 104 G/8 | 104 H/5 2035A | 104 H/6 2034A |

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


Published 2004

Recommended citation:
**Evenchick, C.A. and Green, G.M.**
2004: Geology, Kluea Lake, British Columbia; Geological Survey of Canada, Map 2028A, scale 1:50 000.