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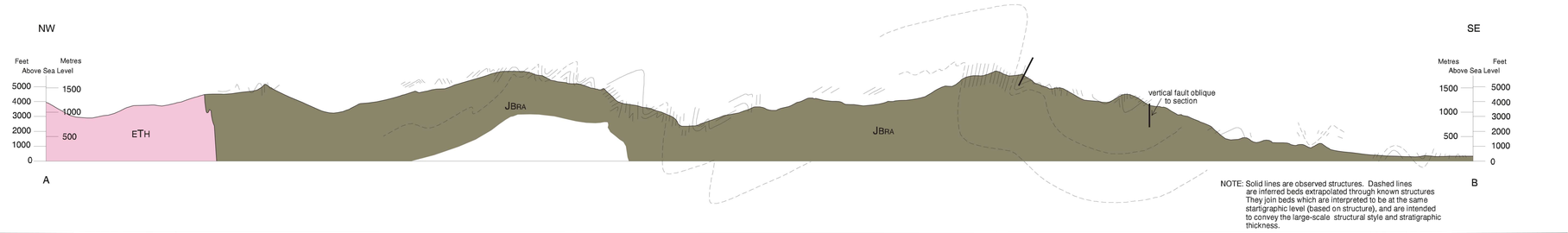
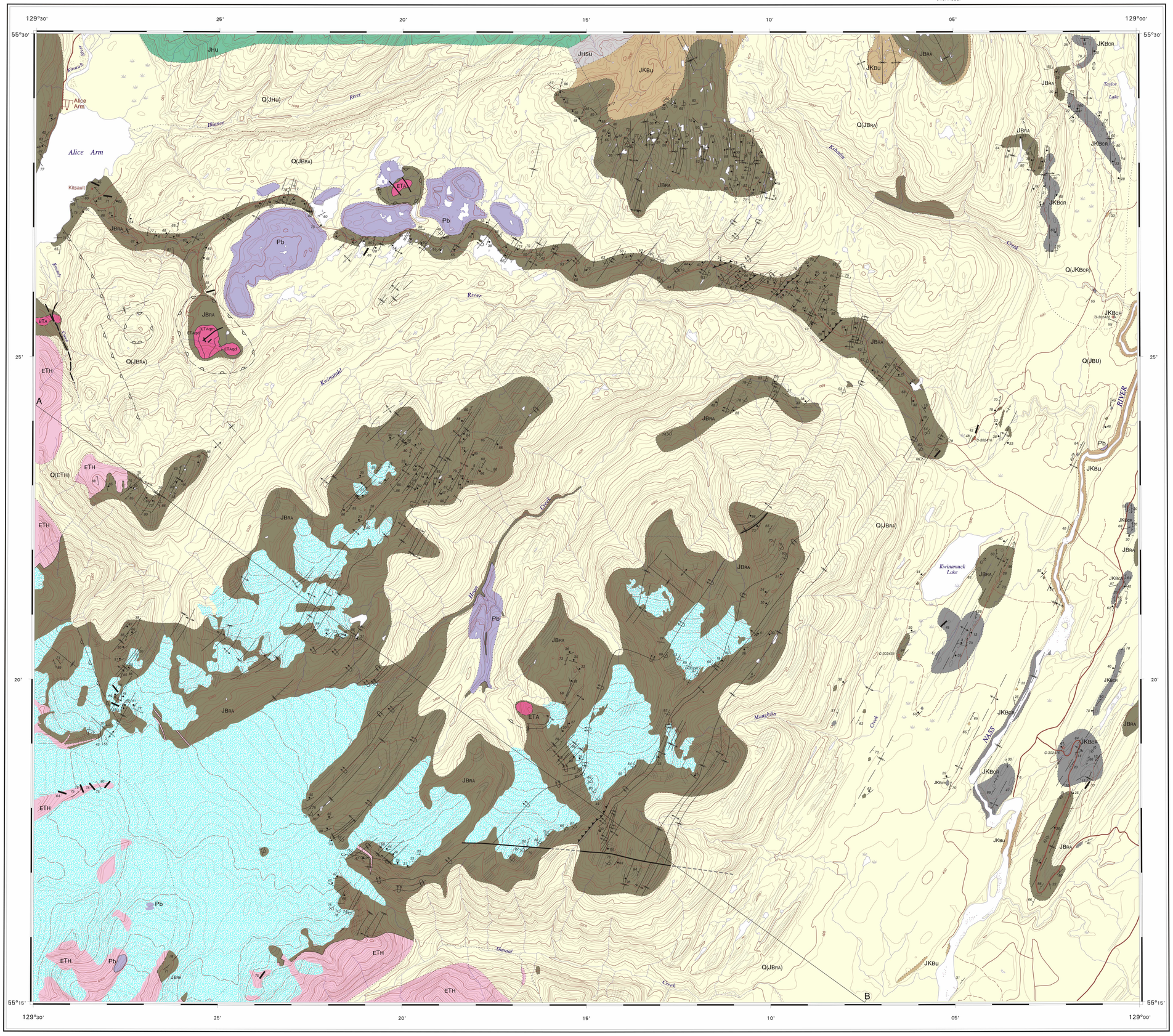
GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA



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

STRATIFIED ROCKS

CENOZOIC

QUATERNARY

PLEISTOCENE AND RECENT

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

PLEISTOCENE

Pb — *Basalt or andesite flows and minor breccia; rocks south of Hoan Creek yielded a preliminary whole rock $^{40}Ar/^{39}Ar$ age of 175 000 ± 50 000 years (V.J. McNicoll, unpublished data, 1996; see Evenchick et al., 1997).*

EOCENE

ALICE ARM INTRUSIONS

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

PALEOCENE AND EOCENE

HYDER PLUTON

ETH — *Biotite-hornblende granite, quartz monzonite, and granodiorite, includes minor garnet ± muscovite granite; locally with potassium feldspar megacrysts.*

MESOZOIC

JURASSIC AND CRETACEOUS

UPPER JURASSIC AND LOWER CRETACEOUS

BOWSER LAKE GROUP

JKBu — *Undivided Bowser Lake Group; predominately sandstone and siltstone.*

JKBCR — *CRANBERRY RIVER ASSEMBLAGE: sections observed or assumed to be at least tens to several hundred metres thick, consisting of >95% dark gray to black siltstone to silty mudstone and <5% very fine grained sandstone to coarse siltstone; siltstone to silty mudstone is generally massive, rarely faintly laminated, pyritic, or bioturbated; very fine-grained sandstone occurs as thick laminations or thin beds, commonly massive, rarely vaguely laminated or slightly normal graded, and locally rippled.*

UPPER MIDDLE TO UPPER JURASSIC

BOWSER LAKE GROUP

JBRA — *RITCHIE-ALGER ASSEMBLAGE (submarine fan assemblage): sandstone, siltstone, and rare conglomerate; approximately equal proportions of sheet-like intervals, up to 50 m thick, dominated either by siltstone, shale, and very fine-grained sandstone (unit* JBRAmd*), or by medium-grained sandstone (unit* JBRAms*); siltstone and/or fine-grained sandstone is dark grey- and black-weathering, sandstone is medium- and light-grey-weathering; abundant turbidite features (e.g. Bouma cycles, flame structures, flute-and-groove casts); conglomerate includes debris-flow units; marine fossils.*

LOWER AND LOWER MIDDLE JURASSIC

HAZELTON GROUP

JHu — *Undivided volcanic and intercalated clastic rock of the Hazelton Group.*

JHSu — *Undivided clastic rocks of the Salmon River Formation; dominated by siltstone and shale, including siliceous well bedded tuffaceous(?) siltstone, limy siltstone, calcareous to siliceous organic shale, calcareous to siliceous siltstone, fine-grained sandstone.*

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

Individual outcrop area within belts of sparse outcrop

Trace of individual beds from ground observation and airphoto interpretation

Linear features observed on airphotos; inferred to be joints, faults, or glacial in origin

Linear features in Q_s reflecting bedrock and glacial features (see Notes)

Fault, unknown displacement (defined, inferred under Q)

Thrust fault (defined); ornament on hanging wall side

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

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

Bedding (upright, overturned, top unknown, vertical)

Cleavage (inclined, vertical)

Intersection of bedding and cleavage (inclined)

Joint (inclined, vertical)

Dyke (inclined)

Glacial striation (direction unknown)

Fossil locality (catalogue number) C-1234

Biotite isograd; ornament on high grade side

DESCRIPTIVE NOTES

This open file replaces Open File 3272 (Evenchick, 1996). It incorporates new stratigraphic terminology of the Bowser Lake Group, distinguishes the Cranberry River assemblage as a new unit of the Bowser Lake Group, and includes the age of the Cenozoic volcanics, now known to be Pleistocene. Files used to create this map will be available in digital format for use with GIS and database programs.

Bedrock in Alice Arm map area is sandstone and siltstone of the Jurassic to Early Cretaceous Bowser Lake Group, early Tertiary granitoid rock of the Alice Arm Intrusions and Hyder pluton, and late Cenozoic volcanic rock. Stratified rocks are similar to those in Brown Bear Lake and Cranberry River areas (Evenchick and Mustard, 2006a, 2006b).

Sandstone occurs as thin to thick beds of medium- to fine-grained lithic to arkosic arenite and wacke, 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. 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. These strata are part of a large belt of turbiditic rocks in the western Bowser Basin known as the Ritchie-Alger assemblage (Evenchick et al., 2004; Evenchick and Thorkelson, 2005). 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. The east side of the map is underlain by several hundreds of metres of strata dominated by massive siltstone. This unit is the Cranberry River assemblage of the Bowser Lake Group.

The structure 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 contrast with the northwest trends in map areas to the northeast (Evenchick and Mustard, 2006a, 2006b) and are similar to those on neighbouring parts of Kiteen River map area to the east (Haggart, 1998). Interference of the 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 Alldrick et al. (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 basalts or andesite lava flows exposed in the valley east of Kitsault, in 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. A sample from south of Hoan Creek yielded a preliminary whole rock $^{40}Ar/^{39}Ar$ age of 175,000 ± 50,000 years (V.J. McNicoll, unpublished data, in Evenchick et al., 1997).

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 space northwest-trending lineaments are probably joints or faults; they may be related to a common joint set in the bedrock which is perpendicular to fold axes ("a-c" joints). Widely spaced east-trending lineaments are several kilometres long and have significant topographic expression; similar trends are noted in Cranberry River area (Evenchick and Mustard, 2006b). One lineament of this orientation across bedrock coincides with a dextral oblique dip slip (?) fault.

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LOCATION MAP

Geology by C.A. Evenchick and P.S. Mustard (1995, 2005)

Map compilation by C.A. Evenchick and P.S. Mustard (1995, 2006)

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)

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

OPEN FILE 5301

GEOLOGY

ALICE ARM

BRITISH COLUMBIA

Scale 1:50 000/Échelle 1/50 000

kilometres 1 0 1 2 3 4 kilometres

Universal Transverse Mercator Projection
North American Datum 1927
© Her Majesty the Queen in Right of Canada 2006

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1927
© Sa Majesté la Reine du chef du Canada 2006

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

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

Some icefield limits have been modified to 1995 extents

Mean magnetic declination 2006, 21°35'E, decreasing 17.4' annually

Elevations in feet above mean sea level

Contour interval 100 feet

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

OPEN FILE
DOSSIER PUBLIC
5301
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2006

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Les dossiers publics sont des produits qui n'ont pas été soumis au processus officiel de publication de la CGC.

Recommended citation:
Evenchick, C.A. and Mustard, P.S.
2006: Geology, Alice Arm, British Columbia; Geological Survey of Canada, Open File 5301, scale 1:50 000.

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