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Vancouver, B.C.
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- STORIE Mo PROPERTY - 1968 REPORT - B.C. -

BY J.F. ARIZ

The enclosed report by J. Ariz records in considerable detail the results of 1968 diamond drilling. In addition it reviews the general & detailed geological conditions in the immediate area of the claims and develops some theories on the origin, genesis and favorable locus of the mineralization.

In previous years certain structural assumptions were made in order that a geological picture might be presented and ore reserves estimated. It was stressed then that we weren't too certain regarding the validity of those geological projections. Now this 1968 report presents an entirely different concept of the structural picture within the intrusive host rocks. Instead of depicting the mineralized zones as more or less flat-lying bodies, they are herein considered to be steeply northerly-dipping tabular bodies, paralleling a major fault-fracture system. Such a possibility was suggested in the 1966 report. A considerable effort has been involved in correlating the available data to arrive at this new picture, especially in view of the difficulty in correlating rock types logged earlier. Detailed photogeology studies were made to assist in this interpretation.

Instead of east-west vertical sections, the new structural setting is best shown on north-south sections which are included in the report. New ore reserve calculations have also been included, in which the cut-off grade was reduced from the earlier 0.10% to 0.07% MoS_2. The result is a three-fold increase in the tonnage to some 22 million tons, but with grade reduced to 0.109% MoS_2. The stripping ratio is also considerably reduced.

R. C. Macdonald

RCM/vs
cc: W. H. Callahan

STORIE Mo PROPERTY - 1968 REPORT

Liard Mining Division

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APPENDIX

Detailed Tonnage & Grade Estimates

Detailed Logs for DH #31 to #48 Not included.

Drill Hole Assays

LIST OF MAPS

AXL-BC	30-2B	-	Geologic Map	- 1" = 100'
"	30-7	-	Photogeologic Structures	- 1" = ¼ mi.
"	30-7A	-	Ditto - Derivative Map	- 1" = ½ mi.
"	30-8	-	Structural Geologic Map	- 1" = 200'
"	30-9	-	Ore Bands	- 1" = 300'
"	30-10	-	Outline of Pits for Tonnage Estimates	- 1" = 100'

VERTICAL SECTIONS:

N-S Sections, Lithology And Structure:
10E, 14E, 18E, 22E, 26E, 30E, 34E, 38E, 42E, (46E. -Not included.

N-S Sections, Mineralization:
10E, 14E, 18E, 22E, 26E, 30E, 34E, 38E, 42E.

STORIE Mo PROPERTY - 1968 REPORT

by J. F. Ariz

INTRODUCTION

Diamond drilling exploration on the Storie Mo property was resumed in 1968. Eighteen BQWL holes were drilled on 400 foot grid centers totalling 9,304 feet during the period from the first week of June to the end of September. Fourteen vertical holes were drilled north and west of the previously drilled area. Two vertical holes were drilled east of the camp along the 46E line, and two inclined holes on DH #10 site at 52N,30E for geological information.

Reconnaissance geologic mapping was also conducted around the property to check topographic lineaments previously recognized on the airphotos. A review was also made on detailed geology along the old trenches, roadcuts, and outcrops with emphasis on structures. In view of limited time, only a portion of the cores of the earlier more important mineralized drill holes were reviewed.

Strong topographic lineaments observed in the airphotos coincide closely to faults, hence, an office study was done on photogeology of the property and the adjoining areas.

Although results of this year's drilling program for ore does not bring us any further ahead than that of 1966, geologic information obtained now permits better understanding of the nature of mineralization. As a result, a different view of the geology of the property is here presented.

LITHOLOGY

Earlier work recognized two classes of intrusive rocks on the property, Quartz Feldspar Porphyry, and Granite or Quartz Monzonite. At this stage, additional geologic information obtained suggests that the latter consists of two rock units. Megascopic study on the compositions and textu-structural relations between these rocks suggests that they are all quartz monzonites of different ages. They are referred to in this report as Units 1, 2, and 3. (Refer to Map 30-8)

UNIT 1: This quartz monzonite is probably the oldest of the three. Its relative abundance and contact characteristics with Unit 2 indicates that it is older. It is truncated by dykes of Unit 3. This rock is pinkish light-greenish gray and appears medium-grained although it is in fact porphyritic. Phenocrysts of pink orthoclase constitute about one-third of the rock and range in size from one-fourth to one-half inch, and are accompanied by a few phenocrysts of light colored plagioclase and quartz. The matrix is fine- to medium-grained consisting of the above minerals together with biotite and some hornblende. This rock occupies most of the area drilled this year and extends even farther west and northwest. Good outcrops of this rock are found at the gulley below the saddle near Limestone Rock. It is also found to a lesser extent southeast of the trenches along the mid-slope towards Long Creek.

UNIT 2: This rock is mostly pink, rather coarse-grained (referred to as "spectacular granite" or very coarse grained granite in the drill logs), and porphyritic, and is similar to Unit 1 but differs from it in the following respects: (a) The phenocrysts are larger pink orthoclase crystals up to 1 in., and quartz to ¼ in. in size, (b) biotite is in thicker plates or books, (c) hornblende is more prominent, (d) it seems to occur as tabular or lenticular bodies in Unit 1.

Two larger mappable bodies are apparent crossing the center of the property. These are tabular in shape, from 300 to 500 feet thick, dipping in general about 60°N and oriented NE-SW. These bodies are separated by a band of Unit 1 100-200 ft. thick. The hangingwall side of these bodies (north side) show rather marked interfingering with Unit 1, the interfingers varying in thickness from one to several tens of feet.

Unit 3: This rock (Quartz Feldspar Porphyry) occurs frequently in Units 1 & 2 as dykes of varying thickness and diverse orientation, but a major body has been recognized during the first stages of geological studies on the property. This body is also tabular and dips steeply to the north. This year it is suggested that this body has a more easterly orientation along its longer dimension. Its apparent thickness in the vicinity of DH # 1 and #14 is close to 350 feet.

This rock has a deep pink color and is strongly porphyritic. About 15% of the rock consists of phenocrysts ranging in size to ¼ in. diameter in which subhedral quartz predominates over light-colored plagioclase and minor pink orthoclase. The matrix is composed of closely packed fine to very fine-grained crystals of the same minerals and some biotite.

The outlines of these rock units as shown in Map 30-8 are the results of correlation of available surface and drill hole data supplemented by photogeologic information.

GENERAL STRUCTURE

Ground checking on topographic lineaments in the field indicates that prominent lineaments coincide closely with faults, thus giving weight to the belief that other strong lineaments are also faults. On this basis, a review of the photogeology of the property was made with emphasis on structures.

Map 30-7 (½ in. to 1 mi.) is the result of this work which covers the area bounded by Marble Creek at the east, Long Creek at the south, and some distance west and north of Limestone Peak and Granite Creek. In general, 5 groups of strong lineaments, or faults are found in this area:

1. N80E/steep N dip: A group of this type-hence a fault zone about one-half mile wide and extending along strike about three miles starts one-half mile south of Limestone Peak and extends eastward crossing the property, and into the meta-sediments east of the camp. On the property, this fault zone is subdivided into three other lesser groups due to apparent closer spacing of faults at those particular localities, the North, Center, and South Fault Zones. The North Fault may be related to the "Crone Fault" at the gulley east of the camp, and the South Fault to the GSC Fault (from Map 1110A of Memoir 319, McDame Map Area).

2. N60W Faults: This set is rather prominent in the area south of Limestone Peak. The system appears to have

terminated, or cut the N70-80E set above. They extend toward Lang Creek.

3. E-W to N80°W Faults: These are individual faults found mostly north of the property at the west bank of Granite Creek. Some of the larger faults extend into the east towards Marble Creek. Reconnaissance mapping along the ridge northeast of the camp indicates that skarn zones are associated with these faults. It is suspected that this set may also be related to the important Fe-Pb-Zn-Ag mineral deposits in Marble Creek recently drilled by Coast Silver.

4. N45°E Faults: These are observed in two locations: (a) along Granite Creek, and (b) in the camp area. The Granite Creek Fault is rather strong, but those at the camp seem to be minor. It is however suspected that the latter may be shears associated with the larger faults.

5. N-S Faults: These are vertical faults that have developed in certain places along closely sheet-jointed zones. Movements in a counterclockwise horizontal sense have occurred in certain groups of these faults and step-faulting patterns have developed in conjunction with N80E structures. The zone between 30E-34E and 48N-56N is affected by this type. These structure are roughly parallel to the general bedding attitude of the metasediments east of the camp.

Map 30-7A was derived from Map 30-7 to emphasize the more major faults. In the immediate vicinity of the property, an equiangular triangular pattern of faults 2, 4, and 5 is apparent. The western corner of this "triangle" is bisected by the #2 system.

LOCAL STRUCTURE

Map 30-8 summarizes correlation between drilling information, available surface geology, and photogeology. The following are the apparent important structural features in and around the mineralized area of the property:

1. A group of faults trending generally N80E, sub-grouped into three as mentioned earlier:

(a) The North Fault Zone is composed of at least seven individual sub-parallel closer-spaced faults dipping some 55°-60°N. The zone is around 300 feet wide. Three stronger faults between DH #26 and #24 are observed on the surface near DH #42 and #43. These faults traverse interesting mineralization intercepted by DH #26 and #33.

(b) The Center Fault Zone consists of at least 10 subparallel faults mostly dipping generally 60°N, and a few vertical ones. The zone may be 600 feet wide and traverses along what is considered to be the most important mineralized zone in the property at this stage.

(c) The South Fault Zone consists of several steep-dipping faults which are relatively wide-spaced. These traverse along the mineralized zones south of the camp. Drill holes in this area are mostly only 300 to 400 feet deep and overburden is thick, hence information for correlation lesser than the others.

Apparent sense of movement of all these N80E faults is generally south wall moved some short distance east relative to the northwall, but vertical movements are different for each individual fault.

Drill hole interceptions of these faults are generally characterized by "sandy" zones or "clay" zones. The wall rocks are rather intensely fractured or brecciated or possess fracture cleavage, and affected by varying intensities of hydrothermal alteration the most prominent of which are serpentinization and argillization. The same characteristics of the wall rocks are observed on the faults in outcrops at the ridge west of the camp. In the drill cores, it is apparent that quartz and pyrite veinlets are more numerous in the certain rock types between these faults.

The fault zones are indicated in the map to extend to the 42E line, further extension to the east being omitted in view of insufficient data.

2. Faults A-A, B-B and D-D are N10W faults that are rather short. They seem to be pre-mineralization structures.

3. In the drilled area the major jointing direction is N10-20E/subvertical. Several joint sets are seen in the trenches and the road cuts and the outcrops along the ridges and gullies west of the camp. Faulting has developed in many of these joints, most noteworthy of which are those in the block bounded by B-B and C-C-C west of DH #10. Five parallel faults of this type about 100 feet apart traverse through the area.

Lithology and structures obtained from the drill logs are shown in the N-S Vertical sections. Some difficulties were encountered in deciding rock types from drill logs previous to 1966. Fortunately, textural characteristics of the rocks were included in the graphic logs. This information, together with surface mapping data where available, was the basis of distinguishing the rock types which are shown in the vertical sections. Fault fractures are also indicated, but only the more important structures are shown where surface geological information, and to a lesser degree - photogeological information, are available for correlation.

GENESIS

On the basis of present information, the following genetic relations and intrusive activity in the area is inferred:

1. The zone now occupied by Units 2 and 3 may have been tectonically active during the geologic past. Presumably, this was a major zone of weakness and immediately after emplacement of the crystallizing magma of Unit 1, faulting occurred, and these fractures in the solidified mass became the loci of forceful intrusion of Unit 2. This may explain why Unit 2 occurs in tabular forms, and has such occurrences as interfingerings with Unit 1, and also chilled margins of Unit 2 against Unit 1. Crude gneissic texture in both 1 & 2 are found elsewhere that may suggest some degree of mobility during solidification.

2. Further faulting may have occurred again along this zone of weakness at the footwall side of the solidified Unit 2, and Unit 3 was similarly intruded into this fault zone - probably from the same magma chamber. The result is the occurrence of tabular bodies of this unit in both Units 1 & 2; and a larger body south of one of the main masses of Unit 2 (Refer to Map 30-8).

The same effect of these series of events may have been the development of the N80°E fault system, with repeated movements along these faults causing more intense rock fracturing and brecciation. This prepared certain zones which later became the loci mineralization.

ROCK ALTERATION & MINERALIZATION

Textu-structural studies on hydrothermally altered rocks and the ore, both on surface exposures and in diamond drill holes suggest the following paragenetic sequence of deposition: pyrite 1, quartz 1, pink orthoclase, quartz 2, molybdenum, pyrite 2, serpentinization, talc, quartz 3, kaolinization, argillization and gypsum.

Pyritization is widespread in the three rock units. Pyrite and quartz 1 were probably the earliest form of alteration to have affected Unit 1. The pyrite occurs as thin veinlets and irregularly distributed fine disseminates and quartz 1 is grey, massive, and occurs as thin barren veinlets in the rock where walls are not sharp, suggesting some degree of silicification along the veinlet walls.

Pink orthoclase is rather widespread - almost in the same proportion as pyrite. It is present in both mineralized and barren rock but shows higher intensity in Mo mineralized zones. It occurs as bands or envelopes on rock fractures. These bands generally dip -60°, and vary in thickness, from a fraction of an inch to a few feet. It also occurs as irregular patches or blotches especially in highly faulted zones.

The lower temperature forms of hydrothermal alteration that occur with these bands or envelopes are serpentinization, quartz 3, and talc. Invariably the central core of these bands are barren, white, quartz veinlets surrounded by a crust or envelope of talc flakes, and vary in thickness to 1/8 in. This in turn is covered by an envelope of serpentinized minerals the thickness of which varies depending on the intensity of the effect. In certain cases serpentinization was seen to grade into pink orthoclase alteration, and in others, it has masked the orthoclase alteration although blotches of the latter still remain. Kaolinization produces general softening of the rock, and seems to occur mostly in certain zones less affected by pink feldspar alteration. Argillization occurs in the zones affected by intense serpentinization. The effect is also general softening of the rock leaving a dirty light greenish bleached appearance.

Quartz 2 may have been deposited after the pink orthoclase stage. This quartz is light grey in color, has sharper veinlet walls, and the quartz crystals are subhedral to euhedral. It seems that pyrite 2 and the main bulk of the molybdenite were introduced somewhere during the mid-stage of deposition of this quartz.

There is no particular alteration product that is specially related in space with Mo mineralization that could be used as a tool for ore finding. A more apparent practical relationship is the grade or intensity of a combination of all the forms of alteration products affecting a certain zone, in conjuction with the presence of strong and close-spaced N80°E faults. These are observed in the drill cores and certain surface exposures.

CONTROL OF MINERALIZATION

A favorable loci of ore deposition appears to be the intersection of N80°E fault zones with the interfingered zones between either of the three rock types. The fault zones as discussed earlier consist of a group of closer-spaced sub-parallel individual fault fractures. The interfingered zones have "fingers", thin tabular bodies of either of the quartz monzonites mixed in alternating fashion producing a hybrid rock. This zone may have been condusive to more intense brecciation along and between fault walls in the fault zone than a single pure rock type.

The greater bulk of Mo mineralization in the property occurs in quartz veinlets and tight fractures or joints in the rock. Therefore, ore is a direct function of the number of these small structures. Hence the ideal case would then be larger fault zones of closer-spaced fault fractures subjected to repeated movements cutting across the favorable combined rock type.

The important mineralization in this property appears to occur in zones as above-mentioned. The Center Ore Zone has a wider fault zone traversing almost along strike of a relatively wide interfingered zone of Unit 1 and 2.

In the South Ore Zone, some interfingered zones of Unit 1 and 3 occur in the southern contact zone of the main Unit 3 body. Similarly, good Mo mineralization is found at the intersection of the faults with this zone. However, it is suspected that Unit 3 is the source rock of Mo mineralization, hence the occurrence of disseminated Mo further into the rock mass from a contact and diminishing in amount gradually to fresh barren rock. Such is the observation along Trench 40N.

ORE ZONES

Two inclined holes drilled perpendicularly across the suspected dominant trend of Mo-mineralized structures on DH #10 site along the 34E line tend to show that the dominant dip of this fracture is on the average -60°N. This information agrees with surface observations of mineralized structures along the trenches, roadcuts and outcrops. Using this information, ore interceptions in the drill holes plotted in the N-S vertical sections were studied. Correlations were made between drill holes along the strike of the structures and also to the surface. It was found that ore interceptions have their corresponding correlations on adjacent holes along the general trend (N80E/-60N). Good examples of this are shown in N-S Section 22E between DH #26 and DH #33, and also N-S Section 34E between DH #4 and DH #31.

As previously mentioned, the mineralized sections are closely related to major fault fractures. This relationship may be noted by using N-S Sections on Mineralization as overlays on corresponding sections on Lithology and Structure.

This year, a cut-off value of .07% MoS_2 is used against .10% in 1966. This is based on the speculation that this property may be an economic possibility even on this cut-off grade in the future. Sections in the drill holes having average values .07% and above are indicated in the vertical sections. Their extensions along the general trend were plotted in accordance with the trend of structures. These are more appropriately termed as "ore bands" in this report to differentiate them from "ore zones" which are groups of these ore bands. Ore zones are named after the fault zones in which they occur. Thus three ore zones are recognized at present:

1. North Zone (N)
2. Center Zone (C)
3. South Zone (S)

Refer to Map 30-9. The ore bands on this map are projections to the surface taken from the N-S vertical sections. Relationship between these ore bands and rock structure may be observed by using Map 30-9 as overlay on 30-8.

Map 30-9 shows that the major mineralized zone in the property is the Center Ore Zone. In the vicinity of DH #20 the surface-projected ore zone has an apparent thickness close to 400 feet and a possible length of 1800 feet. Depth extensions of the ore bands in this zone were carried a little below elevation 4550' which is 100 feet higher than the elevation of the deepest known ore interception in the property in DH #33.

The major ore band (N-4) in the North Zone is close to 100 feet thick. Extension to the west, based on DH #37, seems to terminate east of the 18E line, but extension to the east remains to be proven.

At the South Zone, Trench 40N cuts along a portion of the major ore band which was encountered at shallow depth by DH #1. However the thickness of this band is unknown. Blast holes in the area north of and near DH #1 indicates good Mo mineralization. Perhaps a wider band than 30 feet may exist here.

Several other narrower bands are shown in the map, some of them inferred.

Remark is made at this point that many of the ore bands as now outlined are based on core sampling where fill-in samples are needed, where only high-Mo sections were sampled. With fill-in sampling of cores, a more accurate estimate of ore values could be made, and the grade would be expected to increase.

Moreover, remark is also made that in most of our drilling work, core recovery is rather low in the high Mo sections drilled. This was because good Mo mineralization coincides with highly altered and brecciated zones. Hence the assay values are not truly representative of the sampled sections although they probably tend to lean on the conservative side.

TONNAGE AND GRADE ESTIMATES

"Drill-indicated ore" is defined as ore intercepted by diamond drilling and is considered to extend, within each ore-band, in all directions to a distance of 200 feet, except when geologic information is available to justify further extension beyond this limit. "Inferred ore", is ore indicated by projections along structures and trend, of ore bands from adjacent drill holes, beyond 200 feet where geologic information is insufficient to classify it as drill indicated.

To facilitate calculations each ore band is named according to ore zone location and number, thus, C-1 for the first band in the center ore zone, C-2 for the second band, etc.

Two open pits with walls at -55° inclination were outlined for tonnage estimates. These are shown in Map 30-10 and

N-S Sections on Mineralization 22E to 34E. The main pit on the Center Ore Zone has a surface opening about 1200 feet wide and 1750 feet long. The bottom is a horizontal surface taken at elevation 4550 feet. The maximum pit depth at 34E is 480 feet and at 26E, 740 feet.

No. 2 Pit is for the North Ore Zone. This has a rim about 650 feet wide and 800 feet long. The bottom is also a level surface taken at elevation 5050 feet or 500 feet higher than the main pit bottom level.

At present, due to apparent high wast-to-ore ratio, the South Ore Zone is exluded from this tonnage estimate. Most of the ore bands indicated in this zone are inferred.

The calculations are presented in tabulated form on the following page. The total tonnage potential of the two pits combined is 21.7 million at .109% MoS_2 with a wast-to-ore ratio of 1.34. The density factor used is 12 cu. ft. per ton.

The above tonnage potential may be increased more than 50% if inferred ore is entered in the calculation.

J. F. Ariz

TONNAGE & GRADE ESTIMATES

MAIN PIT - CENTRE ZONE

BLOCK I

Ore Band	End Area East	End Area West	Avg. Area	Avg. Length	Volume	Tons	Est. % MoS_2	1000 Tons x % MoS_2
C-1	111,180	122,080	116,630	330	38,487,900	3,207,000	.131	420.117
C-2	5,026	5,606	5,316	345	1,834,250	153,000	.10	15.300
C-3	64,770	73,660	69,215	345	23,879,175	1,990,000	.096	191.040
C-4	3,600	4,300	3,950	340	1,343,000	112,000	.077	86.240
C-5	2,720	3,200	2,960	340	1,006,400	84,000	.09	7.560
C-6	3,100	3,800	3,450	345	1,190,250	99,000	.072	7.128
C-7	1,000	1,250	1,125	355	399,375	33,000	.17	5.610
					BLOCK TOTALS	5,678,000	.129	732.995

BLOCK II

Ore Band	End Area East	End Area West	Avg. Area	Avg. Length	Volume	Tons	Est. % MoS_2	1000 Tons x % MoS_2
C-1	37,520	42,210	39,865	355	14,152,075	1,179,000	.092	108.468
C-3	96,900	110,200	103,550	365	37,795,750	3,150,000	.097	305.550
C-8	7,200	12,000	9,600	400	3,840,000	320,000	.073	23.360
C-9	3,000	4,400	3,700	400	1,480,000	123,000	.089	10.947
					BLOCK TOTALS	4,772,000	.094	448.325

MAIN PIT - CENTRE & NORTH ZONE

BLOCK III

Ore Band	End Area East	End Area West	Avg. Area	Avg. Length	Volume	Tons	Est. % MoS_2	1000 Tons x % MoS_2
C-1	15,330	17,430	16,380	400	6,550,000	546,000	.106	57.876
C-2	7,200	8,200	7,700	440	3,388,000	282,000	.083	23.406
C-3	137,340	159,140	148,240	530	78,567,200	6,547,000	.098	641.606
N-10	7,380	9,540	8,460	540	4,568,400	381,000	.094	35.814
N-11	12,960	17,280	15,120	535	8,089,200	674,000	.154	103.796
					BLOCK TOTALS	8,430,000	.102	862.498

NO.2 PIT - NORTH ZONE

Ore Band	End Area East	End Area West	Avg. Area	Avg. Length	Volume	Tons	Est. % MoS_2	1000 Tons x % MoS_2
N-1	1,800	2,050	1,925	460	885,500	74,000	.08	5.920
N-2	3,600	4,050	3,825	495	1,893,375	156,000	.19	29.640
N-3	6,300	7,200	6,750	520	3,510,000	276,000	.08	22.080
N-4	33,920	40,280	37,100	540	20,034,000	1,669,000	.112	186.928
N-5	1,200	1,500	1,350	565	762,750	63,000	.08	5.040
N-6	1,300	2,800	2,050	560	1,148,000	96,000	.11	10.560
N-7	800	1,400	1,100	555	610,500	509,000	.11	55.990
N-8	500	1,000	750	535	401,250	33,000	.10	3.300
					BLOCK TOTALS	2,876,000	.111	319.458

GRAND TOTALS --------- 21,756,000 .109 2363.276