O.F. 1080

Geological Survey of Canada

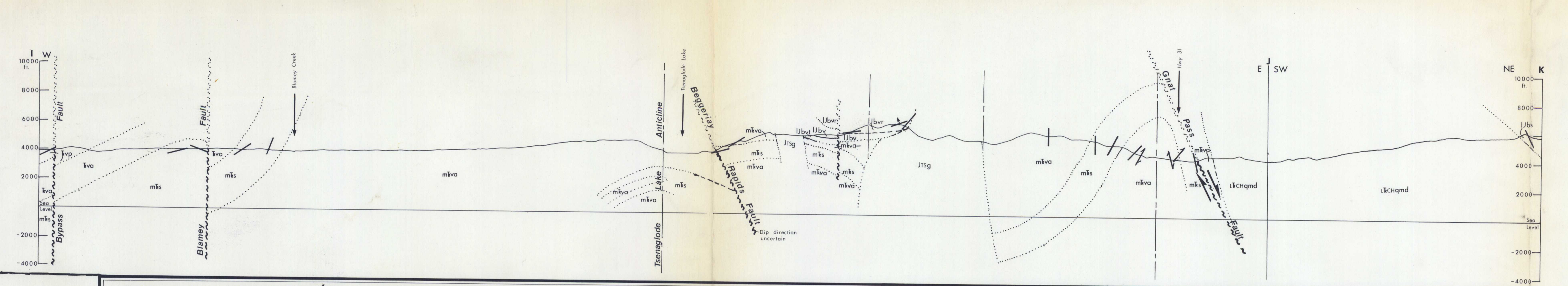
GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

GEOLOGY

KLASTLINE RIVER (104G/16E), EALUE LAKE (104H/13W), CAKE HILL (104I/4W) AND STIKINE CANYON (104J/1E)

BRITISH COLUMBIA



QUATERNARY
RECENT

Rv	"BIG RAVEN FORMATION": Grey porphyritic (augite, olivine, plagioclase) basalt flows
Ral	Unconsolidated river channel sediments. Probable subcrop unit within parentheses

PLEISTOCENE AND RECENT

Qs	Unconsolidated sediments: mainly glacial deposits; minor colluvium and alluvium; few if any outcrops. Probable subcrop unit within parentheses

PLEISTOCENE
LATE PLEISTOCENE

Pv	"KLASTLINE FORMATION": Grey, porphyritic (augite, olivine, plagioclase) basalt flows
Pv1	Basal, swirly jointed, vesicular porphyritic (plagioclase, augite, olivine) basalt flow
Pal	Unconsolidated river channel sediments: mainly alluvium; minor glacial and colluvial deposits. Probable subcrop unit within parentheses

TERTIARY
MIOCENE AND PLIOCENE
LATE MIOCENE AND EARLY PLIOCENE

MPv	"NIDO FORMATION": Grey, porphyritic (augite, olivine, plagioclase) basalt flows with common ultramafic inclusions; rare breccia and ash

EOCENE
"TANZILLA CANYON FORMATION" (Ecg to Ebx)

Ecg	Chert pebble conglomerate, some sandstone and shale interbeds
Ec	Freshwater limestone
Es	Feldspathic sandstone, siltstone, shale and carbonaceous shale
Ebx	Basal breccia; monomictic, subangular pebble to cobble conglomerate; local, subrounded chert pebble conglomerate

EOCENE
EARLY EOCENE

Egd	"MEEHAUS PLUTON": Biotite augite granodiorite

CRETACEOUS OR TERTIARY
LATE CRETACEOUS OR EOCENE

Tfp	Quartz latite porphyry

CRETACEOUS
UPPER CRETACEOUS
SUSTUT GROUP (uKs to lKbx)
BROTHERS PEAK FORMATION (uKs, uKcg)

uKs	Green, lithic sandstone; thin zeolitized bedded tuff layers
uKcg	Chert pebble conglomerate; minor sandstone and carbonaceous shale

LOWER AND UPPER CRETACEOUS
TANGO CREEK FORMATION (lKs, lKbx)

lKs	Feldspathic sandstone, siltstone, shale, and carbonaceous shale, locally muscovite-bearing
lKbx	Basal conglomerate: monomictic, subangular pebble to cobble conglomerate; local, subrounded chert pebble conglomerate

JURASSIC TO TERTIARY
MIDDLE JURASSIC TO TERTIARY

JTwg	"McEWAN CREEK PLUTON" AND RELATED INTRUSIONS: Biotite hornblende leucogranite; rare quartz monzonite

JURASSIC
MIDDLE JURASSIC
HOTAILUH BATHOLITH (Jrsg to Jrpx)
THREE SISTERS PLUTONS (Jrsg to Jrsdi)

Jrsg	"Potassic marginal phase": hornblende biotite granite
Jrsqmd	Biotite hornblende quartz monzodiorite and granodiorite
Jrsdi	Hornblende diorite and gabbro
mJvp	Maroon plagioclase porphyry flows and breccia
mJs	Maroon sandstone siltstone; local grey and green argillite and wacke
mJcg	Chert pebble conglomerate lenses
mJd	Grey-green meta-diabase intrusions

EARLY AND/OR MIDDLE JURASSIC
HOTAILUH BATHOLITH
McBRIDE RIVER PLUTON

Jgd	Hornblende biotite granodiorite or tonalite

PALLEN CREEK PLUTON AND SATELLITIC INTRUSIONS

EJqmd	Biotite hornblende quartz monzodiorite and quartz monzonite; rare granodiorite
EJgd	TANZILLA PLUTON: Biotite hornblende granodiorite

LOWER JURASSIC
"TOODOGGONE VOLCANICS"

lJgv	Green and grey-green, plagioclase porphyry flows and breccia
lJgs	Green tuffaceous wacke and argillite
lJgc	Grey bioclastic limestone
lJrv	Interbedded maroon and grey, plagioclase porphyry flows, breccia; minor tuff
lJvr	Pink layered rhyodacite flows; minor breccia and welded tuff
lJrs	Interbedded maroon and green tuffaceous wacke, argillite; minor cobble and boulder conglomerate
lJg	Green and grey-green aphanitic and plagioclase porphyry andesite and basalt flows, breccia, and minor tuff
lJc	Light grey bioclastic limestone
lJbvr	Rhyolite breccia and welded tuff
lJbs	Grey-green and locally maroon tuffaceous wacke, siltstone, shale, volcanic breccia
lJbc	Medium grey or maroon limestone
lJbcg	Chert pebble conglomerate; minor sandstone
lJbv	Interbedded grey-green and maroon plagioclase porphyry flows, breccia
lJbvt	Grey and maroon plagioclase porphyry tuff

EARLY JURASSIC

eJmd	Porphyritic (plagioclase, hornblende) monzodiorite
eJqm	"ROSE" AND "EDON" PLUTONS AND SATELLITIC INTRUSIONS: Hornblende quartz monzonite

TRIASSIC OR JURASSIC
LATE TRIASSIC OR EARLY JURASSIC
HOTAILUH BATHOLITH
BEGGERLAY CREEK PLUTON (ŦJedi, ŦJsy)

ŦJedi	Biotite hornblende augite meta-diorite and meta-gabbro
ŦJsy	Biotite meta-syenite

TRIASSIC TO JURASSIC
UPPER TRIASSIC TO LOWER JURASSIC

ŦJrv	Maroon and grey, aphyric and porphyritic (plagioclase) breccia, tuff, and flows
ŦJs	Maroon, grey and green tuffaceous wacke, siltstone and argillite; rare thin limestone lenses
ŦJvr	Pink layered rhyodacite flows; minor breccia and welded tuff
ŦJgv	Grey-green and green, aphyric to porphyritic (plagioclase and locally augite) breccia, tuff and flows

TRIASSIC
UPPER TRIASSIC
STUHINI GROUP (uŦw to uŦc)

uŦw	Green tuffaceous wacke and siltstone; basal breccia and conglomerate
uŦs	Olive green to grey tuffaceous argillite, siltstone and wacke
uŦgv	Green, aphanitic plagioclase ± augite-phyric breccia, tuff, flows; patterned where breccia contains Permian limestone clasts
uŦtf	Grey-green, vaguely bedded, tuffaceous argillite, some greywacke; minor aphyric, grey-green and maroon meta-andesite flows; rare augite porphyry flows
uŦcg	Granitic pebble to cobble conglomerate
uŦc	Light grey limestone

LATE TRIASSIC
HOTAILUH BATHOLITH
CAKE HILL PLUTON

LŦCHqmd	Biotite hornblende quartz monzodiorite; some monzodiorite and leucogranodiorite; rare augite hornblende diorite
LŦLqmd	"LATHAM CREEK PLUTON": Biotite hornblende quartz monzodiorite, hornblende augite monzodiorite; rare diorite and quartz diorite; all locally foliated
LŦqd	Quartz diorite porphyry
LŦb	"CARIBOO MEADOWS PLUTON" AND MINOR INTRUSIONS (LŦb, LŦhb): Augite meta-gabbro
LŦhb	Hornblendite; minor meta-gabbro

GNAT LAKES ULTRAMAFITE

LŦpx	Hornblende pyroxenite, hornblende augite gabbro

MIDDLE TRIASSIC
"TSAYBAHE GROUP" (Ŧva to mŦp)
"Upper Volcanic Unit" (Ŧva to Ŧvp)

Ŧva	Porphyritic (augite) meta-andesite and meta-basalt breccia, tuff and flows
Ŧs	Grey to green tuffaceous greywacke, siltstone and argillite
Ŧvp	Porphyritic (plagioclase) meta-andesite pillow lava, flows; some breccia

"Middle Sedimentary Unit"

mŦs	Grey, bedded argillite, siliceous argillite, phyllite, tuffaceous greywacke; olive-weathered tuffaceous argillite; rare chert and dark grey limestone

"Lower Volcanic Unit" (mŦva, mŦvp)

mŦva	Porphyritic (augite) meta-andesite and meta-basalt breccia, tuff and flows
mŦvp	Porphyritic (plagioclase) meta-andesite pillow lavas and flows; some breccia

LOWER AND MIDDLE TRIASSIC
"Basal Sedimentary Unit"

mŦp	Grey to green phyllite and argillite; rare chert

TRIASSIC
EARLY TO LATE TRIASSIC

Ŧmd	"RAILWAY PLUTON": Biotite augite meta-monzodiorite

PERMIAN AND(?) OLDER
LOWER PERMIAN AND(?) OLDER

Ps	Grey phyllite and ribbon chert
Pc	Massive white and grey bedded limestone
Pgyp	Buff to light grey alabaster
Pp	Rusty weathering, light green phyllite, phyllitic greenstone; minor chert; rare limestone
Pv	Dark green phyllitic greenstone

CARBONIFEROUS OR OLDER

Pg	Mylonitic to massive biotite muscovite leucogranite and leucogranodiorite
Pgd	Biotite hornblende quartz diorite and tonalite; minor biotite granodiorite and gabbro

CARBONIFEROUS(?) AND OLDER

Ps	Grey phyllite and ribbon chert
Pc	Massive white and grey bedded limestone
Pp	Rusty weathering, light green phyllite, phyllitic greenstone; minor chert; rare limestone
Pv	Dark green phyllitic greenstone

CENOZOIC — MESOZOIC — PALEOZOIC

INTRUSIONS OF UNKNOWN AGE

fl	Rusty weathering felsite (intrudes units ŦJgv and ŦJrv)
fp	Grey-green plagioclase porphyry (intrudes unit uŦs)
mfp	Porphyritic (hornblende, plagioclase ± augite) andesite (intrudes unit uŦs)
di	Hornblende meta-diorite (intrudes unit uŦgv)
g	Pink biotite granite (intrudes unit mŦva)
hb	Hornblendite (intrudes unit Pp)

Geological boundary	defined; approximate; assumed
Fault	defined; approximate; assumed; beneath rock units or water; normal fault (peg side down); strike-slip fault; low angle fault (▼ on hanging wall); low angle fault beneath rock units
Bedding, facing determined	inclined; vertical; overturned
Bedding, facing undetermined	inclined; vertical
Foliation	inclined; vertical
Lineation	horizontal; plunging
Fold	undetermined vergence*; northerly vergence*; no vergence
Trace of axial plane	upright anticline; anticline overturned to SE; upright syncline; syncline overturned to NW
Paleocurrent direction	
Boundary of former, present or potential slide area	
Fossil locality (indicates barren)	
Radiometric date	location and rock type: mineral (b biotite, h hornblende, w whole rock, z zircon); method (K potassium-argon, R rubidium-strontium, U uranium-thorium-lead); age in millions of years; o SFU, g GSC Van., o GSC Ottawa, u UBC
Radiocarbon date	location and rock type (sedimentary rock); material (w wood); method (^{14}C); age in years before present; SFU, GSC Van., GSC Ottawa, UBC

*Vergence is the direction of the upper member of the rotational couple implied by the asymmetry of the fold viewed in profile.

Geology by Geotex Consultants Limited: P.B. Read 1979 to 1983; D.W. Klepacki 1980, 1981; R.L. Brown 1980 to 1982; L.S. Werner 1980; J.F. Psutka 1981 to 1983; L. Lane 1981; S.M. Moore, 1981, 1982; M. Journeay 1982.

Geological compilation and cartography: P.B. Read, 1984

Geological investigations funded by B.C. Hydro and the Geological Survey of Canada

EXPLANATION OF PROPERTY INFORMATION

NO.	Property number assigned so that numbering increases from north to south.
PROPERTY NAME	Presently used name.
COMMODITIES	Elements or industrial minerals are listed in order of decreasing economic importance.
TYPE	Commonly used terms which describe the general type of deposit in this map area. ANOM, A = geochemical or geophysical anomaly; PORF, P = porphyry; REPL, R = replacement (includes deposits which may be syngenetic); SKRN, S = skarn; STFM = stratiform; VEIN, V = vein
STATUS	Describes the property in terms of its size, grade, and production as of 1978. S = showing: dimension and grade are unknown and lacks underground workings. PR = prospect or developed prospect: an estimate of dimension is available but grade may not be known. P = producer or past producer: has produced 1 ton or more.
LOCATION*	All properties lie in UTM Zone 9V. Northings and eastings are read from NTS 1:50,000 maps.
CERT	Certainty of location of property. 1 = located to within a 1.6 km square but usually to within 100 m. 2 = located to within a range of 1.6 to 6 km square. 3 = located to within a range of 6 to 10 km square.
MINDEPID	Property identification number from the Mineral Deposit file.

STATUS OF DEPOSIT (1978)	Porphyry	Vein	Skarn	Replacement	Stratiform	Placer	Unknown
Showing	◯ (dashed)	ellipse (dashed)	hexagon (dashed)	square (dashed)	rectangle (dashed)		X
Prospect	◯	ellipse	hexagon	square	rectangle	pick	Anomaly A

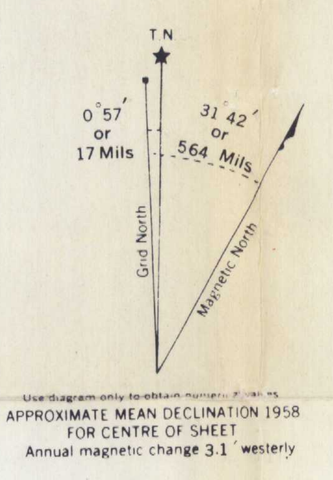
COMMODITY

C ..... Copper; G ..... Gold; I ..... Iron; L ..... Limestone; M ..... Molybdenum; S ..... Silver

Deposit number; Primary commodity; Dip; Secondary commodity; Type of deposit (shape); Status of deposit (size); Strike; Location; Tertiary commodity

PROPERTY INFORMATION

No.	PROPERTY	COMMODITIES	TYPE	STATUS	LOCATION EAST	LOCATION NORTH	CERT	MINDEPID
1	MOSS	Cu	-	S	VQ0448300	VQ6456600	2	-
2	JUNE, STIKINE, SEPTEMBER	Cu	PORF	PR	VQ0451400	VQ6456500	1	05652
3	BELL	Cu	-	S	VQ0446900	VQ6455300	1	05659
4	NOVEMBER	Cu	-	S	VQ0451000	VQ6455300	1	-
5	CROWN	Cu	VEIN	S	VQ0441500	VQ6454650	1	05660
6	KING	-	ANOM	-	VQ0445300	VQ6451000	2	-
7	DALVENIE, NEW DEAL, MAC	Cu Au Ag Ba As	REPL	S	VQ0448400	VQ6449200	1	05611
8	BCR, SS	Cu	-	S	VQ0451600	VQ6440600	1	30121
9	LOUISE	Cu	VEIN	S	VQ0455100	VQ6437200	1	05680
10	RAND	Cu	-	S	VQ0440900	VQ6434200	2	-
11	BUD	Cu	VEIN	S	VQ0439000	VQ6433400	2	08264
12	CB	Fe	VEIN	S	VQ0447800	VQ6424600	1	-
13	TSETOGAMUS CREEK	Cu	-	S	VQ0452900	VQ6421300	2	07853
14	DRUM	-	-	S	VQ0449500	VQ6417300	2	-
15	KITTY, FIFE	Cu	VEIN	S	VQ0442700	VQ6415900	2	36070
16	HANS	-	ANOM	-	VQ0430100	VQ6414500	1	-
17	KLASTLINE PLATEAU	Ls	STFM	S	VQ0453000	VQ6410000	1	-
18	CASTLE #1, CASTLE #2	Cu Mo Au Ag	VEIN	S	VQ0429100	VQ6407700	1	-
19	JO	Cu	VEIN	S	VQ0429100	VQ6407700	1	07703
20	WESTERN	Cu, Mo	PORF	PR	VQ0445750	VQ6406700	1	-
21	ROSE, MFJ, KLAPAN	Cu Au	P, S	PR	VQ0448100	VQ6406150	1	07851
22	HI, WIT, LOW	Cu	SKRN	S	VQ0450600	VQ6405400	1	-
23	RD	Cu	VEIN	S	VQ0444500	VQ6402600	2	36071
24	COYOTE	Mo Cu	VEIN	S	VQ0446400	VQ6401600	1	35058



Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1958 FOR CENTRE OF SHEET
Annual magnetic change 3.1' westerly

GRID ZONE DESIGNATION	100 000 M SQUARE IDENTIFICATION
9 V	V Q

TO GIVE A REFERENCE TO NEAREST 100 METRES

EXAMPLE: SPOT ELEVATION

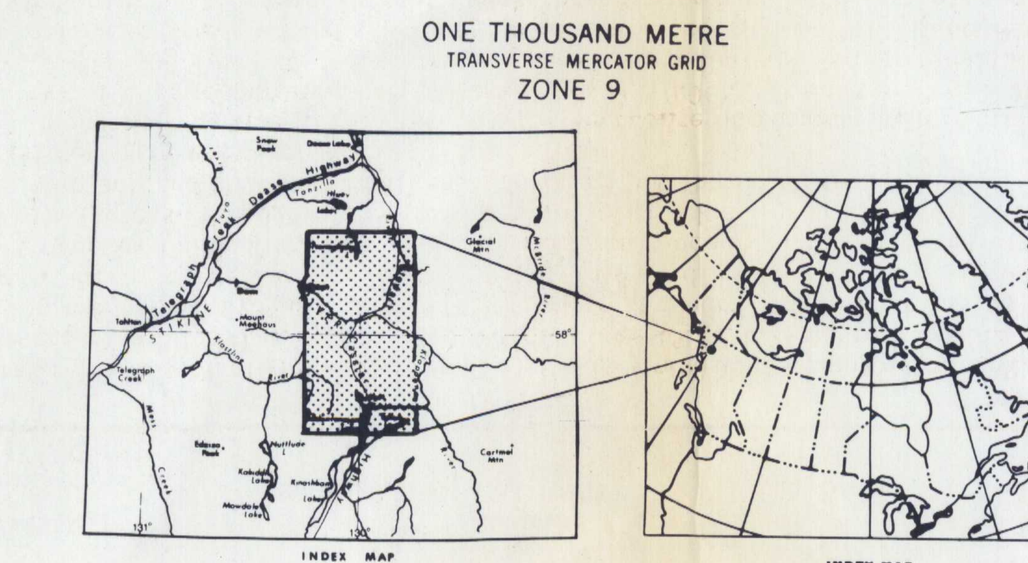
EASTING: Read number on grid line immediately to left of point: 31. Estimate tenths of a square from this line eastward to point: 8. → 318

NORTHING: Read number on grid line immediately below point: 17. Estimate tenths of a square from this line northward to point: 9. → 179

MILITARY GRID REFERENCE: 318179

Nearest similar grid reference 100 000 metres (about 62 miles)

ONE THOUSAND METRE
TRANSVERSE MERCATOR GRID
ZONE 9



INDEX MAP — INDEX MAP

SCALE 1:50,000

1.25 Inches to 1 Mile approximately

1 ½ 0 1 2 3 Miles
1000 500 0 1000 2000 3000 4000 Metres
1000 500 0 1000 2000 3000 4000 Yards

DESCRIPTIVE NOTES

The Stewart-Cassiar Highway 37 runs northward through the area, and where combined with a few short side roads, it provides access to a five to fifteen kilometre width of country on either side of the highway. The west-flowing Stikine River is navigable from a point four kilometres downstream of the Highway 37 bridge to beyond the eastern edge of the map area, but for the remainder, a helicopter provides the most efficient means of travel. From the downstream point of navigation, the Stikine flows through a rock walled canyon incised from 300 to 1000 feet deep in the rolling uplands of the Stikine Plateau. South of the canyon, the swampy eastern end of the Klastline Plateau terminates abruptly against mountains rising to 4000 feet above the plateau surface to over 7000 feet in elevation. North of the canyon, sparsely exposed bedrock characterizes the surface of Tanzilla Plateau which climbs to 5000 feet. From this level the peaks of the Hotailuh Range rise to nearly 6500 feet.

The map area lies within the Lower Triassic to Middle Jurassic Whitehorse Trough of the Intermontane Belt which consists of volcanic and sedimentary rocks (Fig. 1). The trough lies between plutonic and metamorphic rocks of the Coast Plutonic Complex on the west and those of the Omineca Crystalline Belt on the east. The northern end of the sediment-filled Bowser Basin of Middle Jurassic to Early Cretaceous age lies south of the map area. The northern end of the Lower to Upper Cretaceous Sustut Basin contains continental clastic rocks which underlie the swampy lowlands of the Klastline Plateau. The easterly trending Stikine Arch crosses the area, contains large intrusions such as the Kaketsa and Hotailuh batholiths and related plutons, and forms the northern margin of the Bowser Basin.

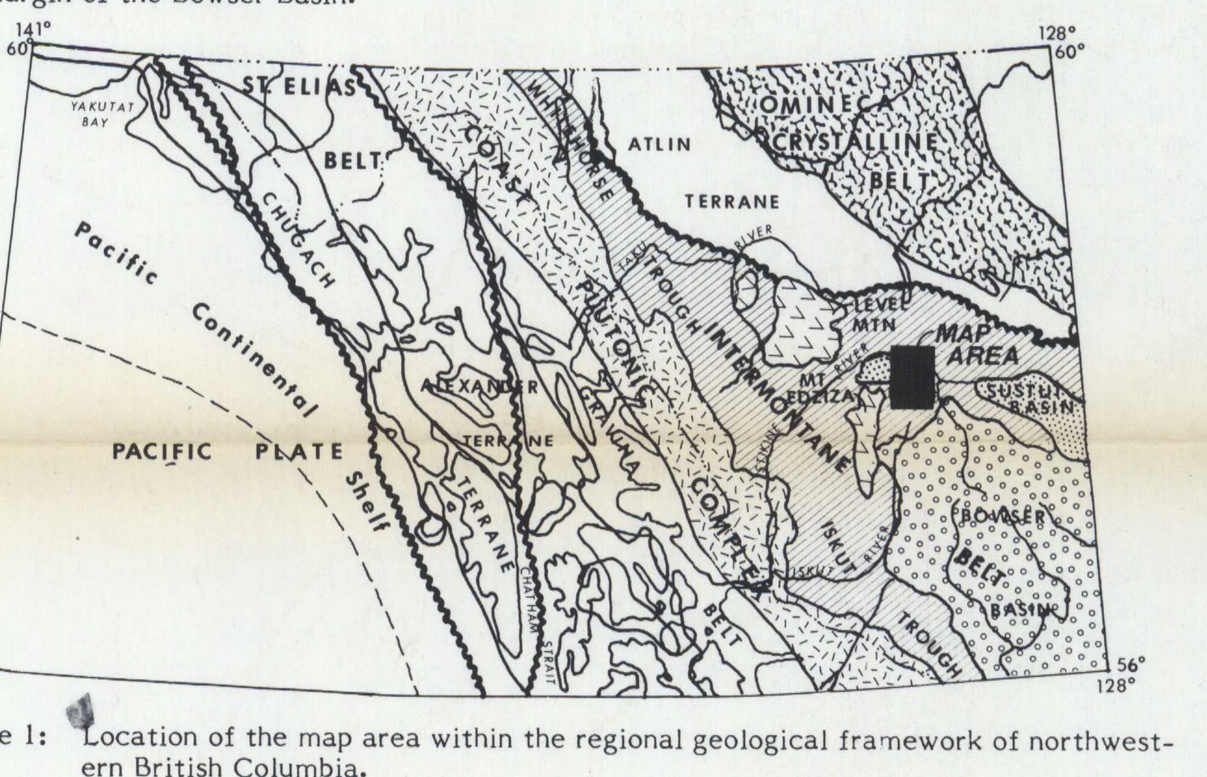


Figure 1: Location of the map area within the regional geological framework of northwestern British Columbia.

A number of regional geological maps have been published (Geological Survey of Canada, 1957; Souther, 1972; Gabrielse 1979; Gabrielse 1980; Gabrielse and Tipper, 1984). This is the second of three detailed maps of the stratified rocks of the Stikine Arch (Read, 1983), and complements Anderson's investigations of the plutonic rocks (Anderson, 1978, 1979, 1980, 1983). Informal stratigraphic nomenclature is enclosed by quotation marks with the words formation or group not capitalized.

In the map area, the oldest rocks, assigned to an unnamed Carboniferous and(?) older sequence, lie on both sides of the westerly striking Pitman Fault in the eastern half of the map area. North of the fault, massive light grey limestone (Pc) is the most extensive rock type and intervenes between the structurally overlying basic metavolcanic rocks (Pv) and green phyllite (Pp), and underlying grey phyllite (Ps). These rocks outcrop along the Stikine valley in the core of Tsenaglode Lake Anticline. South of Pitman Fault, green phyllite (Pp) and greenstone (Pv), less limestone (Pc), and minor grey phyllite (Ps) form a northwesterly trending sequence. On both sides of Pitman Fault, the Carboniferous and(?) older rocks lack the ribbon chert present in the Permian and(?) older rocks about 25 km west of the map area. To the east of the map area, preliminary age data based on zircons indicate that Paleozoic plutonic rocks, probably older than Permian, intrude the Carboniferous and(?) older sequence. Because the Carboniferous and(?) older rocks are so intensely deformed, their stratigraphic order and facing are unknown.

The "Tsaybahe group" underlies much of the area north of Pitman Fault. On the uplands north of Tsaybahe Mountain, the "Tsaybahe group" of Middle Triassic age, unconformably overlies the Carboniferous(?) and older rocks along the southern flank of Tsenaglode Lake Anticline. A "Basal Sedimentary unit" (mŦp), up to 250 m thick, lies on various rock units of the Carboniferous and(?) older sequence. Thick, coarse augite porphyry meta-basalt and meta-andesite of the "Lower" and "Upper Volcanic" units (mŦva and Ŧva) dominate the overlying stratigraphy. Along the western edge of the map area, plagioclase porphyry meta-andesite pillow lava (mŦvp and Ŧvp) form two lenses up to 1000 m thick and 6 km long. Within the volcanic rocks are volcanogenic sediments, and grey phyllite and chert (mŦs) of the "Middle Sedimentary Unit" which ranges up to hundreds of metres in thickness. Conodont collections from limestone and chert of the "Basal" and "Middle Sedimentary" units indicate that both units and the intervening "Lower Volcanic unit" are of Middle and Early Triassic age (Table 1). In the northern half of the map area, Gnat Lakes Ultramafite, radiometrically dated at 227 ± 14 Ma and 230 ± 10 Ma (Anderson in Stevens et al., 1982), and Cake Hill Pluton, dated at 212 ± 7 Ma, within the map area, and as old as 227 ± 14 Ma east of the map area (ibid.), are the oldest plutonic rocks intruding the "Tsaybahe group", and support its pre-Late Triassic age. The green augite porphyry dominated stratigraphy of the Lower and Middle Triassic "Tsaybahe group" contrasts with the green and maroon, plagioclase and plagioclase-augite porphyry volcanic rocks of the sediment-rich stratigraphy of the Stuhini Group of Late Triassic age.

North of Pitman Fault, all Triassic phases of the Hotailuh Batholith intrude the "Tsaybahe group". Both Cake Hill (LŦCHqmd) and Latham Creek (LŦLqmd) plutons have a marginal foliation which is most prominent at and east of Gnat lakes. A new radiometric date of 212 ± 7 Ma comes from the western margin of Cake Hill pluton where it clearly intrudes the "Tsaybahe group". South of Pitman Fault, preliminary radiometric data from zircons east of the map area indicate a Triassic age for "Railway pluton" which forms fault slices along the eastern edge of the map area. Two kilometres east of Thatue Mountain, Lower Jurassic volcanic rocks (lJbv) nonconformably overlie the pluton; 4 km east of the map area, Upper Triassic conglomerate (uŦcg) and limestone (uŦc) nonconformably overlie the pluton.

South of Pitman Fault and northwest of Ealue Lake is a siltstone (uŦs), 200 m thick, with minor limestone (uŦc), conglomerate and greywacke layers and lenses (Cooper, 1978). The southwestern limestone layer yields conflicting paleontological data; Cooper (1978, p. 15) reported a Late Triassic macrofauna, but conodonts from the limestone yield an Early Permian age (Table 1). A possible interpretation is that the limestone represents an Upper Triassic olistostrome composed of Early Permian limestone blocks ranging from tens to hundreds of metres in length. Early Permian limestone blocks, up to tens of metres in length, lie within Upper Triassic volcanic breccia that outcrops 25 km east of the map area. The sedimentary succession is part of the Stuhini Group.

Green andesite, with plagioclase and some augite phenocrysts, forms breccia and tuff (ŦJgv) sequences above and below uŦs, and hosts "Edon" and "Rose" plutons. On Ehahceztle Mountain, purple andesite volcanic breccia, conglomerate and flows (ŦJrv) are interbedded with the green andesite (ŦJgv). Northwest of Ealue Lake, units ŦJgv and ŦJrv may well be part of the Stuhini Group, but because they cannot be excluded from the Lower Jurassic "Toodoggone volcanics", they are placed in unnamed Upper Triassic and/or Lower Jurassic rock units.

South of Cold Fish Fault, lies the fault-slivered western end of a belt of Lower Jurassic "Toodoggone volcanics" which extends over 40 km eastward from the map area. The southwesterly dipping and facing sequence of green and maroon sedimentary and volcanic rocks (lJbv to lJg) is similar to and correlated with a paleontologically dated sequence 10 km east of the map area (Smith et al., 1984). North of Pitman fault and east of Tsenaglode Lake, a remnant of maroon and grey-green plagioclase phyric flows, tuff and breccia (lJbv, lJbvt) topped by a few hundred metres of rhyolite breccia (lJbvr) lies unconformably on the "Tsaybahe group". Although the rocks lack diagnostic fossils, they are lithologically similar to and contain a thick rhyolite sequence which is typical of Lower Jurassic volcanic rocks.

Early and/or Middle Jurassic intrusions include the part of Pallen Creek pluton (EJqm) in the northwest corner of the map area, and "Rose" and "Edon" plutons (EJqm) in the southeast corner. The small, hydrothermal altered and mineralized "Edon" and "Rose" plutons clearly intrude the green andesite (ŦJgv), but may be nonconformably overlain by some of the maroon andesite (lJbv) which locally contains a few clasts of the plutons (Cooper 1978, p. 20). In the northeast corner of the map area, the potassic marginal phase (Jrsg) of the Middle Jurassic Three Sisters plutons intrudes the "Tsaybahe group", Cake Hill Pluton, and "Toodoggone volcanics". Quartz monzodiorite (Jrsqmd), diorite and gabbro (Jrsdi) locally developed along the edges of the potassic marginal phase.

Sandstone and shale (lKs), and local lenses of basal breccia (lKbx) of the Tango Creek Formation outcrop along the rim of the Grand Canyon of the Stikine from upstream of Latham Creek to and beyond the western edge of the map area. Rocks of the Sustut Group probably underlie the swampy Klastline Plateau west of Morchuea Lake to as far south as Pitman Fault. Along the Grand Canyon, they form a gentle southerly dipping sequence that laps onto the steep northern margin of the Sustut Basin (Wainwright, 1983).

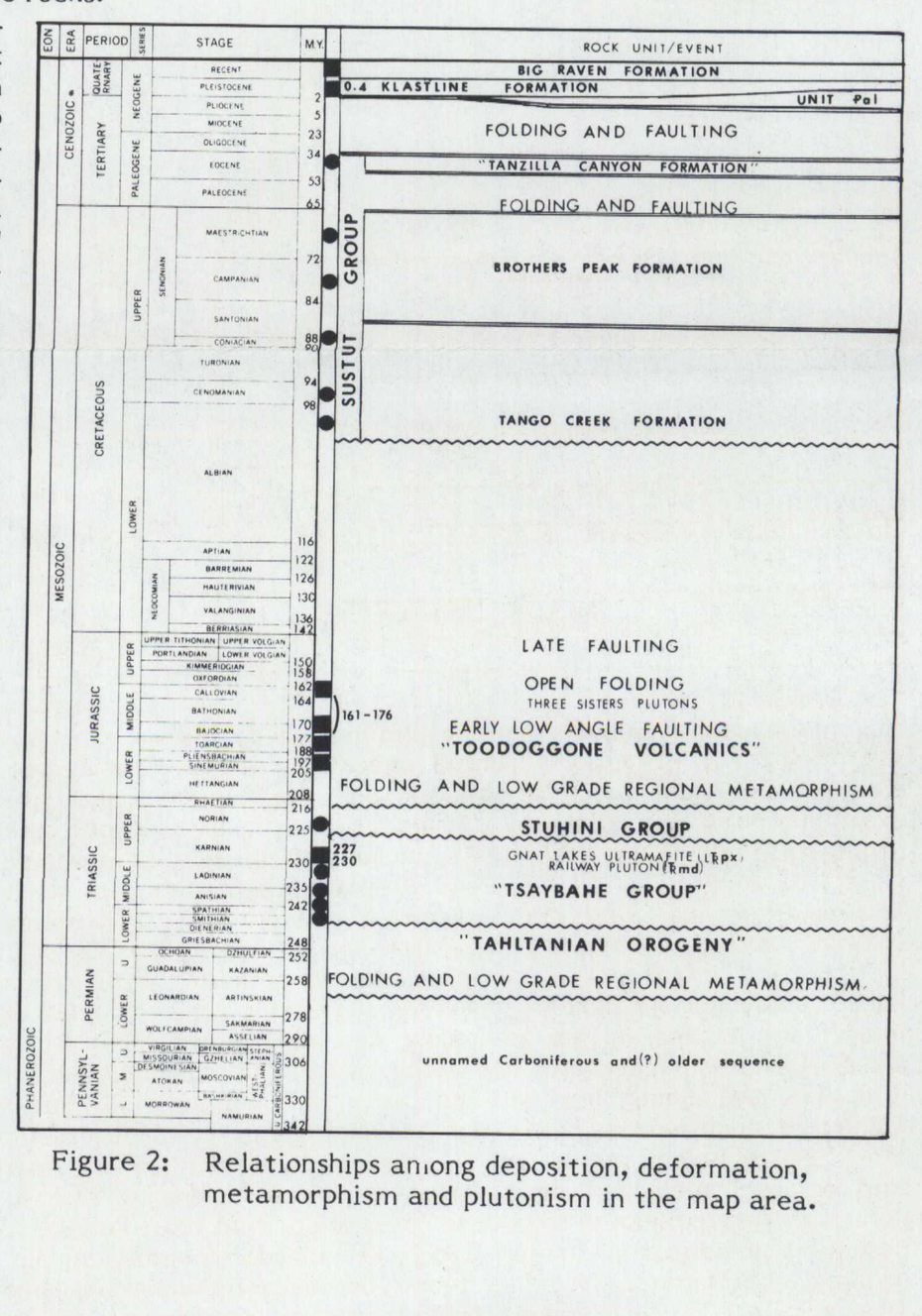


Figure 2: Relationships among deposition, deformation, metamorphism and plutonism in the map area.

Several remnants of olivine basalt with lherzolite inclusions belong to the "Nido formation" (MPv) (Souther, et al., 1984) of Miocene to Pliocene age (5.7 ± 0.2 Ma to 4.6 ± 0.2 Ma). They lie between 2 km northeast of Ehahceztle Mountain and 6 km north of the highway bridge across the Stikine River. Because they are most extensively preserved and extend to their lowest elevation (3300') along the Stikine valley, they locally outline a Miocene/Pliocene ancestral Stikine valley extending from the eastern edge of the map area to about 4 km west of the highway bridge across the Stikine, with bordering uplands to at least 5300' west of Thatue Mountain and over 5500' north of the northwest corner of the map sheet.

Two remnants of olivine basalt, which lack lherzolite inclusions, belong to the "Klastline formation" (Pv) of Pleistocene age (0.5 ± 0.07 and 0.19 ± 0.06). One forms the left bank of the Stikine River near the head of the canyon, and indicates that at 0.5 Ma the Stikine River had downcut to below its present level. Parts of an ancestral course of the Stikine River remain as sediment-filled, hanging bypasses (Pal), of which three of the nine bypasses between the mouth of the Klastline River and Bridge Bypass, lie within the map area. Several of these bypasses are parts of an ancestral course of the Stikine River which may be as old as 0.5 Ma.

In the map area, the rocks retain evidence of four phases of folding and two periods of low grade regional metamorphism (Fig. 2). In the core of Tsenaglode Lake Anticline, Carboniferous and(?) older rocks contain two phases of mesoscopic folding, a well developed foliation, and a lower greenschist facies metamorphism which developed before the Early to Middle Triassic. The foliation in the Carboniferous and(?) older rocks outlines the anticline (section M-N). In contrast, the overlying Lower and Middle Triassic rocks of the "Tsaybahe group" lack foliation and tight mesoscopic folds. From evidence here and 20 km west of the map area (Read et al., 1983; Read, 1983), the deformation and metamorphism present in the Carboniferous and(?) older rocks resulted from the Permo-Triassic "Tahltanian Orogeny". In the northern half of the map area, the Late Triassic Latham Creek and Cake Hill plutons and Gnat Lakes Ultramafite seem to intrude Beggerlay Rapids and Gnat Pass faults, and Tsenaglode Lake Anticline. The Late Triassic intrusions apparently cut folds and faults developed in rocks as young as Early to Middle Triassic. No metamorphism or mesocopic folds developed during the faulting and open to closed folding (sections I-J and M-N). In the northern part of the map area, gently dipping "Toodoggone volcanics" unconformably overlie more steeply dipping sedimentary and volcanic rocks of the "Tsaybahe Group" (section I-J). This deformation may have occurred between Middle and Late Triassic or between Late Triassic and middle Early Jurassic.

Along the western half of the Grand Canyon, gentle southwesterly dipping and unmetamorphosed sediments of the Sustut Group overlie moderate to steep dipping volcanic and sedimentary rocks of the "Tsaybahe group" metamorphosed to a maximum of lower greenschist facies. This second phase of deformation and metamorphism, restricted to the interval between Late Triassic and Early Cretaceous, affects Triassic and older rocks throughout the map area. North of the Stikine River, upright folds change attitude and die out quickly along trend. At least two sets of Jurassic to late Early Cretaceous faults developed with intervening folding. An early set, represented by Z Fault at the western edge of the map area and Tanzilla Fault over 20 km farther west, was original composed of gently dipping faults which were later folded about a northeasterly trending axis. A high angle, late fault set trends north-northwesterly, offsets Z Fault and has minor strike-slip displacement.

The lack of exposures of the Sustut Group obscures the nature and extent of the fault dominated Cenozoic deformation. East and/or west of the map area, Cold Fish and Pitman faults cut the Cretaceous Sustut Group. Both are steep dipping with the older Cold Fish a suspected reverse fault with the northeast side up, and the younger Pitman Fault a possible left lateral strike-slip fault. Pitman Fault is the longest, approximately 140 km, and most important of a few westerly trending faults on the southern flank of the Stikine Arch. Within the map area, it forms the southern limit of the "Tsaybahe" and Sustut groups.

Although mineralization was discovered early, 1899 at Dalvenie (7), inaccessibility of the area hindered exploration. With the completion of Highway 37 and an anticipated railroad access, the area has been extensively prospected since the mid-1960's. Copper is the main commodity, and chalcopyrite-bearing veins are widely scattered in the "Tsaybahe" and Stuhini groups and "Toodoggone volcanics". Those developed as a stockwork that is spatially associated with small, hydrothermally altered, calc-alkalic intrusions, such as those at the June (2), Western (20) and Rose (21), have received attention (Cooper, 1978; Panteleyev, 1978), but none has produced. Many of the showings, except Coyote (#24), are apparently isolated veins with either no nearby intrusions, or fresh unaltered plutons spatially associated. Of these, the Dalvenie (7) has been most thoroughly explored.

TABLE 1: PALYNOLOGY AND PALEONTOLOGY,
KLASTLINE RIVER EAST-HALF (104G/16E), EALUE LAKE WEST-HALF (104H/13W),
CAKE HILL WEST-HALF (104I/4W) AND STIKINE CANYON EAST-HALF (104J/1E)

Map No.*	GSC Loc. No.	UTM Coordinates mE	UTM Coordinates mN	Elev. in feet	Rock Unit	Age
Unnamed sequence of Paleozoic age						
F116	C-087707	VQ0447600	VQ6428270	4125	Pc	Probably late Paleozoic or early Mesozoic
F122	C-081532	VQ0451700	VQ6427300	4825	Pc	Carboniferous or Permian
"TSAYBAHE GROUP"						
F7	C-087659	VQ0439000	VQ6453290	4740	mŦva	Mid Ladinian, late Middle Triassic to mid Carnian, early Late Triassic
F8	C-102901	VQ0428300	VQ6452900	4500	mŦs	probably Middle Triassic
F17	C-087660	VQ0441140	VQ6450100	5100	mŦs	Late Ordovician - Cenozoic
F22	C-087760	VQ0441360	VQ6449100	5225	mŦs	Middle Triassic, late Anisian - early Ladinian
F40"	C-102768	VQ0424731	VQ6442563	2247	mŦs	Middle Triassic, probably Late Anisian to Early Ladinian
F43"	C-102767	VQ0424854	VQ6442464	2165	mŦs	probably Middle Triassic
F51'	C-102772	VQ0425949	VQ6442167	1871	mŦs	Triassic
F59'	C-102761	VQ0425782	VQ6441950	1553	mŦs	Middle to Late Triassic, probably Middle
F60'	C-102762	VQ0425782	VQ6441950	1522	mŦs	Early Triassic, probably Smithian
F63	C-102763	VQ0425837	VQ6441859	1415	mŦs	probably Early Triassic
F78'	C-102771	VQ0425891	VQ6441443	1629	mŦs	probably Middle or Late Triassic
F81"	C-102766	VQ0426248	VQ6441370	1705	mŦs	Triassic, probably Middle
F124	C-087708	VQ0450880	VQ6426170	4925	mŦp	Middle Triassic, probably Anisian
SUSTUT GROUP						
TANGO CREEK FORMATION						
F61'	C-099627	VQ0425272	VQ6441889	2244	lKs	Late Albian to/or possibly Early Cenomanian
F64'	C-099628	VQ0425215	VQ6441743	2167	lKs	Late Albian to/or possibly Early Cenomanian
F65'	C-099639	VQ0424948	VQ6441631	2627	lKs	Late Albian to/or possibly Early Cenomanian
F66'	C-099640	VQ0424948	VQ6441631	2347	lKs	Late Albian to/or possibly Early Cenomanian
F67'	C-099641	VQ0424948	VQ6441631	2058	lKs	Late Albian to/or possibly Early Cenomanian
F70'	C-099642	VQ0425148	VQ6441557	2772	lKs	Late Albian to/or possibly Early Cenomanian
F71'	C-099643	VQ0425148	VQ6441557	2228	lKs	Late Albian to/or possibly Early Cenomanian
F72'	C-099644	VQ0425148	VQ6441557	2089	lKs	Late Albian to/or possibly Early Cenomanian
F74'	C-099630	VQ0425495	VQ6441471	2386	lKs	Late Albian to/or possibly Early Cenomanian
F75'	C-099626	VQ0425518	VQ6441468	2600	lKs	Late Albian to/or possibly Early Cenomanian
F76'	C-099624	VQ0425518	VQ6441468	2386	lKs	Late Albian to/or possibly Early Cenomanian
F80'	C-099629	VQ0425413	VQ6441434	2810	lKs	Late Albian to/or possibly Early Cenomanian
F82'	C-099625	VQ0425379	VQ6441309	2817	lKs	Late Albian to/or possibly Early Cenomanian
STUHINI GROUP						
F147'''	C-086310	VQ0448700	VQ6406500	5200	Pc	later part of the Artinskian/Leonardian, Early Permian
F147'''	C-081530	VQ0448700	VQ6406500	5200	Pc	later part of the Artinskian/Leonardian, Early Permian
F147'''	C-086311	VQ0448700	VQ6406500	5200	Pc	Early Carboniferous to basal Triassic
F147'''	C-081531	VQ0448700	VQ6406500	5200	Pc	probably Permian

*Map Numbers are assigned to fossil collections in order of increasing number and letter for decreasing UTM northings.
'Fossil collections obtained from drill core.
"Omitted from map due to lack of space.
'''Age of limestone clast in limestone of unit uŦc.
'VA - follows barren or indeterminate fossil locality numbers.

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