

Please return
as soon as
possible to
(Miss) Nonie
Campbell
#206-1011 Beav.
Vancouver B.C.

MINING REPORT

concerning certain Silver-Copper
Mineral Claims belonging to the
SILVER ISLAND MINING
COMPANY LIMITED - - - -

of Vancouver, B.C., situated on Silver Island and the south
shore opposite of Babine Lake, in the Omineca Mining
Division of the Province of British Columbia, Dominion
of Canada.



Capital 50,000
Shares allotted 185,000

58 Claims & 3 Franchises

These people gave up
Silver Is. in favour of
Copper Is. Property ran out
& I (Nonie Campbell) picked it up.
Compiled by:

RONALD CAMPBELL CAMPBELL-JOHNSTON

MINING, GEOLOGICAL AND METALLURGICAL ENGINEER

I didn't realize there were
58 claims! I would like to

(Registered under the "Engineering Act" of the Province
of British Columbia.)

July, 1926, Vancouver, B. C.

have all that old ground
reestablished legally.

INTRODUCTORY PREAMBLE AND SYNOPSIS

Addressed to:

The Board of Directors.

SILVER ISLAND MINING COMPANY LIMITED,
Vancouver, B. C.

Gentlemen:

Acting under your instructions, the writer left Vancouver on June the second ultimo, returning on the twenty-sixth ultimo, having been absent during twenty-three (23) days.

The writer now begs to hand you a full and exhaustive mining report concerning your property situated on "Silver Island" and the south shore of Babine Lake. A capitulation is furnished of the actual mining operations already carried out on your property; also the "Certificate of Assay," signed for returns from samples taken by the writer himself from the several points of mining attack; the details of water-power, transportation facilities, geology, and future prospects and chances for opening out large ore-tonnage of commercial values; with suggestions as to providing the requisite large working capital, to carry out more wide development, for the blocking out of ore tonnage; installing the necessary machinery, such as machine drills and diamond drills, air compressor, hoists, cages for lowering and raising the men from underground workings down the shafts; electrical power plant; crushing, concentrating and oil flotation plants; the conversion of the present rough Government road into a first-class motor-truck one, to quickly come and go with concentrates and supplies, by permitting the use of five-ton motor-trucks, or tractors with a trail of trucks behind, to and from the Canadian National Railway system.

Maps and photographs are added to make this report more easily understood.

From Burns Lake, on June 22nd, ultimo, the writer sent your President the following telegram:

"Have completed now careful examination your Company's mine and will render full mining report on receipt assay returns of samples taken from every available point already attacked. Have emphatically good opinion for future success of your mine, but at present consider work to date has been too much restricted to one spot only. Your ore values are certainly high in places, and your open-cast stoping ground by shaft probably carries milling values for concentrating mill across sixty feet at least between tunnels. Since the neighboring properties show great promise, so would expect your several other ledges, already exposed on surface, to also later prove to carry big ore-tonnage of milling values to allow long lease of working life ahead for your group of claims. Have recommended Hugh Mc-

Donald what additional ground to locate to protect your ore extensions, while still open. Will discuss question of providing sufficient British capital when presenting finished mining report.

"R. C. CAMPBELL-JOHNSTON,
"Mining Engineer."

The returns from the samples taken, mentioned above, as shown by attached signed "Certificate of Assay," gave (eight out of the whole ten samples, the other two being trials only) phenomenal silver values and good values in copper also. From these eight returns the averages in silver and copper were as under:

	SILVER, OUNCES	COPPER, PER CENT.	LB.
<i>Per ton mined.....</i>	263.1	3.8	76.
	366.6	6.1	122.
	562.5	8.8	176.
	363.7	4.4	88.
	470.6	6.4	128.
	511.3	8.4	168.
	709.4	13.1	262.
	261.7	4.1	82.

Average: 438.6 oz. Silver; Copper, 6.9%—138 lbs.

NEW YORK PRICES

Silver, 65 $\frac{5}{8}$ ¢ per oz. Copper, 14¢ per lb.

Silver, gross value, \$287.83. Copper, \$19.32.

Total gross values, \$307.15, without deductions for loss in recovery.

These values are returns from narrow paychutes in wide mineralized belts of ore.

Till some systematic attempt has been made to block out ore in bulk, there is no process for sampling the present mass; for cutting channels by drills across the weathered face of the present ore bluff, quartering these samples, so taken, and having the same assayed, in no way will yield any representative average result of whole block of ore. For that reason the property requires more practical working to ascertain average values throughout the whole ore-body.

At the same time, however, these splendid returns cannot be in any way ignored, for as a leaven to the whole ore to be milled they will go a long way towards paying high dividends.

The future can only be most promising, for it has been from such ores as these that the "Cobalt" camp in Ontario has made fabulously rich many of the owners of properties there.

DESCRIPTION OF PROPERTY

THE SILVER ISLAND MINING COMPANY owned, at the time of the writer's visit, eight (8) mineral claims, six of these surveyed, as under: (See Map of Group.)

"Silver Island" Mineral Claim, Lot 6886—1340 feet

long, East and West, and 1500 feet long, North and South.

Nugget, No. 1	Lot 6890
Nugget, No. 2	Lot 6888
Nora	Lot 6887
Birch	Lot 6891
Sunset	Lot 6889
Terminus (unsurveyed).	
Dumbell (unsurveyed).	

Since this time your President has received word from Hugh MacDonald that, according to the writer's suggestion, he has now staked three (3) more mineral claims, to cover part of the extensions of your Company's ore-bodies on the south shore of Babine Lake, on the mainland, probably easterly from the "Sunset" mineral claim, along the shore line, where strong ledges are exposed across the rock bluffs, due to former work of other prospectors. The writer would further recommend that the vacant fractions be yet located, by placing witness posts, when such are required, to especially hold the present vacant ground lying in the lake, between the two Nugget claims, to expedite deep level tunnels in the future, when shafts have been sunk on "Silver Island" and on the mainland, and deep tunnels are to be driven under the thirty-two hundred (3200) feet length of water, so to connect the two shafts, for the convenience of hoisting all the ore, won on the island, through the shaft on the mainland.

As there are two series of veins crossing through this particular locality, namely, the master lodes, parallel with the trend of the main mountain chains, nearly north and south, dipping westerly, and also the more recent ones, constituting the richer, smaller veins, which have robbed the earlier ore-bodies, having their strike east and west, with southerly dip, namely, the ones holding the very high silver values, especially at their intersections with the former master lodes, where, in cooling, by stress fissures were formed.

From the fact that both these series of veins occur at frequent parallel intervals throughout this whole district, therefore it is more possible to locate the extensions by lining up known strikes, even though the thick growth and top soil for the moment obscure their continuation, in order to cover extensions along the intrusive rocks. At present all the workings for the whole property and the principal surface showings are only located on the "Silver Island" Mineral Claim, which covers the whole island. The island itself is 1340 feet in length and 750 feet wide, elliptical in shape, having its highest part 135 feet above the lake, and is all well timbered. Its area is about 22 acres.

CHARACTER AND VALUE OF BODIES

In the synopsis, a short sketch of some of the high values taken from the assay returns were noted. By referring again to the signed, original "Certificate of Assay," attached to this report, the following values of all the ore samples taken from this property will be self-evident of unusual richness; but this matter will be again more exhaustively dealt with later in this Mining Report, under the headings of "Treatment," "Work Accomplished," and also "Geology."

The complex character of the ore-bodies consist in the combinations of Copper, for that metal carried the Silver values.

Sample A:

Was taken across the full width of No. 1 shaft at the 130-foot level, to see if the gangue rock of the whole face carried milling values in bulk, and excluded the paychute, represented by B.

The returns showed Gold trace; Silver, 2.3 oz.; Copper, 0.2%; so gave promise that in more depth the width of milling ore will increase to milling values.

Sample B:

Represented a paystreak 3 inches wide, taken at the end of the 130-foot drift, going 35 feet west from the shaft.

The returns were: Gold, 0.01 oz.—\$0.20; Silver, 263.1 oz., at New York prices, 65.5¢ cents per oz., \$172.65; Copper, 3.8%—76 lbs. at 14 cents per lb., \$10.64.

Gross values \$183.49, without deductions for loss in treatment.

Sample C:

Ore followed down in main shaft No. 1 to 95-foot level, ore chute 4 inches wide.

Gold traces; Silver, 366.6 ounces per ton..... \$240.58
Copper, 6.1%—122 lbs. per ton..... 17.08

Gross Values \$257.66

Sample D:

Was a trial of whole face of drift on the 95-foot level to see if mass carried milling ore, as was done in Sample A.

The returns gave: Gold, trace; Silver, 3.9 ounces per ton; Copper, trace.

Sample E:

Was taken in the main tunnel, No. 1, from a paystreak 4 inches wide.

Returns gave: Gold, trace.
Silver, 582.5 oz. per ton..... \$352.26
Copper, 8.8%—176 lbs. 26.64

Gross Value \$378.90

Was taken from a surface outcrop 40 feet above No. 1 Shaft; 4 inches wide, about.

Gold, trace.
Silver, 363.7 oz., per ton..... \$238.55
Copper, 4.4%—88 lbs. 13.32

Gross Value \$251.87

Sample G:

Paystreak in Main No. 1 Tunnel, 4 inches wide, between 80 and 95 feet down shaft.

Gold, trace.
Silver, 470.6 oz. per ton..... \$313.53
Copper, 6.4%—128 lbs. 17.92

Gross Value \$331.45

Sample H:

Paystreak following along No. 2 Vein and down winze, 3 inches wide.

Gold, trace.
Silver, 511.3 oz. \$325.53
Copper, 8.4%—164 lbs. 22.96

Gross Value \$348.49

Sample I:

Taken from the face of No. 1 Vein, from the tunnel up to top of surface along the cliff.

Gold, trace.
Silver, 709.4 oz. \$472.64
Copper, 13.1%—262 lbs. 36.68

Gross Value \$509.32

Sample K:

Paystreak 4 inches wide at mouth of No. 1 Tunnel

Gold, trace.
Silver, 261.7 oz. per ton..... \$171.73
Copper, 4.1%—82 lbs. 12.08

Gross Value \$183.81

Gross average of Vein 1, taken from samples B, C, E, F, G, I and K:

Across four inches.....\$299.50 per ton

Sample H, paystreak 3 inches wide, Vein 2....\$348.49

TREATMENT OF ORE AT MINE AND ELSEWHERE

As shown above, the average gross values, so far established, for Vein No. 1, are \$299.50.

And for Vein No. 2, \$348.49.

Such ore should be left standing, when drifting or sinking, alongside, are being carried on.

Afterwards, when ready to ship, the ore will be fully "sprung" only, by light shots of dynamite, then with a gad tool taken down on to canvas, spread along the floor of the tunnel, to save all the fine silver dust.

This ore can then be sacked in special canvas sacks to hold this fine silver dust and shipped to a reliable smelter for treatment.

When large bodies of ordinary milling ore have been later blocked out, then some crushing, concentrating and oil flotation plant can be erected, after research has been made for the best method to be adopted.

Lead and zinc, as well as the copper, show as silicates in some of the samples, so probably all these same metals may increase later.

Gold will certainly be more plentiful at depth, as it has on other mines in the district, amounting hereabouts to one ounce (\$20.00) or more; and the camp is proven as a gold camp, in addition to the silver values, throughout the area.

SITUATION OF MINE; TRANSPORTATION AND COMMUNICATION

THE SILVER ISLAND MINING COMPANY'S property is situated, as to one claim, on Silver Island, in Babine Lake, 3400 feet from the southern shore; that is where the workings lie on the east end of the island; and Mary's Bay, the landing place at the end of the trail coming down by way of Anderson Creek above; while the balance of the Company's mineral claims reach along the southern shore of Babine Lake, opposite to the island. (See Map of Group.)

Babine Lake lies within the Omineca Mining Division of the northern part of British Columbia, thirty (30) miles north of the Canadian National Railway system from Burns Lake Station, 317 miles east of Prince Rupert, this railway being part of a transcontinental system reaching from coast to coast.

The Company's property is approached by the present Government waggon road, running for twenty-eight miles from Burns Lake village, past the Taltapin Mining Company's property, but the last few miles is only a swamp road, but can be, fairly cheaply, completed as a waggon road.

The topography of the country between Burns and Babine Lakes is represented by only a low divide passing over the height of land, thus permitting the location of a motor road, having no grades steeper than a two and a half per cent. pitch, so that a good motor-truck way is quite possible at comparative low costs.

Babine Lake is a long and narrow sheet of water, one hundred and ten miles in length from the portage from Stuart Lake to the south up to the outflow by Babine

from the Lake, and the lake is two to six miles wide, lying at an elevation of 2222 feet above sea-level.

The structure of the Lake goes northwesterly parallel to the Babine Range of Mountains, part of the Cassiar system of the Central Belt. The Babine River issues from the Lake at its northwest extremity, and later joins the main Skeena River at a spot near the junction of the two rivers, standing at an elevation above sea-level of 1325 feet, the Skeena River becoming part of the Pacific Ocean below the Port of Essington, near the tidal mouth of this River. (See Large Map at end of Report.)

Babine Lake is well stocked with many kinds of fish, and is a natural spawning ground for the Skeena River salmon.

HISTORY OF GROUP AND DISTRICT

The history of the Silver Island Mine and the surrounding country runs as follows:

On the maps, this island was named by the Indians formerly "Silver Fox" Island, but when Hugh MacDonald and Fred Hagen, prospectors, were traversing Babine Lake in their boat, about fifteen years ago, they were attracted by the white mineralized rocks showing on the shore about the centre of the south bank. They landed and staked the "Silver Island" Mineral Claim.

When prospecting further, on the east end of the island, they found two rich veins there having native silver nuggets. They interested Vancouver people in their find; the SILVER ISLAND MINING COMPANY was formed, providing funds for operations, and to date about \$75,000.00 is said to have been expended, sufficient to prove up rich ore, but not enough to make a large shipping mine yet.

Other claims on the south shore of Babine Lake, opposite the island, were later staked for the Company to hold the extensions of their island ore-bodies and so give them ample ground for future operations.

This Omineca country, including Babine Lake, has a history of gold placer mining excitement in the early days, back in the 60's of the last century, when miners came on in swarms, flushed from the rich Cariboo goldfields. These same miners, in their turn, disturbed the trappers and fur traders of the much earlier times, working for the sturdy Hudsons Bay Company, who till then had reigned supreme among the wild Indian tribes. Next the Grand Trunk Pacific Railway was commenced, about 1909, wending its sinuous way from Prince Rupert on Kaien Island, at the Pacific Coast, following along the strenuous Skeena River to Hazelton, where it then branched off among the picturesque canyons of Bulkley River till it found a pass through the Babine Range and dropped into the vast tributaries of the Fraser River Valley, till finally it entered the Yellow Head Pass.

through the Rocky Mountains, and to Edmonton. Then the prospectors tains afar with renewed vigor, till the calamitous Great War from 1914 till today has daunted mankind. However, again new life and strength and dogged perseverance and personal development to its present stage.

The name "Babine" Lake is derived from the word "babine," referring to the lips of some wild creature, because the Babine Indian women were in the habit of piercing their noses with one bone needle and sticking another through the flesh under the lower lip. These bone needles were then connected together by a chain, primitively made from the native silver pickets on "Silver Fox" Island and other places along the surface of the rich ore-bodies.

Babine Lake also has always been a comparatively much travelled route and line of communication in canoes by both whites and Indians alike, since the advent of the white man into this country a hundred and fifty years ago, and today all the boats on the lake use gasoline engines to propel their crafts along this large body of water, as its surface so often becomes very rough with high, choppy whitecaps.

The prospectors preceded the railway construction engineer in his restless activity.

Implicit faith in the splendid mineral possibilities of this district is now, more than ever, becoming prevalent abroad and impressing capital, which is beginning to believe that here is an extensive source of the metals of commerce, with gold and silver, and even perhaps platinum, for this last metal has been already found in a native state with native gold in the placer diggings hereabout, on the north shore of Babine Lake, and especially on Vitalle Creek, still further yet to the north. The word "taltapin" is said to mean "turtle" with the Indians, applied to the shape of that mountain range (see photographs) on account of their rounded, curved shape, resembling the back of a "tortoise."

The shareholders of this "Silver Island" Mine have doggedly persevered, despite difficult times, till they have so far proven two rich veins, greatly in character and size resembling those of the "Tonopah" camp of Nevada, where over \$85,000,000.00 have been already taken out in gold and silver.

The writer was engaged by your Directors lately to make a thorough examination and mining report, and now he is marshalling all the facts and data together which it is possible to acquire for certain and exact information, to further afford strong evidence, to substantiate his genuine opinion that your Company possesses a property carrying extraordinary values and great promise of large bodies of commercial milling ores, amply sufficient to pay large dividends shortly.

ACREAGE OF "SILVER ISLAND" GROUP

The elevation above sea level of Babine Lake is 2222 feet, and the magnetic compass from the shore is about 28 degrees east.

Mineral Claims held by your Company are as under:

"Silver Island" M/C, covering all of Silver Island, a piece of land rising to 135 feet high above the Lake, containing about twenty-two (22) acres in extent, standing out above water line, and where are all the principal workings and surface showings of this property, so far accomplished.

Then the "Nugget" No. 1 M/C, with the "Nugget" No. 2 M/C, which claims, except for a vacant fraction which can be located now by witness posts placed on the shore, this fraction holding 200 feet by 1500 feet. These "Nuggets" cover the ground lying under the waters of the Lake, and the subaqueous extensions of the ore bodies, between the Island and the Mainland, along the south shore of Babine Lake. By soundings taken by Hugh MacDonald, the deepest water of the Lake here is 150 feet at a point 2000 feet from the south shore, and from there the ground grows shallower towards both shores. On the Mainland, on the south end of the two "Nugget" claims, lie the "Nora" and "Birch" M/C, going up the slope of the rising ground southward. Along the Lake shore to the eastwards is located the "Sunset" M/C, and lately three (3) more new claims, at the writer's suggestion, have been staked, from there going still more easterly along the Lake shore. To the west of the "Nora" and "Birch" M/C are situated the "Terminus" and "Dumbell" claims (as yet unsurveyed, as are also the three (3) new claims). The other six (6) claims mentioned have all been surveyed. (See Map of Group attached to Report.) The present acreage, with fractions intervening, should cover about five hundred and fifty (550) acres.

TITLES

The writer has not examined personally the titles of any properties recorded at the Government offices, preferring to leave this duty to a certified solicitor of good standing, whose profession this is.

However, it is always advisable to have all ground owned, surveyed with, adjoining and intervening fractions, as soon as practicable; then carry out the required assessments in development at once; next procure crown grants to all the mineral claims held, thus perfecting an indefeasible title to all property in perpetuity.

CLIMATE

The elevation of this area above sea level varies, according to its surface contour, between two and five thousand

My brother Jim was in the Dumbells show.

N.C. lived on Birch St.

feet. The yearly snowfall averages two to three feet of snow, but not excessive, to retard any transportation or mining undertakings above or below ground during the winter months. The general winter temperature stands at zero or below, except for a few severer spells. The Government reports the average annual rainfall as twenty-five (25) inches.

The mines and the crushing, concentrating and oil flotation plants all work continuously throughout the whole year, with no stops or difficulties due to weather.

The snow lies from November to the middle of April generally.

TIMBER

There is ample timber growing on the Mainland though the Island could be stripped in a few years making it awkward to draw on the timber the cordwood and lumber. On the Mainland are many places for mine purposes, showing where there has been growth, due to some earlier forest fires long ago.

Hemlock, spruce, some cedar and fir occur in stands, where unburnt in former years, also poplar, for deciduous trees always follow the destruction of the coniferous types. A small sawmill on the shores of Babine Lake near the mine works all the lumber required for heavy square lagging and sills, put into the mill, or lumber for mill plants.

WATER SUPPLY AND HORSE-POWER

There is a splendid chain of lakes, comprising the Taltapin Lake system of waterways, the main Lake being 17 miles long, and three smaller ones, which can be drawn back over a distance of seventeen (17) miles to provide a great water supply at all periods in one immense reservoir, by means of a dam said to be necessarily fifty feet high.

The amount of the average flow of water, though not yet accurately measured and gauged, or the mean rainfall ascertained, though placed at 25 inches, runs at least fifty (50) feet wide by a minimum of four (4) feet deep, velocity unknown, but a rapid current, all white and broken water, so exceeding at least twelve (12) feet fall to the mile, and capable of being harnessed to supply a very large force, of certainly a minimum of thirty thousand (30,000) horsepower.

CONCENTRATOR AND REFINERY SITES

The fall in grade from the Taltapin Lake, as well as the ground lying along the southern shore of Babine Lake, is all towards the Lake, along the northern slope of the Babine Range of Mountains. The Company should

acquire by reclamation of this horse-power and bring it to a site on the shore.

This same site also will obviate all transmission of electricity and power to the mine, since any pipeline for hydro-electric purposes from the proposed dam near Taltapin Lake will more than take the full fall of the grade that can be obtained, to locate a large power house, also adjacent to the mine, so that it may become central, more especially for the refining of copper and precious metals may be cheaply refined and produced chemically pure, so fetching the highest market prices obtainable.

There are pleasant and extensive level spots along the shore on which to erect plants, houses, sawmills and other buildings pertaining to the operation of a concentrating and refining establishment.

GEOLOGY AND ORE ORIGIN

Babine Lake flanks the Babine Range of Mountains, part of the Cassiar System of the Central Belt.

This range extends northwesterly, following the shoreline of the Pacific Ocean, and continuing alongside the Coast and other important Ranges of the Coast between here and the actual seaboard.

The range is an ancient structural valley, coinciding in direction with the general trend of the whole formation, and lying parallel to the other longitudinal, lengthwise valleys of the main Cordilleras. The numerous faults in this district resulted from the disorganization of the original drainage system through the damming of the valleys by banks or eskars, formed by glacially transported drift, so today forcing Babine Lake to flow northwesterly out by Babine River, its northerly outlet, into the main Skeena River, flowing south. The Babine Range consists principally of highly metamorphosed volcanic and sedimentary rocks, which are generally closely interbedded and intercalated, so having been inserted between series of layers among the regular sedimentary strata.

These same sedimentaries appear to belong to the members of the "Hazelton" formation of perhaps Jurassic-Cretaceous age underlying the coal measures of the Pacific slopes, although the writer has not yet found fossils to confirm this statement. The intrusives into these older rocks are smaller bodies, as dykes, sills, and lesser batholiths of granitic rocks of Tertiary age.

Basic, ferro-magnesian lamprophyric (made up completely of crystals) dykes also occur, forming many of the ore-bearing ledges on this and other properties nearby, which have subsequently again been split up the centre by later-coming other intrusives.

In these parts, throughout the Mesozoic era, there were no volcanic outbursts, but at the opening of the Tertiary era (namely, the "Laramie revolution") intense activity

was renewed over a large area, extending far into the north, similar to the "Brito-Icelandic Province," where some volcanoes have persisted until the present day, notably in Alaska.

These same Tertiary igneous rocks, in the genesis of the local ore-bodies, have not been subjected to any important later earth movements since their formation, and they are well exposed all along Anderson Creek and both shores of Babine Lake and on "Silver Island" itself. The rocks of this type are mostly in a perfect state of preservation, and so suitable for detailed study.

Although this cycle was completed in such comparatively recent times, profound pre-glacial denudation laid bare the dolerite plutonic rocks in many places, although in adjacent areas several thousand feet of especially miocene basalt lavas, as around the "Chinook" at the 79-Mile House on the Cariboo Road, have escaped erosion.

The cycle consists of the usual three phases.

In the volcanic phase and that of the minor intrusions it is possible to distinguish events that affected the whole province from those that were restricted in distribution, namely, to only the proximity of certain centres. Thus, in addition to the "regional" extensive eruptions of basalts over the whole, there were "local" centres of eruption, which in some cases remarkably differ from the wider type. The centres of eruptions will have each to be studied locally. Taltapin Mountain is most certainly one marked instance.

There was a time-sequence of the several successive events in the cycle.

Regarding the "regional" lavas, which were erupted from large numbers of fissures, having a general N.N.W.—S.S.E. alignment.

They were singularly monotonous in composition, being olivine-basalt flows, while the feeding dykes of dolerites of coarser grain, and having often a local alteration to "uralite" or secondary hornblende, are filled with material of the same composition, similar in texture in the marginal sections, but becoming coarser in the interior.

The basalts were poured out with a minimum of explosive action, so that no pyroclasts occur, to speak of, between the flows.

The lavas were extruded under sub-aerial conditions, and often the interval between the flows was long enough for weathering to take place.

The few interbedded sediments include fluvial and lacustrine deposits, together with thin coal, accounting for the origin of asphaltum "niggerheads" at Francois Lake, and also near Hope.

The central parts of the flows are so massive as to be undistinguishable from the associated minor intrusions, but the higher parts are very vesicular, often brecciated and slaggy.

This condition allows rapid denudation of the tops of the flows and gives rise to a distinctive terraced type especially conspicuous along the northern shore of Babine Lake. Agglomerates, where present, are due to local paroxysmal outbursts from the central type. A complete series of rock types in composition from ultra-basic to thoria-bearing can be found among the plutonic intrusives, the latter being dominant over the others, granite and gneiss. A further study of this same series will enable the presence of metal platinum locally in the ultra-basic rocks. Its presence has been amply demonstrated among the alluvials along the north shore of Babine Lake and Anderson Creek, further north.

Different intrusions are composite of earlier basalts, overlain by a later acid member, which split the former into two, the centre, accounting for the attraction of the various minerals present for the adjacent gangue matter, and explaining the presence of so many metals, deposited during successive periods, in the same ore. The trend of the tertiary faults is probably due to crustal creep towards the "deep," in this case referring to the vast down-warp of the Pacific Ocean, comparatively so near.

The origin of the ore bodies is obviously due to differentiation of the molten magma, under intensive heat and pressure conditions.

The processes involved may be molecular, opposed to gravitation, or the separation of immiscible liquids, or the presence of residual liquids from crystals already formed; and the interactions between units of differentiation formed at one place or time with those formed at other places or times must also be considered, and especially in relation to thermo-dynamic conditions and the presence of volatile fluxes, such as fluorides.

To properly understand the origin of these particular ores occurring on "Silver Island," it is advisable to speak generally and then apply these generalities when they bear on the subject of these local ores.

Copper-bearing minerals belong to at least three different types which have originated under well defined sets of conditions.

First, the primary ores, either of direct magmatic origin, as segregations in igneous intrusions, or deposited as lodes, veins or disseminations by solutions, derived directly from igneous magmas. Among these are also included some of the contact metamorphic deposits, in which unstable rock masses have been replaced bodily by materials of magmatic origin, as appears to be the case on "Silver Island."

These primary groups include chalcopyrites, cupriferos pyrites and pyrrhotite. The native copper of the lavas and conglomerates, as occur in massive plates on both Fulton and Trembleur Lakes, in the neighborhood, belong to primary ores, since it is derived directly from magmatic solutions.

Secondly, we have the oxidized ores, which, owing to glacial action in eroding away much of this upper formation, are not so apparent here, and which secondary ores were formed by the action of weathering agencies on the primary ores.

Lastly, in the cycle of chemical change, come the minerals of secondary enrichment, precipitated usually at the lower margin of the oxidization zone by the reduction of descending oxidized solutions. The most important here are tetrahedrite ($4 \text{ Cu}_2 \text{ S} \cdot \text{Sb}_2 \text{ S}_3$), carrying 52.1% Copper, with Chalcocite ($\text{Cu}_2 \text{ S}$) with 79.8% Copper; Covellite ($\text{Cu}_2 \text{ S}$), with 66.3% Copper, as an incrustation in the zone of secondary enrichment, and Chalcopyrites ($\text{Cu} \cdot \text{Fe} \cdot \text{S}_2$), 34.5% Copper.

Here Silver replaces part of the Copper in crystallization, in isomorphous mixtures, related by close similarity of chemical constitution, and crystallize in the same class of the same system of symmetry, developing the same forms with angles that differ by not more than a few degrees.

The above accounts for the rich silver ores, and also for the native silver nuggets found in this mine.

Recounting types of Copper deposits.

On the basis of their genetic relationship and mineralogical composition, the Copper deposits are divided into well-defined groups; those of local application are now the only ones mentioned here:

(a) The sulphides of the primary veins, extending downward in depth, formed by solutions of magmatic origin. In some cases they pass down into tin ores in other countries, and here upwards into a zone of lead-zinc ores.

(b) Native copper in the vesicles of amygdaloidal lavas.

(c) Oxidized ores are usually limited downwards by the level of the ground water.

(d) The rich deposits of native copper, silver, gold, oxides and complex sulphides of the zone of secondary enrichment, grading downwards into primary ores.

In Tonopah, State of Nevada, United States of America, one of the most important areas of precious metal mining in that country, from 1910 to 1915 that camp produced annually ten millions (10,000,000) ounces of fine silver, and over two million dollars (\$2,000,000.00) worth of gold, the whole value up to 1916 having been about \$85,000,000.

That camp and the Babine Range both lie to the east of the Coastal Cordillera, and the igneous rocks of both districts are entirely Tertiary volcanics, the most important member being a "rhyolite" (which is a volcanic rock corresponding in chemical composition to granite and generally having small phenocrysts (visible crystals of porphyritic rocks) of quartz and orthoclase (or other

alkali-telespar) in a glassy or cryptocrystalline (undiscernible) groundmass. Flow structure is commonly developed in spherulithic (radiating texture), nodular (bodies that can be separated) and lithophysal (stones that exfoliate when heated) structures are exhibited by many varieties, and two flows of intermediate composition, the earlier now called the "Mizpah" trachyte and the latter the "Midway" andesite. There are also some still later rhyolites and basalts.

All these rocks are flat-lying, but much faulted. Some engineers believe some of them intrusives, rather than flow rocks. Most of the ore lies in the "Mizpah" trachyte, though some go down into the rhyolite below. The ore-bodies are most typical veins, consisting of replacement bodies along fault fractures.

The number of silver-bearing and other minerals found here is very large.

This geological description of Tonopah so intimately described conditions at "Silver Island" that it is fully quoted here.

Horizontal drilling in a systematic manner by diamond drills from levels driven at intervals from a vertical shaft is the most up-to-date, practical manner to open this property from the mainland, connected with a vertical shaft on the island.

BIBLIOGRAPHY

There are many publications extant among the Geological Survey Reports of the Department of Mines at Ottawa, dating from the eighties of the last century down to the present day, relating in a general way to this whole Omineca District.

This applies also to the annual reports of the Minister of Mines for the Province of British Columbia. However, it is the special study in detail of the local rocks, and how the local ores were deposited, that is necessary to progress in development.

WORK ACCOMPLISHED AND PROPOSED

The veins on which workings have been carried out, wholly at the easterly end of Silver Island (see photographs), have an easterly and westerly strike, with a southerly dip at about 35°. The ore, as at present developed, follows fissures, as long as they continue, in the mass of gangue rocks, which fissures have acted as channels for the circulation of ascending mineral solutions, as primary ore-deposits, and again later for descending meteorological waters, the latter causing secondary enrichment downward, till reaching the zone of original primary ores, the situation of which, however, is yet undetermined and may be some long distance down. However, there is no doubt, from general mining experience, that wide zones of mineralized gangue rock will soon appear in any shafts sunk, to afford plenty of milling ore. This conclusion is based on the intense

faulting and fracturing of the gangue rock, already showing in the present workings, and for the presence for 60 feet wide, between the present three tunnels on the weathered surface of the rocks, of high-grade silver minerals, and also some nuggets of native silver, and among the former minerals appear corvellite, chalcocite, tetrahedrite, argentite, and some patches of galena, sphalerite and chalcopyrites.

The resident engineer of the district states that the gangue minerals include calcite, barite and quartz. Already in places in the present workings the mineral solutions have replaced the wider, fractured gangue material, spreading outside of the fissures by chemical action.

The three veins exposed run parallel to one another across the centre of the island, east and west. No. 1 vein has had most work carried out on it, and all the workings have been commenced near the water line of the lake. Going north from No. 1 vein to No. 2 vein, a space of 60 feet occurs; from No. 1 to No. 3 vein, a space of 125 feet occurs; from No. 1 vein still north 400 feet away is the outcrop of No. 4 vein, and 500 feet apart, northerly, from No. 1 vein is Vein No. 5.

The strike of all these veins, occurring within 500 feet, goes east and west, dipping southerly at about 35°.

At the workings, both at the dump and in the water, and also traceable across the water to both the north and south sides of the lake, exists a strong, wide, north and south vein, dipping west, making a junction with the younger east and west veins at this point, and doubtlessly accounting for much of the secondary enrichment found in the workings.

About 800 feet west of the workings another strong north and south vein, dipping west, about 20 feet wide, is shown, being the vein Hugh MacDonald originally staked the claim on. About 1300 feet west of workings, at S.W. point of the island, yet another wide north and south vein, dipping west, at least six feet wide, is apparent. No important work, so far, has yet been carried out on any of the north and south veins, namely, the master lodes, following the general formation, but all can be plainly traced across to the mainland, where they should be stripped and thoroughly prospected.

The following are the returns from the face of the rock bluff, taken across the face of the bluff between No. 1 vein and No. 2 vein, in spaces of 10 feet for each assay.

The rock is weathered and leached:

GOLD, OUNCES		Per 2000 lbs.	SILVER, OUNCES	
		(1 ton)		
1.	0.01	1 to 10 feet	0.66	
2.	Trace	10 to 20 feet	7.22	
3.	Trace	20 to 30 feet	1.50	
4.	0.2	30 to 40 feet	0.12	
5.	0.03	40 to 50 feet	2.40	
6.	Trace	50 to 60 feet	2.62	
7.	Trace	60 to 70 feet	3.22	

Total 0.06 divided by 7. Ag. 65.54c per oz. 17.74 divided by 7. Average 0.0086 oz. New York price 2.53 oz. Value \$0.17. \$2.26.

Gross value without deductions for precious metals. \$2.25. Lead, Copper and Zinc, not estimated

VEIN 1. A drift has been driven following the vein for ~~163~~ feet westerly. *This is a mistake 75'*

The shaft is sunk from a point 50 feet from the portal.

This is sunk on a vein running east and west, and dipping south at an angle of 35° down to the 95-foot level, and then for 35 feet to sump at 55°, so straightening up somewhat.

At the 95-foot level a drift has been driven westerly for 35 feet.

At the 130-foot level a tunnel along the vein has been driven for 40 feet. At the end of this 40-foot drift a cut 18 feet to the south to cross cut has also been driven.

This last drift is only 76 feet vertically below the tunnel. *This is also an error*

No drifts can be driven east under a depth of 250 feet or they will enter the lake, or at a greater depth let the water in through the fissures.

No. 1 vein shaft drains No. 2 vein shaft.

In the tunnel on No. 2 vein, 65 feet north of No. 1 vein, the drift follows the ore for 165 feet.

One hundred feet from the portal a winze has been put down for 47 feet.

Fifteen (15) feet from the face a winze has been put down for 8 feet.

This tunnel runs in lime gabbro, probably a dolerite causing a contact vein with a lime sedimentary, and the latter is so metamorphosed as to lose its identity.

There are rich paystreaks, four feet apart, regularly carrying high-grade ore in thin sheets 6 inches across and more.

There are copper stains and chalcopyrites in specks throughout the intervening gangue.

Sample H was taken systematically along the paystreak of No. 2 vein and down the long winze. The returns gave:

Gold trace; Silver, 511.3 oz. \$335.53
Copper, 8.4%—168 lbs. at 14c. 23.52

Gross values without deduction. \$359.05

The samples taken on vein 1 were:

A. 130-foot level, gangue rock, full face of tunnel.

A trial to ascertain if full width carried pay ore.

Gold trace; Silver, 2.3 oz.; Copper, 0.2%.

No commercial values throughout yet.

B. Taken from a paystreak 3 inches across at end of 130-foot drift, alongside A.		
Gold, 0.01—\$0.20; Silver, 263.1 oz.....		\$155.29
Copper, 3.8%—76 lbs.		10.64
Gross values		\$165.93
C. Taken from ore following the main shaft down to the 95-foot level. Returns gave:		
Gold, trace; Silver, 366.6 oz.....		\$240.58
Copper, 6.1%—122 lbs.		17.08
Gross values		\$257.66
D. Trial assay of gangue from drift along 95-foot level of vein 1. Returns are:		
Gold, trace; Silver, 3.9 oz.; Copper, trace.		
E. Taken from a paystreak 4 inches wide, alongside D.		
Gold, trace; Silver, 562.5 oz.....		\$371.14
Copper, 8.8%—176 lbs.		24.64
Gross values		\$395.88
F. Taken from outcrop of ore 40 feet above No. 1 Tunnel.		
Gold, trace; Silver, 363.7 oz.....		\$242.31
Copper, 4.4%—88 lbs.		12.32
Gross values		\$254.63
G. Paystreak in main No. 1 shaft, between 80 and 95 feet down, Returns gave:		
Gold, trace; Silver, 470.6 oz.....		\$313.44
Copper, 6.4%—128 lbs.		17.92
Gross values		\$331.36
I. Face of No. 1 vein, from tunnel up to top of surface along cliff.		
Gold, trace; Silver, 709.4 oz.....		\$465.54
Copper, 13.1%—262 lbs.		36.68
Gross values		\$502.22
K. Taken from the 4-inch paystreak, No. 1 Tunnel.		
Gold, trace; Silver, 261.7 oz.....		\$173.76
Copper, 4.1%—82 lbs.		19.48
Gross values		\$193.24

WORK PROPOSED

It is now evident, from the data furnished in this report, that on the "Silver Island" Mineral Claim, limited in ground to only twenty-two (22) acres, standing up above the level of the Babine Lake, including the whole of Silver Island, that abnormally rich silver ore has to date been opened in paystreaks; that probably by continuing the present drift further westerly into the hill, the total height of the Island being about 135 feet above

the water level of the Lake, good milling ore in quantity will be met beyond where weathering has leached the minerals near the surface.

The total length, however, east and west, of the island is but 1340 feet. If the present inclined slope is continued down at the same degree, namely 55°, as the present slope takes, in two hundred feet horizontally to the south the slope will be reaching under the waters of the Lake, very close to the bottom of the lake, instead of leaving a space for safety of at least 180 feet vertically above; also the dip of the first part of the inclined shaft was only 35°, or more flat, which would bring the incline nearer still to the surface, all of which means danger

the waters of the Lake should break through and drown out for good all the workings and maybe cause loss of life, for the vertical depth at present of the shaft is but 79 feet. *this shaft will be 1100 ft deep*
 Hugh MacDonald's soundings read 150 feet in the deepest part, in a line from the Island to the south shore, but still there may be a bed of deep silt lying over the bottom of the Lake.

No drifts to the east can be driven for the same reasons. Also the cordwood on the Island, used under the boiler for steam, will soon be completely stripped over the surface of the whole Island, when rafting wood from the mainland will add great expense.

Therefore it would be unwise to continue for some time to carry on the present workings on Silver Island. This difficulty can be obviated, however.

As much vacant ground, for it is known to hold mineral veins, as can be acquired should be staked on the south shore around the other mineral claims already held there. Of course, claims could be staked on the north shore, to hold an independent group. But on the south shore the veins already exposed along the beach could be stripped of top soil and well explored by open cuts up the slopes until good ore-bodies are proven to exist. Then suitable workings can be laid out to extract and treat the ores so blocked out.

Another way is by amalgamation now with adjoining properties which are more advanced in their explorations.

If ore-bodies are found on the mainland, and a shaft is considered advantageous, then a similar vertical shaft, down to sufficient depth to avoid any inrush of waters, can be sunk on Silver Island, drifts driven from both ends to connect, and so mine the Island from the mainland. NB

*This aim was to amalgamate
 team with the Taltapine
 Mining Co which was 4
 miles distance and our
 people could not understand
 why; so did not do it.
 This inrush of water was
 his strong point.*

MINING COSTS AND PROFITS

It is necessary to be certain of the actual costs per ton of ore mined to accurately know what is really commercial ore, to pay all costs and leave a balance for sinking fund and dividends. So the following itemized figures are here given, to permit any increased charges to be allowed for, and therefore added against the value of any ore won:

COST SHEET PER TON

Drilling	\$0.46
Blasting .....	.05
Explosives .....	.16
General Mine Supplies .....	.04
Mine lighting, candles and lamps.....	.02
Mine lighting, electric .....	.02
Blacksmithing .....	.04
Tramming and shovelling, direct.....	.28
Tramming and shovelling, apportioned....	.12
Timbering (labour) .....	.29
Timbering (material) .....	.12
Machine drills, fitting and repairs.....	.08
General mine labour .....	.13
Tramming underground .....	.25
Compressed air .....	.11
Ventilation .....	.02
Assaying05
Surveying, underground02
General27
<hr/>	
Total per ton (2000 lbs.) won.....	\$2.53
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Royalty to Government, 2% net.....	.50
Royalty to Flotation Patentees, say.....	.06
Development, per ton74
Concentrating in milling plants, with transportation	1.00
Direct shipment and freight (10 tons mined to 1 ton concentrates and treatment).....	5.00
Brokerage10
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Total costs per ton mined and treated.....	\$9.93
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Raising, per foot	\$38.60
Drifting, per foot	18.19
Winzing, per foot	59.01
Diamond drilling	3.00
Count total costs, then.....	\$10.00

In mining rich ore, the work should be done alongside of the ore, leaving the same standing in place. Later, when ready to extract the ore, a canvas is spread along the floor of workings and the ore is first sprung by a light charge of explosives and then gadded down and sacked underground on the canvas, saving all the rich powdered minerals. Canvas sacks to hold fines are preferable to gunnysacks.

WORKING CAPITAL REQUIRED

To explore this mine, further working capital, amounting to at least two hundred and fifty thousand dollars (\$250,000.00) should be provided to carry out the suggested location of more ground and for mining on the mainland along the south shore of Babine Lake. The outcrops of new veins are already exposed on the bluff there. Much surface work is very essential before undertaking extensive underground tunnels or shafts.

That future success will follow your attempts is most likely; or, better still, if feasible, to join forces with adjoining mining companies.

CONCLUSIONS AND DEDUCTIONS

The writer has made a very careful study of your mining property, and has given the matter his most earnest attention before advising your Board of Directors as to their future policy.

Your ore, opened up, is certainly very rich, but the surrounding conditions for further development on "Silver Island" are too cramped and not advantageous to continued operations there; in fact, they will become very dangerous, and the Board has no right to jeopardize the lives of miners by asking them to work there as sinking proceeds.

Moreover, the Government Inspector of Mines will most certainly shortly prohibit work near or under the shore line.

There is no other recourse for the Board to follow, if mining development is to proceed, than by exploring the balance of your property on the mainland.

RONALD CAMPBELL CAMPBELL-JOHNSTON,

Mining, Geological and Metallurgical Engineer.

*a lot of this danger
and cramped position
on Silver Island is
to force our directors
to join hands with the
Saltpine Mining Co*

(Registered under the "Engineering Act" of the Province of British Columbia.)

*Who went 50.50 with
his expenses for trip.
July, 1926, Vancouver, B. C.
but our directors did
not see it that way
E.F.C.*