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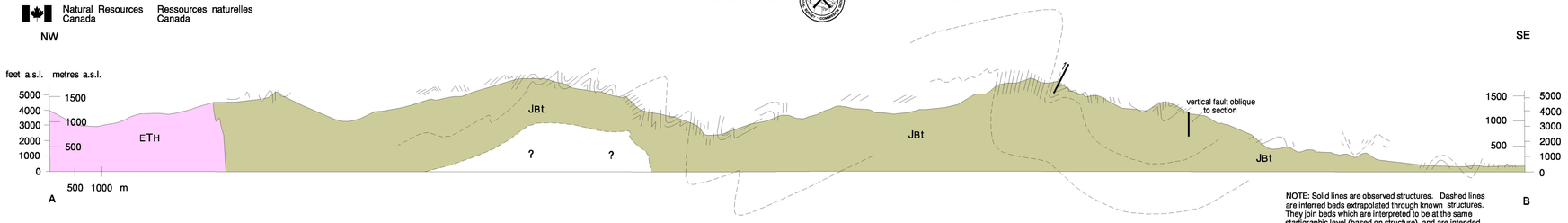
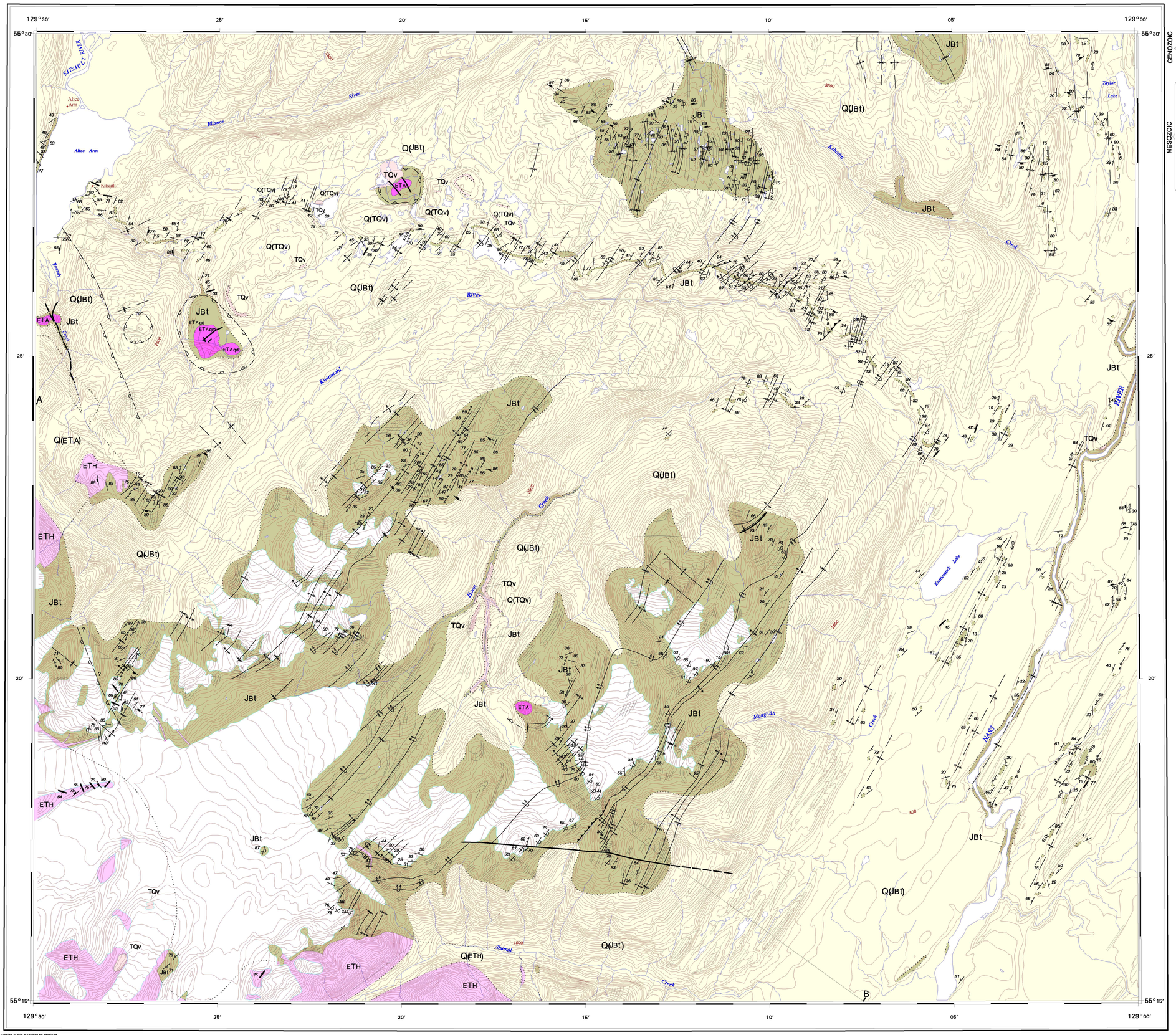
GEOLOGICAL SURVEY OF CANADA / COMMISSION GÉOLOGIQUE DU CANADA




NOTE: Solid lines are observed structures. Dashed lines are inferred beds extrapolated through known structures. They join beds which are interpreted to be at the same startigraphic level (based on structure), and are intended to convey the large-scale structural style and stratigraphic thickness.




## LEGEND

**CENOZOIC**

QUATERNARY
PLEISTOCENE AND RECENT

Q — *Glacial till, alluvium, colluvium, and fluvial deposits; Q(JBt), Q(ETH), and Q(TQv): areas presumed to be underlain by JBt, ETH, and TQv respectively*

UPPER TERTIARY AND/OR QUATERNARY

TQv — *Basalt or andesite flows; minor flow breccia, rocks commonly feldspar-phyric, vesicular and columnar jointed*

TERTIARY
EOCENE
HYDER PLUTON

ETH — *Biotite-hornblende quartz monzonite, granite, and granodiorite*

ALICE ARM INTRUSIONS

ETA — *ETA quartz monzonite, quartz diorite, granodiorite, alaskite; ETAqm quartz monzonite - granodiorite porphyries and minor alaskite; ETAqd quartz diorite*

**MESOZOIC**

JURASSIC
MIDDLE TO UPPER JURASSIC
BOWSER LAKE GROUP (JBt)

JBt — *Medium to fine grained lithic to arkosic arenite, and siltstone to silt rich mudstone (locally pyritic and locally including volcanic clasts); turbidites*

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

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

*Linear features in Q, reflecting bedrock and glacial features (see notes)*

*Fault, unknown displacement (defined, approximate)*

*Thrust fault (defined, approximate. Ornament on hanging wall side )*

*Anticline, trace of axial surface (defined, approximate, overturned)*

*Syncline, trace of axial surface (defined, approximate, overturned)*

*Bedding (inclined, overturned, top unknown, vertical)*

*Cleavage (inclined, vertical)*

*Intersection of bedding and cleavage (inclined)*

*Joints (inclined,vertical)*

*Dykes*

*Glacial striations (direction unknown)*

*Biotite isograd (ornament on high grade side)*

### NOTES

Bedrock in Alice Arm map area is sandstone and siltstone of the Jurassic to earliest Cretaceous (?) Bowser Lake Group, early Tertiary granitoid rock of the Alice Arm Intrusions and Hyder pluton, and volcanic rock of late Tertiary (Pliocene) or Quaternary age. Strata and structural geometry vary in significant ways from those in Brown Bear Lake and Cranberry River areas (Evenchick and Mustard, 1996; Evenchick, 1996a,b).

Sandstone occurs as thin to thick beds of medium to fine-grained lithic to arkosic arenite and wacke (locally muscovite-bearing), forming resistant weathering sheets tens of metres thick; subangular feldspar and volcanic clasts are common locally. Siltstone to silt-rich mudstone (locally pyritic) occurs as laminated and massive units up to tens of metres thick and as the tops of fining upward beds in dominantly sandstone units. In the east siltstone forms a unit perhaps a couple of hundred metres thick, and siltstone to fine grained sandstone is common on the shores of Alice Arm. Common sedimentary structures are normal grading, flute casts, grooves, cross-lamination, and rip-up clasts. Sedimentary structures and the overall succession are the basis for interpretation of these strata as turbidites. Interpretation of the structural geometry suggests that they are at least 2000 m thick, and perhaps as much as 3500 m thick. The stratigraphically lowest rocks are in the core of the anticlinorium northwest of Hoan Creek. Although these strata have similarities with, and appear to be continuous with Bowser Lake Group farther northeast, the presence locally of volcanic clasts, and the change at the west side of the map to more common fine grained strata are significant differences which will be addressed in future work. Structure in the turbidites is dominated by northeast-trending, gently plunging, chevron-style folds of tens of metres to several kilometres wavelength. Consistently north-trending folds are present only in the northeast corner, and folds of a variety of orientations are present within a few kilometres of the Hyder pluton. The major (northeast-trending) folds are upright and overturned to the southeast. Fold orientations are markedly different from those in areas to the northeast, which trend northwest (Evenchick 1996a, 1996b). Interference of northwest-trending folds with northeast-trending ones occurs locally where the latter dip gently. Cleavage is common in siltstone and rare in sandstone. The grade of metamorphism is sub-greenschist facies except within 2 km of the Hyder pluton and Alice Arm Intrusions, where biotite hornfels is present. Biotite isograds around the Alice Arm Intrusions, and the Hyder pluton east of Roundy Creek, are after Carter (1964,1981) and Dawson (1986).

The Hyder pluton is massive, white to rusty-white weathering, biotite-hornblende granite to granodiorite and quartz monzonite; it is commonly coarse grained equigranular to megacrystic. The pluton has sharp intrusive contacts with the Bowser Lake Group and it is intruded by granitoid and diorite dykes. Alice Arm Intrusions are quartz monzonite, granodiorite, and quartz diorite stocks cutting the Bowser Lake Group. They host Cu and Mo deposits in the region, and the Kitsault, Roundy Creek, and Bell Moly Mo deposits in Alice Arm area. K-Ar age determinations for the Hyder pluton range from 47 to 52 Ma, and for the Alice Arm Intrusions from 49 to 55 Ma (recalculated from Carter (1981) using modern decay constants).

The youngest consolidated rocks in the map area are basalt or andesite lava flows exposed in the valley east of Kitsault, upper Hoan Creek, and near the crest of the icefield at the head of Hoan Creek. Columnar-jointed flows form conspicuous cliffs in the valley east of Kitsault. In upper Hoan Creek a stream has incised a spectacular canyon through columnar basalt, breccia, agglomerate, and poorly consolidated sedimentary rock. The volcanic rocks appear to be erosional remnants of originally much more extensive flows which were extruded on an irregular paleo-surface at elevations of 10 to 1500 m above the present Nass River level. The flows are undeformed but are locally glacially grooved, striated, and covered with glacial deposits. The glacial cover, extensive erosion, and lack of deformation, suggest a Pliocene or Quaternary age for the volcanics.

Most bedrock in the east is covered by stratified surficial deposits and poorly sorted surficial deposits, mainly till. They are at least 20 m thick locally. Lineaments in areas of poor exposure, or in areas covered mainly by surficial deposits are shown on the map by grey lines. North-northeast trending ones in Nass valley are parallel with measured glacial striations and bedrock structure. Northeast-trending ones farther west are parallel with, and inferred to be controlled by, bedrock structure. Regularly spaced northwest-trending lineaments are probably joints or faults; they may be related to a common joint set which is perpendicular to fold axes ("a-c" joints). Widely spaced east-trending lineaments are several kilometres long and have significant topographic expression; their origin is unknown, but similar trends are noted in Cranberry River area (Evenchick, 1996a).

### REFERENCES

Carter, N.C.
1964: Geology of the Lime Creek area; Minister of Mines and Petroleum Resources, British Columbia, Annual Report 1964, p. 21-41.
1981: Porphyry copper and molybdenum deposits of west-central British Columbia; British Columbia Ministry of Energy, Mines and Petroleum Resources, Bulletin 64, 150 p.
Dawson, G.L.
1986: Geology of Kitsault River area NTS 103P; British Columbia Ministry of Energy, Mines and Petroleum Resources, Open File 1986/2.
Evenchick, C.A.
1996a: Geology, Cranberry River, British Columbia (103P/10); Geological Survey of Canada, Open File 3224; scale 1:50 000.
1996b: Geology, Brown Bear Lake, British Columbia (103P/15); Geological Survey of Canada, Open File 3225, scale 1:50 000.
Evenchick, C.A. and Mustard, P.S.
1996: Bedrock geology of north-central and west-central Nass River map area, British Columbia; in Current Research 1996-A; Geological Survey of Canada, p. 45-56.

Geology by C.A. Evenchick and P.S. Mustard, with the assistance of C. Huggins and K. Holm;1995

Map compilation by C.A. Evenchick, 1995

Other sources of information are Carter (1964,1981) and Dawson (1986) for geology in and around the Alice Arm Intrusions. Outline of the Alice Arm Intrusion and nearby hornfels south of Hoan Creek was generously provided by Lorne Warren (CJL Enterprises), from original prospecting in 1978

Any revisions or additional infomation known to the user would be welcomed 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

Digital cartography by C.A. Evenchick and D. McKee

Electrostatic plot produced by the Geological Survey of Canada

Magnetic declination 1995, 24° 38′ East, decreasing 9.2 ′ per year West

Elevations in feet above mean sea level

Contour interval 100 feet

Contour lines and drainage do not match western and southern edges of map due to datum conversion from NAD83 to NAD27

Some icefield limits have been modified to 1995 extent

Copies of this map may be obtained from the Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8 100 West Pender Street, Vancouver, B.C. V6B 1R8

LOCATION MAP

OPEN FILE 3272

GEOLOGY

# ALICE ARM

BRITISH COLUMBIA

Scale 1:50 000 - Échelle 1/50 000

Kilometres 1 0 1 2 3 4 Kilomètres



Published 1996

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|---|---|---|
| 103P/12 | 103P/11 | 103P/10 OF3224 |
| 103P/5 | 103P/6 OF3272 | 103P/7 |
| 103P/4 | 103P/3 | 103P/2 |

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

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3272
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA
03/1996

Recommended citation:
Evenchick, C.A.
1996: Geology, Alice Arm, British Columbia (103P/6); Geological Survey of Canada, Open File 3272, scale 1:50 000

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