

Notes on Geology of Babine Area

Feb. 3/72

The Babine area is underlain by volcanic and sedimentary rocks typical of an island arc type of 'sedimentation'. The volcanic rocks are predominantly fragmental and more acid than basalt. Tuffs and breccias are the most common. These rocks have been correlated with the Hazelton Group which in turn I would tend to correlate with the Bonanza Gr. of Vancouver Island. Interbedded siltstones (+ quartzites?) in the Hazelton often are pyritiferous. The significance of these interbedded sed. is not known to me but may just be a period of quiescence in the evolution of the arc. Such interbedded sed. do not exist in the Bonanza.

~~Several~~ Several varieties of porphyries (e.g. bio.-fsp. po, fsp. po, hdd bio. fsp. po, dacite po) intrude the Hazelton Gr. in the form of small plugs, dykes or sills. Many of these have varying degrees of mineralization ($\text{Cu} \pm \text{Mo}$). Intense fracturing +/or qtz veining is most favourable. The lack of mafics in the 'Crescent'-type porphyries ^{and lack of quartz phenocr.} is characteristic. Typically the rocks are ^{crowded} porphyries. In some cases, these porphyry bodies have preferred trends which may reflect ~~the~~ zones of least resistance or most amenable to fracturing, either by regional stresses or by stress caused by the upwelling of magma with decreasing confining pressure. So far as is known, no breccias or breccia pipes have been discovered in the Babine area (except for Grouse Mnt. area) ^{i.e. Huber prospect}

Beside the mineralized porphyries, the volcanic rx. + sed. are hosts to numerous base metal + precious metal occurrences. Most of these occurrences, by the way, were first discovered + worked on in the late 20's + early 30's. The main metals are Pb, Zn, Cu + Au, Ag. The literature suggests that the metals are in fissures, qtz. veins +/or

Shear zones within andesitic rx. In addition, metals have been described as being dissem. + as replacements along bedding planes. In general, these shear zones + qtz. veins are not of great enough extent to warrant production. Topley granitic rx. occur in the SE. region (+ Cu, Mo).

Exploration Potential

Much of the Balvine area is covered with glacial deposits of sand + gravel. Geochemistry has been used in many areas (mainly soil ^{+ rock}). Elements which should be tested are Cu, Mo, Ag, Zn. Drilling has been sparse.

Hazelton Gp.

The volcanic rocks are commonly green + maroon in colour, with the latter overlying the former. Some are fragmental rx. (^{cliff}) others are massive flow rx. (~~flow~~). Structurally, a N ~~W~~ trend (lineament + fold axes) is common. Plutons occupy the core of such antiforms (e.g. Big Oxion).

Plutonic Rx.

2 main types - 1) qtz diorite + 2) qtz-fsp. po. or qtz. monz. Alt'n to sericite + kaolinite may be common. Many fltn. parallel to contacts have been noted.

Seds. Dense-black argillites & argillaceous siltstones are ^{the} most common types. When adjacent to plutonic stocks the seds. are met am. (hornfels) + pyrite.

In general, we should be looking for a pluton or sill-like porphyry with more than one phase (eg. aty. dis. $\rightarrow$ aty. monz.) that has been well fractured + healed by qtz (+ sulphides).

$\Rightarrow$ see 1965 Description !!

1943 Thesis on Mt. Cronin Mine deals with stratigraphy of Hazelton Group.

Conclusions: ① Stratigraphic controls at
 a) Top of sed. + ~~low~~ base of ^{2nd} volc. unit.
 b) contact of sed. + intrusive rk. , , ,
 c) near or at contact of sed. division + lower volc. division.

Stratigraphy:

A. Upper Volcanic Division	- rhyolitic
B. Middle Sedimentary	- fossiliferous
C. Lower Volcanic	- green - basaltic andesitic

↑ 'maroon'

Oct. 30/72

Geology of Babine Area - As Seen June-Nov. '72

The area observed includes the area bounded by
between SMITHERS → MNT. CROWN → DORIS LAKE →
BELL COPPER → ^{GRAVISE} → TOPLEY LANDING → TOPLEY → HOUSTON
→ GROUSE MNT. → SMITHERS.

Three main 'groups' of rocks exist in the area:

1. Topley granitic rocks,
2. Hazelton volcanic and sedimentary rocks
3. Biotite-feldspar porphyry; ~~old~~ Hold-bio-fsp-po.

1. Topley granitic rocks; ^{Upper Jurassic to} Lower Jurassic in age.
Mainly a porphyritic quartz monzonite. Western most
known existence in the area is the Lennac Lake
(AMAX) showing (~1 mile north of Babine Lk). I observed
Topley rocks at the following places:

- (i) Bear Island & shoreline of Babine Lk. south
of Topley Landing.
- (ii) Lookout tower on Shoulder Mnt.
- (iii) Topley - Richfield Pb-Zn-Au prospect

Mineral showings visited include:

- a) Calcocite veins on shoreline ^{~2 miles} south of Topley
Landing (N. Carter)
- b) Topley - Richfield Pb-Zn-Au prospect - first
'major' looking road to the east off the Topley Landing
rd. (~7 miles from Topley).
- c) Lennac Lk. - drove on road with 2 ft
of snow - saw no otep. - only hearsay
= Cu + MoS₂ - Greywacke on southern part of property

This showing was apparently, a follow-up of a large reconnaissance geochemical survey. To date, line cutting & extensive I.P. surveys have been completed. Trenching has also been conducted. No drilling has been done yet. It is interesting to note that the Lennac prospect shows up by a distant mag filtered low on ~~Spe~~ Lockwood's 'filtered' maps. It would be interesting to know the type of alteration here.

(d) Camp Rafton (Cities Service) - adjoining Lennac prospect on the NW corner. To date, line cutting, soil sampling, mag, E.P. & I.P. has been conducted (the latter with some results?). I was ~~on the~~ at the camp via the Lennac Lk. road but didn't observe any rocks. Apparently they have some B.F.P. rocks & maybe? a Topley phase. Another 'Lockwood' low.

(e) ^{Not Visited!} Tacheek Creek option - located ~ 5 miles south of Topley Landing on the east side of the Granule road. This prospect was not visited but available company reports (Noranda 1968-70) & assays (+Taseko - 1971) were evaluated & also some ^{hand} specimens were observed. The hand specimens were impressive - but the results weren't. Further study? It is interesting that this prospect also lies on a 'Lockwood' low.

(f) Ducanex drilled a property ~ 10 miles north of Topley & straddling the Granule road. Early results were discouraging (i.e. siltstones), but later drilling proved encouraging (Cu).

2. HAZELTON ROCKS - Jurassic in age.

(i) Volcanic Rocks,

The following succession appears to exist:

A. Upper Volcanic Division

B. Middle Sedimentary Division

C. Lower Volcanic Division

C. Lower Volcanic Division: A 'green' basaltic andesitic ~~rocks~~ characterizes the lower division. These 'andesites' are typically massive and porphyritic ($\approx 10\%$ plag. phenox. in a finer grained matrix). Pyrite is not uncommon in these rocks. When this rock is altered, chlorite is the most common alt'n. ~~Places~~ In the vicinity of younger rocks (i.e. S.F.P.) the 'green' colour may be 'transformed' to a 'brown' colour. Places where this 'green' andesite were observed:

- Saturday Lake prospect
- Marin Lake group
- Grouse Mt. area
- Mt. Cronin area
- Dome Mt. area
- Granisle

B. Middle Sedimentary Division: Rock types included here are: red mudstone & light green siltstone (eg. Reister Creek traverse ^{Saturday Lk. gp.}); Limey, carbonaceous rocks (eg. Saturday Lk. group); black ^{crs. gr.} fossiliferous tuffs & light green ^{lm. gr.} fossiliferous (belemnites) tuffs (eg. Thursday Lk. group & Grouse Mt. area respectively)

; and pebbly conglomerate (eg. Saturday Lk. gp. & Morin Lk.). These rocks are not significant in an economic point of view; however, they do give some indication of the stratigraphy & also the environment & mode of deposition.

The mudstones & fine grained tuffs were probably deposited in deep water in possibly restricted areas and progressively shallower conditions resulted in deposition of limey & argillaceous rocks. The conglomerate consists of well rounded fragments of several different rock types - thus suggesting a ~~short~~ long period of transportation as well as a very large provenance. Sorting is only moderate.

Places where sediments were observed:

- a) Saturday Lake prospect
- b) Thursday Lake group
- c) Morin Lake group
- d) Grouse Mnt. area
- e) Mnt. Cronin area
- f) Reister Creek traverse
- g) Bell Copper - ? - ~~shale~~ argillaceous rx. near ferry docking

A. Upper Volcanic Division: A maroon coloured massive rhyolitic rock is characteristic. The rock may be massive or porphyritic (phenox. of Kspar.). The maroon colour is probably due to hematite which reflects the 'access' to air - i.e. subaerial.

Places where maroon volc. observed:

- (a) Saturday Lake prospect
- (b) Grouse Mnt. area
- (c) Dome Mnt. area?

3. Biotite - Feldspar - Porphyry: This is a light grey coloured rock with ~~character~~ between 1 and 5% biotite, ~ 10% plag. phenox, ~ 1% qtz phenox, + a light grey matrix. These rocks tend to form NE trending ridges. An excellent description of this rock type is given in the B. C. D. M. report for 1965. The conditions which make this rock type favourable for mineralization economics include: intense, hairline fracturing with fillings of qtz $\pm$ chlorite, $\pm$ sulphides ($\pm$ Cu, $\pm$ MoS₂, $\pm$ ZnS $\pm$ py). The mafic content is low (i.e. 1% or less).

These rocks are Tertiary in age (~ 50 my.)

[Hypabyssal equivalents of the B.F.P. are hornblende feldspar - porphyries which are sill-like and exhibit well developed columnar jointing. These rocks are ~~not~~ typically devoid of any mineralization.

Places where observed:

- a) Friday Lake group
- b) Babine Lake shoreline opposite Bell Copper
- c) Townsite prospect target?
- d) Thursday Lake group?

B.F.P. hosts the Granisle ~~Copp~~ porphyry Copper deposit.

Places where observed:

- a) Granite open pit
 - b) Saturday Lake group
 - c) Bell Copper
 - d) Tachek creek option - intruding Topley rx.
- Not observed

OTHER 'GRANITIC' ROCKS

1. Porphyries at Grouse Mnt.

- a) 'Granodiorite - po' - euhedral phenox. of fsp.
 - b) 'Bladed' porphyry - up to 3" laths
- apparently post? mineral - i.e. chilled contacts,

2. Granodiorite at Dome Mnt. group.

< 1% mafics; chlorite alt., no sulphides

3. ^{Qz} Monzonite on Huber prospect + associated hornfels (+ MoS₂).

4. Granitic 'plug' into ^{contacted} 'limestone' on east end of Fulton Lake - barren.

Not observed

5. Old Fort Mnt.

OTHER ROCK TYPES

- 1. Amygdoloidal basalt (calcite ± pyroxene)
- Friday Lake group; Grouse Mnt. area; 'Townsite' area
- Youngest rx. in area (i.e. Tertiary?). Best example is on townsite prospect + Friday Lk. (120 N/115 E)

2. Meta-andesites - schists - eg. Dome Mt (top)
 + near Granisle road (west side ~ 4 miles south
 of Topley Landing.
 - Probably metamorphosed Hazelton rx.

STRUCTURAL GEOLOGY

Major structural features (eg. faults) are best delineated on maps or air photos. Smaller scale structures in the field are not particularly observable. A. NW trend (lineament + fold axis) is common. Plutons occupy the core of such anticlines (eg. Big Onion).

ECONOMIC GEOLOGY

1. Copper ($\pm$ MoS_2^*) : (a) Granisle* - see other descripts.
 (b) Newman* - extreme qtz. veining - see other descripts
 (c) Mt. Cronin - skarn-type - Cu minor to Pb-Zn-Ag
 (d) Grouse Mt. - massive vein type in Hazelton ^{volc.} ~~plut.~~
 (e) Dome Mt - in sheared volc. + qtz. veins
 (f) Huber prospect* - in hornfels + breccia
 (g) Lennac Lk.* - in Topley granitic rx.
 (h) South of Topley Landing on Babine Lk. shore - chalcocite veins
 (i) Old Fort Mt.* - in granitic plugs - in Hazelton ^{in Topley.} ~~sed.~~
 (j) Saturday Lake* - in B.F.P. + hornfels volc.
 (k) Pyrite - ubiquitous.
 (l) Hudson Bay Mt.* - porphyry intrusive
2. Zn-Pb ($\pm$ Ag) (a) Mt. Cronin* - skarn type (f) Topley-Richfield
 (b) Granisle - Zn halo (g) Dome Mt.
 (c) Saturday Lk. - ZnS veins - qtz. veins
 (d) Grouse Mt - 'massive veins'
 (e) Huber prospect

3. Au (+Ag) : (a) Dome Mt. - in pyrite in qtz. veins
 (b) Grouse Mt.
4. MoS₂ (+Bi) - Reister Creek breccia

Exploration Techniques ^{Trueft} ~~Useful~~ in Area of

- (a) Geochemistry - (i) soils - Cu, Mo, Zn, Ag
 (ii) waters - Cu, Mo
 (iii) silts - Cu, Mo, Zn, Ag
- (b) Geophysics - (i) I. P. - recon. + detail (300' x 100')
 - lines 800' apart or less
 (ii) Ground magnetometer - as a follow-up to airborne mag. maps. Both recon. + detail use. Look for subtle lows?
 (iii) Airborne mag. map filtering - Lockwood
 (iv) ^{Ground} EM - Crane Radem - cf. Newman - good
- (c) Geology - Used in more detailed follow-up of reconnaissance geochemistry and airborne mag. filtering
 - Careful recognition of B, F. P. + % mafics (biotite) important plus qtz. veining plus altn' of intruded rx. plus pyrite halo?
- (d) Drilling - 8Q size. Depth of overburden varies but probably less than 75' in most places. Average shift on Sat. group was ~ 150 ft. Longyear junior drill used - capable of 700 ft. Average depth of hole ~ 300 ft.

Access : Access for reconnaissance work is good. Several logging roads exist plus private mining roads. It is advisable of course to have 4-wheel drive and maybe a 'come-a-long' or winch if available. Beyond that and for specific bush targets, access is by helicopter only. (Set Ranger-206B).

Roads in the area inspected:

- 1) Smithers Landing road - very good
- 2) Mt. Cronin rd. ^(off Smithers Ld. rd.) - poor
- 3) Driftwood creek rd. - good
- 4) Upper Telkwa rd. - good
- 5) Dome Mt. rd. (from Telkwa - 'Windermere' turnoff) - good to fair
- 6) Dome Mt. rd. (from Smithers Landing rd.) - ^{inaccessible} _{Spring + Summer not tried in Fall}
- 7) Fulton Lake 'Main Line' logging road - good
- 8) Chapman Lake rd. - good
- 9) Deris Lake rd. - good
- 10) Grouse Mt. rd. - fair
- 11) Huber prospect (Fishman Lake) - good to fair
- 12) Granisle rd. - excellent (to 4 miles south of T.L.) - fair (to Nanaimo)
- 13) Topley Richfield rd. - fair
- 14) Shoulder Mt. rd. - good
- 15) Fulton Lake south rd. (off Granisle rd.) - good
- 16) Lennace Lk - Camp Rafton rd. - poor
- 17) Topley Landing - Fulton Lake east rd. - good
- 18) Logging rd. behind Granisle Townsite - fair

The bush is not too thick so that a small cat (eg. SD 350) can be walked in almost anywhere. Swamps on the summer

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+ Springtime would not allow this however.

Choppers were available from Smithers (Okanagan) + Topley Landing (Northern Mountain).

A reconnaissance type traverse may consist of ~ 10 miles in this country.

A total of 70-80 soil samples per ^{per day} man is possible.

People + Companies In The Area During Summer

1. Nick Carter - B.C.P.M. - stationed in Topley Landing (+ Smithers)
2. Paul Plicka - Cities Service - Camp Rafter
3. ~~Jim~~ Gavin Dixon - Noranda
4. Jim Allen - AMAX
5. Dave Silversides - Lennac Lk - AMAX
6. Tony Barker - AMAX & New York
7. Rod Kirkham - G.S.C. Ottawa
8. Tony L'Ossa - Smithers
9. Roy Desargins - Canadian Suppliers
10. Lorne Alcock - Can. Sup.
11. Al Clark - Cities Service
12. Frank Vokes - Prof. - Norway
13. Ray Hockey - AMOCO - Ireland
14. Os Hackey - AMOCO - Toronto
15. John Barakso - Min - En Labs
16. Cam Stevens - Bacon + Crowhurst Consultants
17. Bill Bacon - Bacon + Crowhurst Consultants
18. Abbot Sutherland Brown - B.C.P.M.
19. Charlie Ney - Kennco
20. Ned Reed - Grangis Expl.

21. Jim McDougal - Falconbridge
22. Jake Forsythe - Texas Gulf Sulphur
23. Art Sargielli - Prof. U.B.C. (former Noranda)
24. Dr. Bell - Noranda
25. Tom Hasek - Dolmage & Campbell Consultants
26. Ed Holt - Quintana
27. Mel Haige - Kennecott
28. Wayne Morton - Cities Service
29. Don Davidson - Climax Moly
30. Dave Lawry - Ducanex
31. Ash Mullen - McPhar geophysics
32. Neil Church - F.C.D.M.
33. Tom Richards - G.S.C. - Vancouver
34. Robin Anderson - Bethlehem Copper

Chopper Pilots:

- 1) Okanagan:
 - a) Nick Bloomfield
 - b) Jack Milburn
 - c) Gene Byrdesen
 - d) Dick Emerson
- 2) Northern Mnt. - Randy Diston

Stores in Smithers with AMOCO Accounts

1. (Rod) Cunningham Meats -
2. Lakeside Motel - Wilf Watson
3. Tilden
4. TPA - McLure Lake
5. PWA - Mackenzie's Travel agency - Nick Castek
6. Okanagan
7. Smithers Transport.

8. Chevron Standard Oil - on Railway Ave.
9. Marshall Wells hardware
10. Bulkley Valley H Wholesale
11. Safeway
12. Tyee Motor Hotel

Weather : Generally good. Wet in Spring & Fall.

Update on Drilling on Saturday Lake Property - To Dec 3/72

Drilling has indicated that much of the anomalous zones are underlain by sedimentary rocks (siltstones, argillites & tuffs). The siltstones are 'skarnified' but bedding is probably steep (i.e. 60°). The attitude of units is now guessed to be trending N to NNE and dipping steeply SW. Pyrite $\pm$ pyrochroite are common in silicified mudstones. Sediments are intruded in places by numerous sills of hornblende-feldspar-porphyrty (+5-10% py).

No economic minerals have been located in the sediments. The B.F.P. to the south of the zone "A" is fresh & unfractured.

SKARN was found with minerals including chlorite, epidote & garnet.

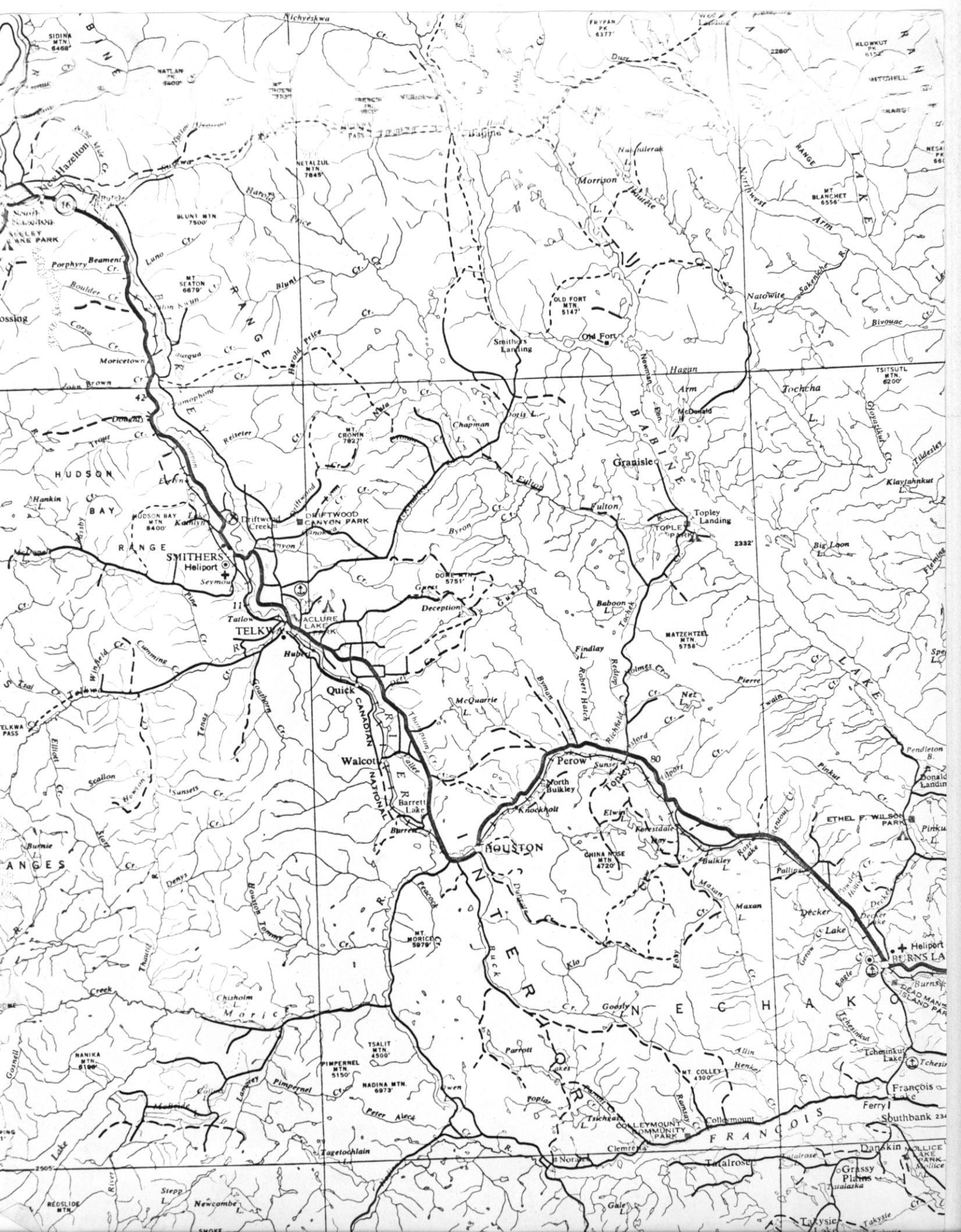


Figure 14
GEOLOGY
OF THE
NORTHERN BABINE LAKE AREA

