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REPORT ON THE GEOLOGY
OF THE CLAIMS OF THE
WESTERN EXPLORATION CO. LTD
SILVERTON, B. C.

To
Mr. A. M. Ham, Manager,
Silverton, B. C.

By Charles C. Starr,
June 12, 1937.

INTRODUCTION: The area covered begins at 1-1/3 miles east of Silverton, B. C., in the Slocan Mining Division, and extends 2 3/4 miles eastward to the Carnation and Wakefield Mines over an area about 1 1/2 miles wide. The area covered is nearly 2000 acres, ranging from 2300 to 7200 feet altitude, and comprising the following well known groups, as well as a number of less known claims: - Emily-Edith, Standard, Alpha, Echo, Midnight, Prescott, Cliff, Mowich, Mammoth, Buffalo, and parts of the Jenny Lind and Wakefield.

The data is platted on a topographic map prepared for the Western Exploration Co. Ltd. in 1936. For general geology and other data see Memoirs 173 and 184, by the Geological Survey.

Considerable parts of the area are covered with soil and thick brush up to about 6000 feet elevation. Except for a few considerable areas, rock outcrops are reasonably frequent, but often small and not continuous. There is a rather general tendency for rock contacts, ~~and~~ veins, and shear-zones to be softer than the surrounding rocks, and therefore covered. It was found difficult to trace veins and shear-zones definitely because their ~~different/outlet~~ outcrops are often widely separated, the intervening ~~areas~~ ^{Sections} being covered with soil.

ROCKS: The chief rocks of the area are the Slocan series of argillites, quartzites, and tuffaceous sediments, ~~Of these the argillites are the most prominent, and range from siliceous to calcareous, occasionally to impure limestones.~~ which are of Triassic age. The series ~~have been~~ are underlain by the Nelson Granite batholith, and cut by ~~its~~ tongues and dikes from it.

Slocan Series The series consists of slates, argillites, quartzites, ~~and~~ impure limestones, and tuffaceous sediments.

Argillites, varying from silicious to calcareous, are the most common and are generally semi-massive. Locally, quartzites form bands of considerable width. Limestones are generally quite impure and might more properly be called "calcareous argillites" than "limestone" in most cases. They have a tendency to occur in lenses ~~and to be~~ of limited length. The various members of the series are not platted separately on the map herewith.

P A broad belt consisting chiefly of quartzite passes through the southeast corner of the Tram Fr. claim, crosses the claim just south of the tramway break-over, passes through the Goodwin claim, near the northwest corner of the ^{Minoru} ~~John~~ claim and on to the northwest. ~~on the north margin of the map.~~ There is some calcareous

argillite and ~~lenses of~~ impure limestone along the margins of the quartzite belt. ~~Quartzite also occurs at many other places~~

~~but is narrower and less prominent,~~

A second prominent belt of quartzite ~~starts~~ begins along the west side of the Monarch claim, passes through the center of the John claim and ~~on~~ northwestward to the bluffs at the margin of the map. More indefinite belts of quartzite occur at various points in the area.

P A dark fine grained rock of porphyritic appearance outcrops along the east part of the Minoru claim, and to the northwest, and appears to be interbedded with the argillites.

This is probably tuffaceous material which was deposited with the argillites. There are other minor occurrences in various parts of the map area.

Granite and Granite-porphry:

~~and~~ ^{and granitic-porphry} Tongues, and dikes, and sills of granite (and quartz-diorite) occur in the map area. They are most common in the southwest corner, where they are closer to the main intrusion. The larger bodies are distinctly granitic in texture, while in the narrower dikes and sills they are more

porphyritic; there is also some variation in composition. ~~They~~
~~are~~ They are undoubtedly closely connected with the ~~granites~~
 underlying granite mass, in origin, ~~if not~~ ^{actually} feathering
~~part~~ of the batholith itself. Occasional ~~dikes~~ narrow
 dikes, or parts of dikes, are very fine grained and entirely ~~por~~
 porphyritic; it is believed that these represent the more quickly
 cooled parts of the same magma.

These dikes are, in detail, much more irregular than shown ^{on the map,}
 often splitting up into small irregular stringers ^{a few inches wide} which may
 penetrate the argillites for some distance. Contacts are often
 concealed by soil and exposures ^{are} often a considerable distance apart.

There is no doubt that there are many small dikes which have not
 been found ~~at all~~ ^{and mapped.}

Andesitic Dikes: There are a few dikes, mostly ~~local~~ ^{local} north and
 south of the Standard claim and presumably crossing it, although
 not exposed on the surface, which are more basic and generally finer
 grained than the granitic-porphyry dikes. They have some points
 of resemblance to both the granitic-porphyry and to the tuffaceous
 beds of the Slocan series. They are definitely dikes ~~or~~ sills,
 and distinctly porphyritic, and therefore later than the Slocan series.

Since they are nowhere in contact with the granitic-porphyry
 dikes their relative age is uncertain, but certainly previous to
 the mineralization.

Lamprophyse Dikes: Very few dikes of this type were noted.

They are basic dikes ~~with~~ containing considerable mica; they are
 probably younger than the other dikes, but whether younger than the
 veins is not known.

STRUCTURE: The Slocan series has been strongly folded ^{and broken} and,
 in many areas, much crumpled. In much of the area it is impossible,
 on account of lack of sufficient exposures, to work out the structure.

in detail. Dips and strikes of the bedding planes in the better exposed areas are shown on the map and suffice to give a general idea of the structure, excepting the local crumples.

Near the eastern end of the map area a ^{sharp,} sinuous anticline enters the eastern part of the Buffalo claim, passes through the west side of the Gem, ~~and~~ Moose, and Highore, the center of the Jim, and thence northwesterly to the edge of the map. This anticline is complicated by many crumples, ~~and~~ domes, etc. Another more gentle and less definitely marked anticline passes through the south end of the Tram Fr. claim and the Alpha.

The formation has a general northwest-southeast strike, but locally the strike may be in any direction.

No evidence was noted indicating that the folding has had any definite influence in the localization of the orebodies.

Faulting: There has undoubtedly been a great deal of pre-mineral faulting, but it is almost impossible to ~~determine their~~ ^{determine their} movements on account of lack of markers. The veins and lodes now occupy the planes of many of these faults. There has apparently been very little post-mineral faulting, except ~~possibly~~ probably some continued movement along the ~~same~~ planes of the lodes.

LODES and VEINS: By "lode" is meant any single body of fractured ground in which a vein occurs or is likely to occur. "Vein" means any single body of minerals developed along a fracture. By "shear" is meant any fracture in which movement has occurred along several parallel planes. Under these definitions "lode" and "shear-zone" are nearly synonymous.

P Throughout the Slocan there are numerous lodes which can be traced for long distances and which show considerable movement in a wide zone of ~~z~~ crushing and shearing; they are often accompanied by thick carbonaceous ^{or graphitic} gouges. Veins occur in these lodes, usually approximately conforming in strike and dip, but ~~so~~ in the case of a wide lode sometimes running diagonally

~~xxxxxxx~~

across it. A considerable number of lodes are known in the map-area, many of them small and perhaps better called shear-zones. Since, from their nature, they are softer than the enclosing rock they are very frequently covered with soil and often outcrop only at considerable intervals; the correlation of the different outcrops is therefore sometimes uncertain.

DESCRIPTIONS OF CLAIMS: J.I.C., Jenny Jones, Arena Fr., Anacortes, and Crescent: 082F NW 180 These claims lie on low flat ground and show

scarcely any outcrops. It is probable that the underlying rock is argillite with occasional granitic-porphry dikes; there is no evidence of mineralization.

Un-named ground west of J.I.C. claim: A rather weak vertical shear-zone six or eight feet wide strikes N 60°E, and has been opened by three tunnels. The upper tunnel is about 50 feet long and shows weak mineralization; there are a few pieces of ore on the dump showing galena. The middle tunnel is caved, but also shows a few pieces of galena ore on the dump. The lower tunnel is 20 ft. long and is at one side of the shear-zone. The rocks are argillites with quartzite bands, and an andesitic dike outcrops a few hundred feet to the eastward. ✓

Buck Fr. Claim: East of the northwest corner of the claim there are two short caved tunnels and several open-cuts, all of which are caved. The dumps show very weak mineralization.

A few hundred feet south of these workings there are two tunnels, about fifty feet apart vertically. The face of the upper tunnel was not reached, but the crosscut follows a very weak shear running N 8° E. The dump shows weak to medium mineralization and a few spots of lead and zinc. The lower tunnel shows very weak mineralization throughout, but no definite vein or shear.

The workings are in argillite with a large body of granite lying a little to the south. These workings lie very closely on the strike of the Emily Edith lode.

Silverton Boy Claim: There are two short caved tunnels and some ground sluicing on, and near, the argillite-granite contact. No mineralization or definite shear can be seen.

Eagle, Eagle Fr., and Mohawk Claims: There is no known mineral although they should contain the extension of the Emily Edith lode showing on these claims. They are underlain by both argillite and granite, the ~~contacts~~^{surface} being badly obscured by soil.

Midnight Claim: There are four short tunnels on the property, of which two are caved. The third tunnel is about 75 feet long on a weak shear striking N 40°W and dipping 50° southwest. The tunnel shows a little quartz and calcite in a three foot shear, but no ore minerals were noted. The fourth tunnel is a crosscut^{designed} to enter the shear at 125 feet lower elevation. The upper workings are on ~~and~~ or near the argillite-granite contact. The exact positions of the contacts throughout the claim ~~is~~^{are} obscured by soil.

Iron Clad Claim: Two open cuts are caved and there is no evidence of mineralization. Contacts are approximate only.

Prescott & Prescott Fr. Claims: There are two tunnels on the Prescott claim, the west one being caved. The second tunnel runs into the hill N 45° W for about 40 feet. A little stoping has been done on a nearly flat vein, or lense, of ore near the contact of the ~~the~~ argillite and granite. A large band of calcite shows in the stope along the contact. The open-cut to the eastward is in granite.

Centaur Claim: There are two open cuts in argillite showing no mineralization, and a 30 foot tunnel on the granite contact also without mineralization.

Cliff, Cliff Fr. & Cliff Ext. Claims: ^{On the Cliff claim} there are two ^{shallow} inclined shafts on the vein, and a tunnel at about 60 feet lower elevation.

The shafts are on a four or five foot vein and shear showing quartz stringers with a little galena and sphalerite, and a weak graphitic gouge. It is a fairly good looking small vein. The tunnel is about 200 feet long, of which about 80 feet is on the vein.

The vein strikes east and west and dips 50° northward. In the tunnel the vein is about four feet wide, with six to ten inches

of quartz carrying some galena and sphalerite. A little stoping has been done. A little weakly mineralized quartz float was found near the center of the Cliff Ext.; this may or may not represent the eastward continuation of the vein.

W.H.R. Claim: This claim is mostly covered with soil. Some ground-sluicing has been done near the west side and some chunks of quartz showing occasional specks of galena exposed. Soil has fallen in so that it is now uncertain whether the quartz is in place or is float.

Gordon Claim: A weak shear showing traces of graphitic gouge and mineralization crosses the road on the southwestern part of the claim.

Further up the hill, near the center of the claim, there is an outcrop showing a weak shear with no traces of gouge but a few narrow quartz stringers. It is probable that this is a continuation of the shear showing in the road, and it may be the continuation of the Cliff vein, although this is far from certain. The Cliff vein dips to the northward, and the showings on the Gordon appear (indefinitely) to dip south. An irregular granitic stock outcrops along the western side of the claim.

082FNW180 Emily Edith & Shunieu Claims: There are very few outcrops on ~~the Emily/Edith~~ either of these claims, although extensive workings, now nearly all caved, show that the Emily Edith-Standard-Alpha lode passes through them; the portals of No. 7, 7A, 7B, 7C, and No. 8 tunnels being on, or just south of the Emily Edith claim. Caving over No. 7 tunnel, near the portal, indicates the position of the lode at that point. It is then concealed by heavy overburden for 1500 feet ^{eastward} to near the portal of No. 6 tunnel, where an open cut shows ^{seven} (plus) feet of fairly mineralized vein matter. Since No. 7, and all lower tunnels are caved and inaccessible the lode and veins cannot be accurately projected to the surface, the position as shown ^{on the map} is

approximate only. For the same reason no opinion can be formed as to whether the Emily Edith lode is a separate shear intersecting the Standard, or whether it simply represents a bend in the Standard, - a matter which has been the subject of some argument.

There is no indication of the presence or absence of the lode to the westward of No. 7 tunnel.

Standard Claim: Whether due to an intersection or a turn, the Emily Edith lode is continuous into the Standard claim. While it does not outcrop on the Standard it can be located approximately by projections from the mine workings, as shown on the map. The sharp turn shown on the map in the vicinity of No. 3 tunnel is largely due to the rather flat dipping lode cutting steeper surface contours, rather than to any great change in the strike, There are no lode outcrops on the Standard claim and comparatively few rock outcrops.

Two andesitic dikes enter the south end of the claim but are soon lost under overburden.

Alpha ~~Claim~~ and Suprise Claims: The Standard lode is continuous through the Suprise and Alpha claims, widening to more than two hundred feet on the Alpha where it is marked by unusually heavy graphitic gouges, numerous short narrow veins, and little commercial ore. Somewhat less than half of the workings are now accessible and have been briefly examined; they do not look favorable for finding much ore in the Alpha ground. Comparatively massive argillites are the chief rocks ^{on} of the two claims, and seem to form a gentle anticline having a northwesterly strike.

Lost Bear Claim: There is no mineral showing on this claim.

The rocks are argillites, cut by several andesitic dikes.

0826 NW 061 Echo Claim: Continuing from the Alpha, the Standard lode can be traced across the Echo claim to the edge of the map at the Tiger slide.

On account of the change in the surface contours the lode outcrops nearly on its normal strike, - N 60° E; the dip is about 45° southward.

The claim is credited with a production of \$107,000 from 815 tons of ore. The rocks are chiefly argillites and calcaeous argillites with some quartzite; they strike northwesterly and dip to the northeast.

Robin & Goodwin Claims: A small shear and vein has been opened by three tunnels on the Robin claim, and by two opencuts on the north end of the Goodwin claim. The western tunnel is caved but appears to have been some 200 feet long. It starts on a rather weak fissure running N 70° E and dipping 65° south; it shows some quartz and calcite mineralization but no ore minerals were noted on the dump; the vein has not been found to the westward. Two hundred feet to the eastward there is a second caved tunnel with, apparently, an entirely similar showing.

A hundred and fifty feet further east a short tunnel shows a three foot vein and fissure with quite narrow gouge, some quartz and calcite and a very little galena. The vein looks stronger and better in this tunnel than further east. From this tunnel eastward to the cuts on the Goodwin the vein is covered. These cuts show the fissure but little mineralization. ~~Westward of the first mentioned tunnel the vein has not been found~~

Minoru Claim: The Robin vein and shear continues into the Minoru claim and shows in the Standard slide. On the west bank it has been opened by a small cut showing a four or five foot shear with a little quartz and other weak mineralization in yellow weathered rock, probably quartzite. In the slide the shear is about ten feet wide with quartz and calcite mineralization, close to where it cuts a granitic-porphry dike. To the eastward the course of the vein is under cover for a long distance.

John Claim: A number of open cuts have been dug near the west side of the John claim, apparently in search of the Robin-Mimoru vein. None of them have exposed the vein but in some of the more northerly ones ~~is~~ soft black soil, suggestive of a graphitic shear has been found.

claim. On the first ridge east of the slide there is a little quartz float which likely marks the eastward continuation of the vein.

Also, a few hundred feet further up the slide there is a small spot of outcrop showing small quartz and calcite seams; there is no evidence of any important shear. ~~Next to the south side of the claim~~

~~At the south side of the claim and just over on the Mammoth claim the vein has been opened up in the slide by ground-sluicing and by No. 3 $\frac{1}{2}$ tunnel. It shows twenty feet or more of sheared and weakly mineralized argillite. An intersection is indicated on the map at this point; while it cannot actually be seen it is evident that an intersection occurs, close to ^{the point indicated,} ~~the~~ between the John vein and what may be called the Monarch vein. Eastward of the intersection~~

~~the outcrop of the lode, known as the Mammoth vein, swings sharply northward up the flank of the ridge on to the Highore claim.~~

Highore Claim: On the Highore claim the lode crosses the ridge at elevation 6100 where a small cut shows coarse quartz and calcite float with silicified argillite, thence it swings sharply southward to the exposure in the ground-sluice near the old portal of No. 2 tunnel. It is very poorly exposed in the slide just east of the tunnel and has not been definitely found to the east of that.

Just over the line on to the Jenny Lind Claim a few pieces of quartz float have been found on the point of the ridge, and at three hundred feet south-east there is a weak appearing soft zone with tiny quartz stringers in argillite having about the proper strike and dip for the Mammoth vein. There is considerable doubt whether this is the continuation of the Mammoth lode or not, for projections made from the dip and strike of the vein in No. 2 tunnel indicate that the outcrop should be ~~found~~ a hundred and fifty feet north of the point where the float is found.

and Hecla Claims: lode
Monarch/Claim Returning to the/intersection near the northwest corner of the Mammoth claim, mentioned above under "Hercules", the south branch has been developed in the tunnel ^("west tunnel") driven some years ago by the Standard Silver Lead Co. Ltd.; ~~and~~ it is also exposed in the slide to the west of the tunnel, where it appears as a rather weak shear with slight mineralization. West of this point the vein has not been definitely identified. A little quartz float on the ridge near the southeast corner of the Hecla ^{or might not} might/represent the vein. Beyond that the argillites are somewhat altered but show no definite mineralization or shearing, and no vein was found in the saddle near the ^{southwest} corner of the John claim, *although one might be buried.*

Jim Fr. and area north of Robin, Minoru, and John Claims: This area is ~~most~~ in good part covered with thin soil; ~~no~~ little mineralization or other items of interest were noted. There are a few open cuts which show nothing of interest, and a few ~~gr~~ dikes which cannot often be traced ~~far~~ far. There is in places considerable quartzite interbedded with the argillites.

On the Jim there are several small tight quartz stringers, and some float at various points, which seem to be of no importance. Toward the southeast corner there is a very small exposure of brecciated argillite with some calcite; it is probably in place but no dip or strike could be obtained.

Opatunka and Jack Fr. Claims: On ~~the~~ a saddle ~~of~~ in the main ridge on the east end of the Opatunka claim there is a ~~strong~~ strong shear, with four to six feet of calcite and a little quartz, which ~~is~~ exposed in a large open cut. Several other open cuts in the vicinity did not cut the vein. The vein strikes N 37° E and dips 45° southeast, but has not been definitely located elsewhere south of the divide. A few coarse pieces of calcite float show on a small ridge about 200 feet to the southeast, and some

300 feet further there is a spot of well silicified argillite with small stringers of calcite and quartz, apparently having approximately the same strike and dip. It is probable, but not certain, that this is in place. A few feet to the north and west of this there are several large boulders of barren white quartz one of which might weigh upward of twenty tons. At 7100 elevation there is a small cut showing a foot of calcite; this is believed to be a lense or at most a very small vein. On the Jack Fr. there is a ^{vague} soft sheared zone covered with soil which has the attitude and position for a continuation of the Opatunka vein.

Mammoth Claim: The outcrop near the northwest corner of the claim has already been mentioned under "Hercules". Most of the workings of the Mammoth mine are on this claim but there is little ~~surfa/ce~~ showing on the surface. There is a weak shear and mineralization in the slide just west of camp, but as it has not been found elsewhere it is probably of ~~Y~~ small extent.

The northerly extension of the Buffalo vein appears in No. 1 and No. 4 tunnels, but was not found on the surface except ^{at} forty feet west of the ^{east} portal of No. 7 tunnel, where it appears as a fracture and silicification in the argillite.

Moose and Gem Fr. Claims: Near the east end of the Moose there is an unimportant showing of calcite and quartz stringers in the bedding planes of the argillites, but no definite shearing.

There is no known mineralization on the Gem.

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Buffalo Claim: The Buffalo vein shows as a weak, poorly exposed shear in the slide just above the upper tunnel; it strikes N 5° E and dips 55° east. It has been developed in the lower tunnel for about 200 feet. Here, it is a rather weak shear three or four feet wide with small stringers of quartz and calcite. No ore is now visible on the level but a small production has been made.

with a trace of mineralization
 There is also a weak shear in the first slide south of the tunnel which probably is the continuation of the vein.

Tick, Fly, & Monarch Fr. Claims: There is no known mineralization on the Tick and Monarch Fr., and only a ^{very} weak shear with traces of mineralization near the north end of the Fly claim.

Mowich Claim: A weak shear with 1 to 4 inches of quartz, and little other mineralization, cuts across the road at two places near the south end of the claim. What is apparently the unmineralized continuation of the shear, shows under the tram tower, but it has a steep dip to the north instead of to the south as at the road. This shear appears to be of little importance.

Gnat and Tram Fr. Claims: The only mineralization noted is some quartz which is poorly exposed in a cut near the west end of the Tram Fr. As at present exposed it is impossible to tell the dip and strike, or to say if it is accompanied by any shearing.

It is possible that it may be the continuation of the Gordon shear, but there is nothing to indicate that it is. A considerable belt of quartzite passes through these claims, and considerable granite-porphry outcrops on the Gnat but the contacts are often concealed by soil.

Paige Claim: No mineralization was found on the Paige claim except a short three foot "frozen" vein of barren quartz which is of no importance. Near the northeast corner of the claim a weak apparently unmineralized shear follows the bed of the slide for a short distance. Old maps show a vein near the south center of the claim in the bottom of the slide. This was not found; it may be under snow as there is still some left at this point.

Two irregular stocks of granitic-porphry outcrop near the slide.

^{082E NW 183} Jennie Lind, Beaver, Cazabazua, and Wakefield Claims: ^{082E NW 059} The Carnation-Wakefield lode passes through all of these claims and has been opened at reasonably close intervals.

This lode extends from the north side of the divide and can be followed for well over a mile. It strikes around N 50° E and dips from 45° to 15° southeast, the flatter dips being on the south end. The lode is a strong shear, with graphitic gouges, varying from ^{five} ~~twenty~~ to sixty feet in width and, at the south end, closely coincides with the strata in dip and strike. It contains much calcite in large, sometimes overlapping, lenses and a little quartz, besides small veins of galena, sphalerite, and grey copper. There appear to be a number of separate veins in the lode. Numerous tunnels have been driven on the lode and a considerable production made.

RESUME' OF LODES: The Standard ^{is very strong and} ~~is~~ traceable from the Emily Edith claim to the north border of the map ^{and, according to report, far beyond.} The strike varies from S 85° E at the Emily Edith to N 60° E at the north end, and the dip from 40° to 60° southeast, the sinuous outcrop being due largely to the changing contours of the hillside. The lode is credited with a production of \$10,940,000 up to 1933. The Robin-John-^{Maple} ~~Highway~~ lode (assuming that it is continuous as believed) is a medium strong lode appearing to weaken somewhat at the west end where it has a strike of N 70° E and dip of 68° south; toward the middle the strike is practically east and west with a 65° dip south, and at the east end the strike is very slightly south of east and the dip 45°. No production has been made.

The Monarch Lode strikes N 80° E and dips 65° south. It is comparatively short and weak. Part of a carload of ore was produced.

The Opatunka lode strikes N 40° E (approximate) and dips 45° southeast. It appears to be a strong lode but cannot be traced but a short distance. No production known.

The Carnation (Jenny Lind-Wakefield) lode is strong and persistent. It strikes N 50° E and dips 15° to 45° ~~south~~ southeast. It has produced about \$104,000.

The Buffalo Lode is rather weak and narrow; it strikes N 10° E and dips 50° to 60° east. It has produced about \$18,700.

The Mowich lode is small and weak and scarcely worth noting; the strike is N 40° E and the dip rather indefinite, but steep.

There is no production.

The Cliff lode is ~~small~~ rather small and indefinite in its extensions; it strikes N 80° E and dips 50° north, approximately.

The production, if any, is small.

LODE INTERSECTIONS: The intersection of the Emily-Edith and Standard lodes (assuming ~~that~~ that they are separate lodes) has been partially developed without particularly good results.

The Robin-John-Mammoth lode can only be traced ^{to} within 1700 feet of the Standard lode, the intersection is therefore liable to vary considerably from the calculated point, which is about 150 feet north of the Surprise tunnel. The projected position of the Robin lode on the level of the No. 4 tunnel of the Standard is hundred and fifty some ~~two hundred~~ feet north of the face of the level. ~~That~~

Three hundred feet of drifting northeast on the vein from the face of No. 4 tunnel should reach the intersection with the Robin lode according to the projections. However, as the projections are long there may be 100% error in this footage.


There is only one vein opened in the Standard-Alpha workings which seems to have any possibility of being the Robin, - this is a three foot vein with ^{fair} ~~medium~~ mineralization in a medium shear in "V" tunnel of the Alpha. Its strike and dip would project it to the proper position under the Robin tunnels, but the Robin vein would have to change considerably in strike to reach the "V" tunnel workings.

As mentioned before, it is believed that the Robin lode is the same as that in the center of the John claim; if not, it undoubtedly is the Monarch lode which is presumed to extend through the Hecla claim, and these two intersect near the northwest corner of the Mammoth. The combined lodes have been developed by the main Mammoth workings; the Monarch branch has been developed

by the West tunnel (on the Monarch claim), but the John branch has not been developed, ~~separately~~. According to the observed dips and strikes the line of intersection will pitch 25° westward, but a small variation in dip or strike will change the pitch of the intersection greatly.

The Buffalo-Mammoth intersection has been developed in the Mammoth workings, and while ^{the actual intersection} ~~it~~ is not very clear, it is quite certain that the large orebodies on levels 5, 6, and 7 are due to it, - at least in part.

P The ^{location of the} probable ~~intersection~~ of the Mammoth and Opatunka lodes is very vague. Using the strike and dip obtained in the cut on the summit, the ~~lode~~ lode should intersect the Mammoth on the surface at about the portal of No. 2 tunnel. If the vein outcrop goes just below the quartz Boulders (as sketched on the map) it will intersect the Mammoth in the southwest corner of the Hercules claim; - that is the intersection may be anywhere for a distance of 2000 feet. It will be necessary to determine the dip and strike of the Opatunka lode more accurately by digging, or some other method, before any close estimate can be made.

P The intersection of the Mammoth and Jenny Lind-Wakefield lodes is also indefinite, but somewhere around ~~the~~ the southeast part of the Jenny Lind claim; ~~there was~~ no indication of it ^{was} found. 

The probable intersection will be off the ground owned by the Company, and will rapidly get further away with depth.

P The Cliff and Standard lodes should intersect at about six hundred feet vertically below the Standard No. 6 level opposite the Cliff workings; eastward of this the intersection will be at somewhat greater depth.

RECOMMENDATIONS:

Conclusions based on long projections, which are as a rule unavoidable in this area, are subject to ~~some~~ serious error and especially so when, as is often the case, the data on which the projections are based are themselves subject to considerable error, as when dips and strikes are ^{from necessity} taken over quite short lode exposures.

The most important preliminary work is, therefore, to trace the course of the outcrops from a known outcrop toward an expected intersection. With this in mind I would recommend ⁽¹⁾ trenching across the course of the Robin lode on the ridge along the east sideline of the Alpha claim.

When the lode is found, trenching should be continued to the southwest along its course.

(2) I would, with some hesitation, recommend the driving of a prospect tunnel on the Robin-John vein eastward from the Standard slide (northwest corner of the Minoru claim). This is an impossible location for winter work, but otherwise would seem justified.

(3) Trenching should also be done across the presumed course of the Robin-John vein near the northeast corner of the Minoru claim. This is an area of generally thick overburden, but the present cuts there show that some shallow areas can be found.

(4) Trenching should be done to determine more definitely the dip and strike of the Opatunka lode. The first work should be done quite close to the ~~work~~ cut on the divide to definitely determine the direction the outcrop runs; ^{and on the showing below the quartz boulders;} later, trenching should be done along the apex of the ridge near the west sideline of the Highore claim.

(5) Some trenching also might be done to advantage across the course of the Monarch-Mammoth lode on the ridge at the northwest corner of the Monarch claim. (6) There is also a possibility of locating this lode by trenching in the depression crossing the ridge 250 feet northeast of the northwest corner of the Hecla claim.

The John-Mammoth lode looks sufficiently strong both at the center of the John claim and in the slide at the southwest

corner of the Hercules to justify some exploration, and I would recommend ⁽⁷⁾the driving of a prospect tunnel westward from the bottom of the slide, starting at such an elevation that it could ~~later~~ ^{underground} be connected up with the West tunnel (old Standard workings) for winter work if found advisable later.

P Some type of electrical prospecting instruments might prove valuable in tracing the lodes and locating ore in them.

It would be well to enquire into the capabilities of the various better known ~~types~~ devices, with especial reference to their ability to trace the graphitic-shears, and their cost of operation. Most of them are more or less successful in tracing sulphide orebodies, but there is some question as to their tracing the graphitic lodes where there are little or no sulphides. All of the map area not immediately adjacent to the undeveloped ^{or projected} portions of the ~~lodes~~ various lodes may be eliminated from an electrical survey.

The areas requiring survey are:- Emily Edith lode west of No. 7 tunnel; Robin lode between the Standard lode and the Hercules claim; Mammoth lode east of No. 2 tunnel; and the Opatunka lode between the divide and the Mammoth-John lode. Possibly the Cliff lode might also merit attention.

P The porphyry, both in the Standard mine and throughout the Slocan, seems to be favorable for ore and, other things being equal, development in its vicinity is to be recommended. Porphyry is present close to most of the development recommended, - probably more porphyry than has been located on the surface.

Little or no porphyry was found on the surface over the Standard mine workings, presumably on account of soil cover, but much porphyry occurs in the workings near the orebodies and is often replaced by ore.

~~When the contents of the country~~
P ~~part~~ The lodes have a strong tendency to occur in depressions, ^{overburden} and in trenching the deepest ~~cover~~ is most apt to have a lode underneath.

It does not seem advisable to do any work at the present time ~~to do any work~~ in the Standard Mine to discover its intersection with the Robin lode. For one thing there is much doubt as to just where the Robin lode is with respect to the Standard workings, and for another thing it would be expensive to put the workings in safe condition for working, except in the case of No. 6 level which ~~appears~~ is probably too deep.

Cliff lode might also merit attention.

P- The porphyry, both in the Standard mine and throughout the Slocan, seems to be favorable for ore and, other things being equal, development in its vicinity is to be recommended. Porphyry is present close to most of the development recommended, - probably more porphyry than has been located on the surface.

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~~Whenever the surface of the lode is~~
P- ~~perit~~ The lodes have a strong tendency to occur in depressions, and in trenching the deepest ^{overburden} ~~cover~~ is most apt to have a lode underneath.

It does not seem advisable to do any work at the present time ~~to do any work~~ in the Standard Mine to discover its intersection with the Robin lode. For one thing there is much doubt as to just where the Robin lode is with respect to the Standard workings, and for another thing it would be expensive to put the workings in safe condition for working, except in the case of No. 6 level which ~~appears~~ is probably too deep. Work could be done on the easterly striking vein in the "V" tunnel of the Alpha with little preparation, but is hardly to be recommended *until the Robin vein has been traced westward on the surface.*

In my report on the Mammoth Mine, earlier this year, I recommended that the No. 4. level be driven westward, in preference to other levels, to develop the vein to the westward.

It now seems better to use the No. 7 level as the main exploration level, ~~xxxxxxxx~~ for the following reasons:- No. 4 is not now as far west as No. 7; it would only be a short distance below No. 3 $\frac{1}{2}$ tunnel and the West Tunnel, and a tunnel near the west side of the Hercules, if such is driven; and it would come quite close to the surface in both the Mammoth and the Monarch slides. In my opinion No. 5 level is at a better elevation for exploration than either No. 4 or No. 7 but as it has not yet been advanced very far westward advantage should be taken of the present length of No. 7, especially as ~~the~~ ventilation and the handling of muck will be ~~more~~ easier on No. 7.

CONCLUSION:

For reasons mentioned before the conclusions drawn in this report are somewhat vague, and lode extensions and even the connection between separate outcrops are ~~rather~~ strong probabilities/^{rather} than facts. Lode intersections are supposed to be, and probably are, favorable loci^l for orebodies and should be explored wherever found, although there appears to be no certainty that ore will be present. The Robin-John- Mammoth lode has a strong and favorable appearance, especially in its central and eastern part. The Opatunka also is decidedly promising and should be traced to its intersection with the Mammoth-John lode and developed there. ~~Further work~~ Some work to further explore these lodes and their intersections, seems fully justified.

~~Respectfully submitted~~

Respectfully submitted,

Two Maps Accompany this Report