Friday July 3/64

802543

Notes Glacier Gulch Moly. Prospect from Material That Dave Johnson Let Me Read

J. Allan (Dec. 5 1962) Observations on Drill Core

p. 8 — Conclusion

- large mineralized zone in granodiorite
  - if any dip it is low
  - 500' to 600' thick by 600' long (open to the south)
  - along section B—B grades bet. 0.23 & 0.27 % MoS_2
  - along D—D is 300 - 350' thick & 600-700' long (open to the south), grades ~ .21% MoS_2
  - mineralization & to a certain extent alteration, other than silicification, dies out toward the north along both sections (*but qtz. veining & fracturing do not appear to decrease in intensity to the north — eg. qtz. veining in granodior. is just as intense in D.D.H. 24 as it is in D.D.H. 18.

p. 9

*— Discontinuous high grade sections intersected in D.D.H. 18 are probably characteristic of the mineralized zone as a whole. Since the moly mineralization in the quartz veins rather than the quartz veins themselves appears to be spotty and discontinuous there is no reason to believe that the high grade moly mineralization intersected in D.D.H. 18 is confined only to a small area around the drill hole. It is much more probable that the high grade moly patches occur discontinuously along the entire length (within the limits of the mineralized zone) of an individual quartz vein or set of qtz. veins. In other words, the high grade sections encountered in D.D.H. 18 should not be considered as isolated high grade pockets unique only to the area around D.D.H. 18 but rather as representative of probably a number of discontinuous high grade pockets scattered throughout the mineralized zone. In conclusion it is difficult to say at this stage whether the high grade assays should be cut to 1.00%, somewhere between 1.00% and the uncut average, or to the uncut average of the mineralized zone as a whole for purposes of overall grade calculation.

A. Sutherland Brown T.S. Studies (Dec. 22, 1958)
To Mr. John DeLeen

D.D.H. 58-10 – grade of meta. increases with dep
58-8 – same " throughout

Spec. 58-6: 444', 58-8: 672', 58-10: 461' & 748' are well within the halo close to contact
58-10: 748' – fine garnet may be few hund. ft. from contact

58-4: 508' – dacite porphyry – some matrix feld. are microperthite looking – possibly due to exsolution during metamorphism – plag. phenos replaced in part by musc., some chlorite in matrix

58-5: 472' – fine musc. + some bio. – ? rk. type

58-6: 444' – fine felted amph. (act.?) – some zoisite, replacing earlier bio. + chl. – many "phenos." entirely recrystallized

58-8-785 – matrix recrystallized some chl. & zoisite

58-8-65 – much felted bio. with incipient change to amph. – matrix partly recryst.

58-8-672' – much felted bio. replac. matrix + larger grains – matrix partly recryst. + some larger grains entirely recryst.

58-9-10' – greywacke – recryst. matrix + larger feld, much felted biot. with some changed to muscovite

58-9-300' – entirely recryst. with much felted musc. – replacing feld. entirely

58-10: 18' – felted musc. in partly recryst. matrix + in large feld. – a minor amt. of new mica is bio.

58-10-461' – completely recryst. – hornfels of amph. (act.?) clinozoisite, ep. – (recryst. qtz.)

58-10: 748' – greywacke hornfels – almost completely recryst. with growth of act., clinozoi., and garnet

58-10: 16' – greywacke siltstone – recryst. in part – with much fine musc.

58-11: 314' – ~ 1/2 qtz-calcite veinlet – feldspathic orig. rk., with hornfelsic overlay of fine muscovite.

Dec. 29/58 John Delaen to R. A. Barker - meta. aureole
A. Brown 58-10 incr. meta. with depth
(hole south end of grid area) also 6, 8 & 10 south end

Yorke-Hardy Molybdenite Prospect

July 18, 1958 W. W. Moorhouse

Summary & Conclusions

1. MoS_2 min. exposed over area of 1000 by 2000' to east of glacier

2. Min. is confined to stringers, veinlets, and coatings, composed of molybdenite with quartz, quartz-carbonate, qtz.-bt., or quartz-chlorite with or without pyrite or rarely chalcopyr.

3. —

4. assays 1st-(124) on 200 grid in grid area (small in size) 10 lbs
0.02 to 1.69% MoS_2 - av. 0.195% MoS_2

2nd-(26) same area (larger in size) *in error, actually smaller size
.02 to 0.47% MoS_2 - av. .116%

* noticeable discrepancy

5. Check on assays - very large sample from high zone (gave .20%) G-2600

6. No particular rk. type or structure more favorable for higher grade ore

Development to Date

61 claims

-optioned in 1957 off a group headed by W.D. Yorke-Hardy

-1957 - surface sampling on 200' grid

-blasted pit - 2 samples 10 lbs. each - assayed from every pit (124 assays)

Geology

volcanics — flows, tuffs & breccias
rhy. and & dacite to basalt

NW-SE/ 20°-45° SW veinlets (in shear or shattered zones) - qtz., carbonate (ankerite & calcite) - considerable & Moly
pyrite - occasional chalcopyr. & rarely sphal.

in veinlets – moly stringers + films on joint planes
– no diss.
– compos. – moly. by itself (little or no gangue (as films)) or gangue of qtz., qtz.-carb., qtz.-hb. or qtz.-chl.
moly. ± pyr. + other sulph. in these veinlets
– ~~NE~~-~~SW~~ E-SW conc. but may be any dir. (also NW-SE)

* – only small % of total joints are min. with moly (qtz.-carb. 4 due zones)
– moly. never diss. but sometimes pyr. is
– pyr. + pyrrho. are most abundant sulph. in volcanics

Grade
– he considers commercial grade to be .4%

Summary Report – Yorke-Hardy Prospect
March 1959
by: R. A. Barker
W. W. Moorhouse

Summary + Conclusions

– optioned in 1957 @ $750,000 purchase price over 9 yrs.
– $11,000 paid by 1959 (Oct. 30)
– metallic min. – moly, pyr., pyrrho., magnetite, chalcopyr. + sphal.

– weighted av. of 150 – 10 lb. samples + 29 – 400 lb. samples from the grid area is .166% MoS_2 (but they assume samples are unreliable)
– 3,743' of drill core from the grid area 0.07% MoS_2
– 550' from beneath glacier av. 0.04% MoS_2

* within grid area 100,000,000 tons @ < 0.1% MoS_2 to a depth of 500'
(no higher grade zones within area were recognized

p.10 Agreement $750,000 as follows

Oct. 30,	1957	3,000
		2,000
	1958	6,000
	59	9,000
	60	20,000
	61	40,000
	62	80,000
	63	140,000
	64	200,000
	65	250,000

in 1959 – 61 claims with assessment work for 10 yrs.
to Dec. 31, 1958 – total cost $110,000

Geol. mapping & supervis.	(?)13,000
Surface sampling	(?)11,000
D. Drilling	32,000
Assaying	7,000
Equipment	3,000
Misc. & Overhead	3,000
Property Payments	11,000
Prov. & Supplies; Operation & Maintenance	15,000
Aircraft Charter	15,000

- Alt. – sil. & propylitization producing qtz., chlorite, epidote & calcite (sericite in felsitic rks. / chl., act., zois. & ep. in darker volc. rks)
- * no base metal deposits ever discovered on northwest side of bisecting fault
- Duthie mine over 25 yrs. – 80,000 tons containing about 35 oz. Ag, & 10% combined Pb & Zn

Joints

- at all angles
- frequency varies with rk. type (more in felsitic rks.)
- probably the more abundant the fractures the lower the number that are mineralized
- 1. // bedding 2. ⊥ bedding (tensional) 3. related to shears 4. random (primary?)
- no evidence that moly. is more abundant in one set than another

Shears – av. 120°/38° SW (bedding av. 95°/80°N) // strike & ⊥ dips p.24 The angular relationship between the dips of the shear direction & the bedding is what might be expected for conjugate planes of movement resulting from doming of the mountain by subjacent igneous intrusion. If this is the case, the center or apex of the doming would lie in the vicinity of the maximum elevation of Hudson Bay Mts. in the extreme west corner of the claim group. (they admit is just a guess)

- Mo min is younger than shears since it occurs on films cutting shear

B-2400 - Spec. tr. Ni + Cu
.01-.1% Mo,
.1-1% Zn + Cu

Magnetite to 1/8" veinlets

P29 Comparison of Properties in Terrace-Smithers-Endako Area

Country Rk (variable)	Property
Granite, granodio., etc.	Bell Pitman, Stella, Woodcock, Pacific and Telkwa Prospecting Club prospect, Parent prospect, Black Prince
Greywacke and sandstone:	F.A. Maclean prospect, Woodcock
Contact of granite + Greenstone	Talus Creek
Volcanics	Yorke-Hardy

~~Quart~~ Habit (variable)	Property
Quartz-molybdenite stringers	Yorke-Hardy, F.A. Maclean, Bell Pitman, Woodcock, Telkwa Prosp. Club, Black Prince

Quartz veins (6"-2'):	Stella, Bell Pitman, Pacific
Shears with qtz. lenses	Talus grp., Parent, Woodcock

Alteration	Property
None:	F.A. MacLean, Telkwa Prosp. Pacific
Considerable	Yorke-Hardy, Bell Pitman, Stella, Woodcock
Considerable but localized	Talus grp., Parent

Molybdenite (type)	Property
Very fine grained:	Talus grp., Bell Pitman (part), Woodcock (part)
Fine to med. grained:	Yorke-Hardy, Stella, Pacific F.A. MacLean, Woodcock, Parent
Med. to coarse grained:	Yorke-Hardy (Porph. boulders) Telkwa Prosp. Club, Eureka (granite)

Generalizations

1. Moly occurs in virtually all rk. types in the area
2. It occurs @ elv. from <500' to >6000'
3. It may localized along a shear zone, or it may occur in jointed countryrk. without any noticeable structure other than jointing
4. There does not appear to be any tendency for localization of min. @ or near granite contacts, unless these are marked by distinct shear zones.

H-2400 – sample trench for 1 large (3,600 lb) bulk sample

– surface samples in grid area – can not reproduce values

arith av. of samples (178) .159

weighted av. 13120 lbs [.166] % MoS_2

3743' D.D.H.

B.C.-58-5	465'	0.07
" "-7	787'	0.06
" "-8	670'	0.08
" "-9	762'	0.05
" "-10	315'	0.10
" "-11	744'	0.05

wt. av. 0.07
(but upper 50' av. .08% MoS_2)

<u>Holes thru Ice</u>

B.C.-58-1	111'	0.04
" - " - 2	192'	0.04
" - " - 3	86'	0.05
" - " - 4	118'	0.02
" - " - 6	43'	0.03
	550'	0.037

** av. of surface samples is more than twice as great as that of the core samples in the grid area
(? because breaks along joints)
i.e., they assume av. grade of grid area is <0.10%

1946 P. 9-18.

p.40 Muir Inlet Prosp. in Alaska (U.S.G.S. Bull. 947B)

Paleozoic hornfels (some shale & ls.) intruded by small 1200 x 500' qtz. monz. porph. stock (probably early Cret. age)

- contact aureole containing abundant diopside stock & hornfels are cut by myriad of qtz. veinlets
- increase in number towards the intrus. where they coalesce to form a siliceous envelope around it
- after qtz. monz. intr. many (hundreds) dikes emplaced (mainly hb.-andesite porph.)
- joints cross qtz. veinlets
- molyb. main min. but plus pyr., chalco. & magnetite
- " occurs along margins of qtz. veinlet & less freq. as xtl. agg. within qtz.
- some as thin seams without qtz. - not diss. in hornfels
- pyrite diss. & in veinlets
- Hb., diop., clinoz., & feldspar are main alt. minerals

this stockwork is largest deposit in area & is richest where zone projects NW along an anticline

- moly. in some of veinlets in an intermediate zone of the stockwork - less outward & in siliceous envelope around & in the intr.

related to structural anomaly

U.S.B.M. samples

- 170,000 sq. ft. 0.125% MoS_2 - richest zone
- 2,000,000 " " 0.08% " - envelope
- they suggest is very similar H.B. Mtn. deposit (geol. occurrence & grade-tonnage potential)

Tonnage - Grade

100,000,000 tons < 0.1% MoS_2

1,000 x 2000' drilled to ~500' (tonnage factor 10 cu. ft./ton) - not sufficient Cu & W for by-product values

- not economically feasible now or in near future (based on existing producing mines & potential producers) they guess this grade not for 20 yrs.

My Observ. ✓ **Petrography of Rks. by Moorhouse**

- mainly tuffaceous & fragmental volc. rks
✓ - " acid to intermediate tuffs, breccias, welded tuffs & porphyritic to glassy flows

These rks. have been tilted up, intruded, & intensely altered (devitrified, saussuritization of plag., silicif., biotitization, amphiboliz., carbonatiz., with minor meta. diop. & garnet.
- ortho. & albite may have been introduced

He descr. many spec.

58-11-314' - intensely silicified rk - originally felsitic or glassy rhyol.

CX-57-100 - Biotitized, albitized basalt (some hb.) called lamprophyre in gov't. reports.

CX-57-103A: Silicified, devitrified tuff, fractured. Fractures filled with biotite, qtz., orthoclase. Molybdenite in biotite-filled fractures! Possibly some altered scheelite (powellite).

- he makes mention of widespread sparse sheelite (powellite); fluorite & apatite
- most rks. (even dark ones) qtz. & alkali feldspar

Final Report
Yorke-Hardy, B.C.

Aug 1959 W.W. Moorhouse

Concl.

3 (in part) There is some indication from surface sampling & drilling results that there is a slight improvement in values in the southwest corner of the grid near the glacier (seems to be greater number (visually) of MoS_2 stringers in this area)

4. No definite structural control of molybdenite mineralization has been indicated by geological work. However, plotting the location of carbonate shears mapped on the grid on figure 3 suggests that fracturing associated with these shears has increased the abundance of molybdenite in their vicinity -

Recommendations:
No further expenditure on project
6 reasons why not 6 - no good explor. target

P.3 Molybdenite is clearly associated with hb. - biot. - qtz. replacement of lavas & other volcanics in Gl. Gulch.

P.6. The volcanics are predominantly agglomerates, tuffs, crystal tuffs, welded tuffs, and breccias. For the most part flows appear to be subordinate.

P.14 Concerning assay - D.D. grade most closely ='s most frequent assay plots (~.07% MoS_2)
- plot of values along grid lines tend to show sl. incr. to south & west (same results by drilling
- of 16 ~~shears~~ high assays - 8 assoc. with shears; ∴ may be connected with control

1963 Summary Report
Yorke - Hardy, B.C.
Nov. 28, 1963 R.E. Anderson
J.F. Allan

P.32 A major steeply dipping fault is located on the back or west wall wall of the cirque occupied by the Hudson Bay Glacier. It is marked by a steep narrow "chimney" or large crack on the cirque wall & a V-shaped notch on the ridge (N70E/steeply S. The S. block has moved down relative to the N. block. Movement was apparently post-thrusting as the thrust fault appears to be displaced along this fault. (Eastern extension should pass through drill area

P.39. Porcelaneous rk.
Tiny euhedral feld. laths are scattered throughout the por. ~~matrix~~ (usually vague contacts - product metasom.
- anhedral feld & qtz. matrix - locally glomeroporphyritic texture (clusters of feld. laths)

p. 42 – numerous small ovoid inclusions in granodio. – these incl. have been altered to fine grained mixture of chlorite, magnetite, epidote and garnet.

3 facies of granodio

1. aplitic variety (recognized in core) myrmekitic? micrographic texture
2. micro porphyritic variety (not separated in core)
3. "normal" granodio.

mainly large subhedral to euhedral laths of feld. with smaller subhedr. qtz. crystals & some fine grained interstitial qtz.

– plag – An 30–40% (*same more as quartz-eye unit)

– k-feld. – up to 30% of the total feld.

– *very few primary mafic min.

– secondary min: biotite, chlorite, epidote, sericite, carbonate, magnetite, pyr. & qtz.

– typical granitoid texture

p. 43 – glomeroporphyritic texture – large feldsp. crystals are intergrown & grpd. together in clusters

– weak cataclastic texture in a few sections

– fine-grained ragged habit or texture of some of the qtz. suggests that some recrystallization or secondary silicification has occurred in the granodiorite. *The "normal" granodiorite intersected in the drill holes is similar both microscopically and megascopically to the granodio. exposed in Toboggan Creek

P41 Granodio. body

– roughly sill-like body that thickens to south

– 250' thick in Hole 28 & over 1700' in Hole 29

– contacts with both overlying & underlying volc. are sl. discordant & are generally gradational

The granodio. is cut by lamprophyre & qtz-feld. porph. dykes & sills.
Contact thermal effects due to the intrusion of the granodio. are evident in some of the overlying volcanics. Dense tuffaceous hor. of a few of the have been hornfelsed adjacent contact (well & will be ll - sec. bio. & hbn. gained lesser chl. & magnetite)

P45. Lamprophyres
Lamprophyre is a dense fine-grained dark green equigranular rock characterized by a distinct sheen on the freshly broken surface. Fine-grained green intrusive rocks approaching diorite, andesite, and diabase in composition and texture have also been mapped and logged as lamprophyre (50' sill extends throughout drill area). Lamprophyres are later than the granodiorite but older than the qtz. feld. porphyries

P49. 3 sets of tensional joints
by gen. offset other fractures 0-10°/80°E to 80°W (strongest). - qtz. veins in this set 1/16 - 1/2 wide
youngest set. 60°-70°/~~90~~ vert. to 75°N
90-100°/vert. to 70°S

* but late readjustments have, however, occurred along nearly all fractures as mutually offsetting relations have been observed along fractures of every set
- 3 other poorly defined sets of steep fractures & qtz. veins strike 30°, 120°, 150°
- breccia fractures are younger than all steep qtz. veins

- steep shear fractures in grid area & along S. wall 30°-90°/steeply north & south - generally small displacements - these offset breccia fractures & most of the qtz. veins in grid area

P50. The fact that numerous fractures, faults and lineaments? parallel to those mapped in the grid area, have been recognized elsewhere on the mtn. indicates that the

fracture pattern in the lower cirque and grid
?? areas has been produced by regional rather than
local stresses. Also, because all major fracture
and quartz vein sets occur in the lamprophyre
sills and dykes of the grid area, the regional stresses
must have been in existence subsequent to the
intrusion of the lamprophyre.

* P52 Mineralization
– bulk near toe of Hudson Bay Glacier

Diamond drilling has outlined two vaguely defined mineralized zones termed the upper and lower zones. The upper zone is gently dipping. As presently outlined, it is roughly 600 feet wide, 1600 feet long, averages 190 feet thick and lies 500 – 600 feet below surface. The lower zone, although only vaguely defined, appears to be fairly shallow dipping. It is 1300 feet long and 1200 feet wide, as presently outlined, averages 500 feet thick and lies 1100 to 1600 feet below surface. <u>Both zones are open to the southeast.</u> **Neither of the main zones are exposed on surface. The surface mineralization in the grid and lower cirque areas appears to be representative of scattered and probably somewhat erratic mineralization occurring above the upper zone.

(my calculations = 182,240,000 tons upper zone / 78,000,000 tons lower " → 7.2% MoS_2)

P53. Molybdenite occurs primarily as fine to medium-grained flakes and rosettes in medium to coarse-grained quartz veins in the grid area. The veins are $\frac{1}{16}$ to $\frac{1}{4}$ inch wide and generally $\frac{1}{2}$ to 2 ft. apart in the intensely veined areas. Molybdenite also occurs as fine "paint" and medium-grained flakes along dry joints and as clumps of fine and coarse flakes in the quartz carbonate breccia fractures.

In the drill core, molybdenite occurs as fine flakes and coarse rosettes in coarse-grained quartz, quartz-carbonate, quartz-K-feldspar and quartz-biotite-hornblende-magnetite veins and veinlets and as fine grains or "paint" along tight shear fractures. Molybdenite was also noted as fine disseminations in 3 or 4"-4-8" wide pink K-feldspar dykelets in the granodiorite. This type of mineralization is, however, extremely rare. In the lower mineralized zone, the bulk of the molybdenite occurs as finely disseminated flakes and streaky layers of fine flakes in sugary quartz veins

The character of the molybdenite mineralization depends, to a certain extent, on the type of character of the vein filling (eg. coarse rosettes of molybdenite in coarse-grained quartz veins and fine flakes of molybdenite in sugary quartz veins), and occasionally on the attitude of the mineralized fractures (eg. coarse-grained quartz veins containing coarse molybdenite rosettes are generally gently dipping).

P.54

Structure

Although the mineralized fractures and veins appear to be randomly oriented in the grid area, a statistical study has shown that the majority of the veins fall into four sets: three sets of steeply dipping mineralized quartz veins striking 0-10°, 60-70° and 90-100° and dipping 80° E to 80° W, vertical to 75° N and vertical to 70° S respectively and a set of slightly sinuous breccia fractures cemented by quartz, carbonate, limonite and locally molybdenite striking 120-140° and dipping 20° to 30° west. Three other weak, poorly defined, steeply dipping sets of mineralized fractures and qtz. veins strike 30°, 120° and 150°. The mineralized quartz veins are generally 1/16 to 1/2" wide and most persist over lengths of 20' or more.

In the intensely veined areas, the mineralized quartz veins are ½ to 2 ft. apart. The quartz-carbonate breccia fractures pinch and swell along strike and probably down dip and
P55. molybdenite mineralization in them is very patchy. Widths vary from 1/16" to 4' but generally
? if these are similar type structures to Sil Van vein
average around 6 inches. The breccia fractures are the youngest mineralized fractures in the grid area.

A statistical study was made of the attitude of quartz veins in the drill core from D.D.H's 18, 21 and 22. Most of the mineralized fractures cut the drill core at angles of 20, 50 and 70° to the core axis. The majority of the mineralized fractures in the upper mineralized zone intersect the core at angles of 10 to 50° or dip 40 to 80°. The steep fractures in this zone are generally tight hair like fractures. Molybdenite occurs as "paint" along these fractures or as fine to medium grains in narrow quartz veins. Some fine-grained molybdenite in sugary quartz veins with coarse rosettes of molybdenite also occur in the upper zone these veinlets are generally shallow dipping.

Molybdenite in the lower mineralized zone occurs primarily in gently dipping sugary quartz veins. The sugary veins vary from ¼ to 6" wide with the molybdenite occurring as very finely disseminated flakes or as a number of thin streaky layers of fine flakes. A considerable amount of molybdenite also occurs as coarse rosettes in wide (½ to 5") gently dipping quartz veins. * The amount of the coarse
P56 rosette-type of molybdenite appears to decrease to the southeast in the lower zone (eg. there appears to be less coarse-grained molybdenite in Hole 29 than in Hole 18). A number of steeply

dipping mineralized quartz veins also occur in the lower mineralized zone. These veins which contain 20-30% of the molybdenite in the lower zone, are generally much narrower than the gently dipping quartz veins.

A detailed study of the core from the 1963 holes indicates a rough correlation between intensity of fracturing, quartz veining and molybdenite mineralization in both zones.

Alteration

Hydrothermal alteration associated with molybdenite mineralization is difficult to distinguish from "auto" or late deuteric alteration associated with volcanic activity, or from contact metamorphic-metasomatic alteration related to the intrusion of the granodiorite. The following types of alteration have been recognized on the Yorke-Hardy property: a silicification b feldspathization c development of secondary biotite, chlorite and amphibole (biotitization, chloritization and amphibolitization), d development of secondary sericite and carbonate (sericitization and carbonatization) e epidotization and f development of secondary clay minerals (argillization)

P57 (bleached zones may equal silicif. zones but is primarily the result of destruction of dark mafic minerals rather than silicif.)

a Sec. Silicif. - other than qtz. veining has proved difficult to recognize in mineralized areas.

P58 -a few small isolated areas (no relationship to grade) (near granodior.)

Microscopic study has shown that considerable pervasive, diffuse silicification has occurred in the country rock around the margins of individual quartz veins, and throughout the host rock where quartz

veining is intense.
(lensy mosaic qtz. in fine grained volc. suggests that some sec. sil. has occurred in bleached areas)
P.57 — no large silicif. zones — On the other hand, qtz. veining appears to increase generally in areas of better grade mineralization.

b feldspathization
— difficult to recognize
— K-feld. in many qtz. veins (barren & mineralized)
— " "dyke-like" bodies up to 6" wide — wht/pink K-feld. in granodior.

— These "dyke-like" bodies of K-feld. are unique in that they always contain finely disseminated molybdenite.
— staining has revealed some K-feld. diss. in wall rks. adjacent to a number of mineralized qtz. veins.
— K-feld. is spatially related to MoS_2 but doesn't seem to be increase in areas of better grade mineralization

c Sec. biotite, chlorite & amph. (& usually assoc. magnetite)
— in all rks. of min. area.
— chlorite & biotite generally occur as fine-grained aggregates and streaks & in hair-like stringers & tiny quartz veins.
— sec. amph. - actinolite in qtz. veins & in fine grained diss. in volc. rks.

Saussurite (fine-grained epidote, magnetite and possibly albite) is abundant in the granodiorite where secondary biotite and chlorite are present. *None of the above
P.61 minerals are present in areas of intense sericite — carbonate alteration. The development or introduction of fine-grained biotite, chlorite and amphibole occurred subsequent to the intrusion of the granodio. but prior to molybdenite mineralization.

Biotite, chlorite, amph. and magnetite also occur in some of the mineralized qtz. veins in the drill area. There is a possibility that these minerals were solutions

leached from the host rock by the mineralized veins. This is suggested by the fact that: i the above minerals usually occur in ~~by the fact~~ mineralized quartz veins cutting basic rocks and ii the host rock is usually bleached adjacent to the mineralized veins.

d Fine-grained sericite-carbonate alteration is well developed in the granodior. + in places in the overlying volcanic rocks of the drill area.

*- it is spatially related to molybdenite mineralization +, generally speaking, is most intense in areas of high grade mineralization

Sericite and carbonate occur as fine to medium grains in both barren and mineralized quartz veins, as fine (microscopic) disseminated

P62 grains in the host rock adjacent to mineralized quartz veins, and as fine disseminations throughout the host rock in intensely mineralized areas. In the intensely altered sections sericite occurs as felted masses, almost completely replacing the feldspar of the host rock, while in areas of weak to moderate alteration, sericite occurs as fine scattered plates generally aligned along the crystallographic directions of feldspar crystals. Fine-grained, disseminated pyrite is generally abundant while biotite, chlorite, magnetite and amphibole are absent.

** this change may have occurred upon introduction of S into the rock

* Apparently the mafic minerals were destroyed and magnetite was converted to pyrite in areas of intense carbonate sericite alteration.

The granodiorite may be either cream, buff, pink or olive green in areas of moderate sericite-carbonate alteration. The volcanic rocks are usually bleached to a buff or cream colour.

all save alt.

Ser.-carb. alt - weak in D.D.H. 13, 19, 24 & 25
moderate in " 22, 26, + 27

moderate to intense in D.D.H. 16, 18, 21 + 29

P63. are exceptions to rule of higher grade ore assoc. - ser-carb. alt.

D.D.H. - 18 - both ser.-carb. + sec. biotite and chlorite are present in the lower mineralized zone. Although the grade of the molybdenite mineralization intersected in this hole is fairly high, the ser.-carb. alteration is only moderate. In places, secondary biotite chlorite is more abundant than sericite-carbonate. In D.D.H. 29, intense sericite-carbonate alteration occurs near the top of the granodior. (840-1650) whereas the main mineralized zone extends from 1330 to the bottom of the hole (2580'). Most of the lower zone mineralization (1650-2580') occurs in an area of intense biotite-chlorite alteration.

* contradictory statement with some above statements

* Carbonate - sericite alt. occurs on surface along the trail below the grid area between 3000 + 4000'. Barren qtz. veins are also abundant in this area and on the slopes above the trail. In places the qtz. veins are 6" to 1' apart. Fine-grained

P. 64 sericite and carbonate form buff and creamy-brown alteration halos around a number of the barren qtz veins. Intense sericite-carb. alt. is also associated with the lead-zinc and gold-bismuth-telluride mineralization in Glacier Gulch. Very little sericite-carbonate alteration occurs in the volcanic rocks of the grid area or in the volcanic rocks on the south wall above drill locations 21 + 22.

e sec. epid. occurs as scattered patches in the volcanic rocks of the drill and grid areas. Extremely fine-grained brown garnet, and to a lesser extent magnetite & chlorite, are usually associated with epidote. In the grid area unaltered lamprophyre cuts the highly epidotized volcanic rocks (i.; they consider lampro. are probably post epidotization)

P. 65 They suggest is more closely assoc. intr. of granodior. than hydroth. alt. assoc. moly.

f Argillic alteration is confined to 1/8 to 1/4 inch wide halos around a few mineralized quartz and qtz.-carb. veins. Although it appears to be genetically and spatially related to molybdenite mineralization, the argillic or clay alteration is too limited in extent to be useful as a guide to mineralization.

P.66 Structural Control & Guides to Mineralization

The genesis and structural control of molybdenite mineralization on Hudson Bay Mtn. has not, as yet, been satisfactorily resolved.

Possible reasons for localization

a intense fracturing & faulting ~~(contro~~ but they say is not any more highly fractured than other parts of Mtn. - I don't agree)

b Proximity to a source rock (they believe is most important)

- they mention "strong" fault on back wall of cirque (strike east - northeast)
  - hypothesis that it breaks up into to many small tensional & shear fractures
  - composite mov't. on the small shears = that on the main fault (considerable because it displaces thrust

P67 - they propose that this fault acted as channelway for Mo mineralization (also "readjustment" during min.)

Rock type has controlled, to some extent, the development of fractures in the lower cirque area.

P68 The quartz eye unit is, in general, less fractured than other volcanic rocks & the granodior. appears to be structurally more favourable for the formation of gently dipping fractures. The bulk of the mineralization in the upper mineralized zone, located entirely in the volcanic horizons above the granodiorite, is in moderately to steeply dipping fractures, whereas most of the mineralization in the lower zone, located within the granodiorite, is in gently dipping fractures. (These are probably the qtz-carb. breccia fractures of the grid area.)

Although the main distributing channels for molybdenite mineralization are steeply dipping, both mineralized zones, as presently ~~mineralization in the lower~~ outlined, are gently dipping. The bulk of the molybdenite mineralization in the lower zone is in gently dipping fractures, therefore, it is logical that the zone as a whole should parallel the attitude of these fractures.

!!?! what! Supposition for evidence.

P.69. The gently dipping attitude of the upper zone is, however, more difficult to explain. The fact that the upper mineralized zone is roughly // to the upper granodior. contact suggests that the intrusive contact has some control over the deposition of molybdenite in the upper zone. Also, the wide, locally vuggy nature of the shallow-dipping mineralized quartz veins in the upper zone, suggests that they were tension direction of the stress system operating during the mineralized period. Thus, it is suggested that mineralization in the upper mineralized zone was deposited in a dilational area developed along a predetermined plane of weakness - in this case the upper granodior. contact - by the tensional stresses operating during the mineralizing period. The solutions entered this "dilational" area via the steep shear and tension fractures.

The main wall rock alterations related to molybdenite mineralization are feldspathization, argillization, silicification, sericitization and carbonatization. Feldsp. + argill. are too limited in extent to be useful as a guide to mineralization. Diffuse silicif. related to mineralization is generally difficult to distinguish from silicif. related to volc. and that related to intr. of the granodior. ∴ sil. is no good as guide

P.70

- incr. qtz. veining may be used as a guide to incr. grade
+ ser.-carb. alt. (with some exceptions)

source rock:

- porcelaneous rks., gabbro, granodior. & lamp. as hosts
- feld. porph. dykes are intramineral (both earlier & later) & porph. granite is at least in part earlier
- they conclude source rk. is unknown

1,000 x 2,000 x 500'

1,00 000 0000 cu. ft

÷ 10 | = 100,000,000 tons
~ .1%+

1,600 x 190,600

= 18,240,000 tons
~ .21% ?

= 78,000,000 tons
> .2 %

190
600

114,000
1,600

68400000
114000

182,400,000

18,240,000 tons

1200 500
1300

360000
~~1200~~
1200

1560000
500

780,000,000
78,000,000

5000' x 2000' x 2000'

$$\frac{20,000,000,000}{10} =$$

= 2,000,000,000

= 2 bill. tons

estimate [oct. 64] of mineralized rk already discovered

@ .02% = ~~4,~~400,000 ~~tons~~ Tons MoS_2

1,~~000~~000,000,000
~~300~~ .3

3,000,000 Tons MoS_2

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