TONGPAH BELMONT DEVELOPMENT COMPANY
REPORT ON PROPERTIES
OF
SURF INLET GOLD MINES LTD.
PRINCESS ROYAL ISLAND, BRITISH COLUMBIA
BY
GEORGE H. CARNEY
Report on Properties
of
SURF INLET GOLD MINES LTD.
Princess Royal Island, British Columbia

by
Geo. H. Garrey
Mr. Clyde A. Heller, President,
Tonopah Belmont Development Co.,

Dear Sir:

I herewith submit my report upon the properties of the "Surf Inlet Mines, Limited," in the vicinity of Surf Inlet, Princess Royal Island, British Columbia.

Accompanying the report are two white print maps showing geology of the present workings, together with the assay returns on samples taken by me during the examination; and also a sketch map giving outlines of ore blocks used by me in calculating the "possible ore" indicated by the present ore showings.

Very respectfully submitted,

Geo. H. Garrey.

G.A.H.-3.
The ore on the properties of the "Surf Inlet Gold Mines, Limited," is a quartz ore, with its chief values in gold, but with an average of 25 to 30 cents in silver per ton. In spots assays as high as $30.00 to $60.00 per ton in gold can be obtained, but the pay ore in deposits of workable size was found to average between $0.17 and $8.48 per ton.

The ore bearing quartz occurs in very irregularly shaped masses, usually lenticular in cross section, which are very erratically distributed along a shear zone in gneissoid granite some 150 to 300 feet in width which appears to have a general strike of about NSO and a dip of approximately 40° west.

The main values in the ores seem to be associated with small amounts of the sulphide minerals, pyrite, copperiferous pyrite, and chalcopyrite, especially with the last two, and possibly also with molybdenite to a minor extent.

These sulphides occur very erratically disseminated throughout the quartz and as a result certain portions of the quartz bodies are practically free from sulphides and therefore nearly barren, or too low in grade to work. Sufficient quartz with sulphides carrying low but pay values was exposed in the workings to indicate that the property has merit, although enough development work had not been done to actually "block out" any ore.

I checked up and confirmed the results of the sampling by Mr. Roy King. Using the combined results of the sampling by
Mr. King and by myself, I outlined a series of "ore blocks" of sizes just as large as was warranted by the development work done and by the geological evidence regarding erratic occurrence of the ore bodies.

Some 52,200 tons of "Possible Ore," of average value of $8.48, were indicated in the vicinity of the present workings.

Possibilities for further ore development exist in depth below the present exposures and also beneath the 2,000 feet of debris covered surface which forms an unexplored area immediately north of the present workings. However, the very erratic occurrence of the quartz ore bodies, and the fact that examples of ore bodies pinching out, both laterally and vertically, exist in the Surf Inlet district, does not encourage one to count too much on the pay ore bodies extending to any great distance along their strike, or to be very optimistic about the ores continuing to great depth.

Provided the pay quartz bodies showing on Tunnel 2 continued with same size and value to Tunnel 3, a very good profit upon the investment could be made. However, while some ore will probably extend to Tunnel 3 level, I do not expect the pay quartz bodies above to have increased in size or importance upon Tunnel 3 level and there is a question if they will not actually be found to have diminished in size. These are points, however, that will have to be determined by actual development work.

In order to be sure of getting back in profits the necessary capital outlay, which is estimated to amount to over $700,000.00, a minimum of 200,000 tons of ore averaging or better than $8.00
per ton (or the equivalent of this) would have to be produced by
the mine. Owing to the very erratic occurrence of the quartz
bodies in the barren sheared granite and of the values within the
quartz itself, it is almost absolutely essential that practically
all of this 200,000 tons of pay ore should be "blocked out" on
three sides, that is, actually "in sight," before the Company makes
any of the large payments under the terms of the option or the ex-
penditures for mill and power plant.

My conclusions, based upon the evidence obtainable from
present surface and underground showings, are that the property
will never develop into a great big mine which will produce mil-
lions in profit, but that the Surf Inlet properties have merit and,
upon the completion of the exploration work outlined, may be found
to have developed sufficient ore to justify the expenditures
planned and permit of a fair profit upon the total investment.
Report Upon the Properties of the
SURF INLET GOLD MINES, LTD.
Princess Royal Island, British Columbia.

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Report Upon the Properties of the
SURF INLET GOLD MINES, LTD.
Princess Royal Island, British Columbia.

Location:
Approximately 7 miles north-northeast of wharf at Surf Inlet, Princess Royal Island, British Columbia, and 365 miles N50W of Vancouver, B.C.

Properties and Acreage:
(a) Mineral Claim: Nine in number, with a stated aggregate acreage of 360 acres, as follows:
- D.L.S. .................. (Lot 31)
- Lake Fraction ....... (Lot 32)
- Gulch .................... (Lot 33)
- Bluff .................... (Lot 34)
- Bench .................... (Lot 35)
- Uta Fraction .......... (Lot 36)
- Mountain Fraction .. (Lot 37)
- Twin Peaks ............. (Lot 38)
- La Quivrece .......... (Lot 39)

(b) Land for Mill Site and Timber: Lot Forty (40) in Range Four of "Coastal District," British Columbia, said to contain sixty (60) acres.

(c) Power Site: All rights, powers and privileges granted and conferred on "Surf Inlet Power Company, Limited," under Water Record No. 5, granted May 6, 1905, for
Properties and Acres (Cont'd.).

10,000 inches of water cut of Cougar Lake, by government of Province of British Columbia (subject to payment of annual fee).

Topography:

The topography of Princess Royal Island (which is a single large island, or else a group of islands separated by irregular narrow water channels, some 53 miles long by 5 to 25 miles in width) is very rugged. According to government survey records some of the highest steep mountains rise to elevations slightly over 4000 feet above sea level. The general strike of these mountain ranges is about northwest-southeast.

In the vicinity of the mine the topography is also very rugged. The vein zone in outcrop runs NNE diagonally up across the east slope of a rugged mountain range whose east face rises very steeply and in places precipitously from the elevation of the mine workings (481 to 985 feet) to the summit, which are over 3500 feet above sea level.

Transportation Facilities and Accessibility:

The mining properties are comparatively inaccessible, when viewed from the standpoint of transporting supplies, machinery, ore, etc.

The Grand Trunk line of steamers from Vancouver, B.C., to Prince Rupert, B.C., on present summer schedule stop weekly at Surf Inlet wharf and on winter schedule boats stop every two weeks, only on the "up-trip", but would stop on "down-
Transportation Facilities and Accessibility (Cont'd.):

trip" if there were sufficient passengers and freight to warrant it.

Method of transferring freight from wharf to mine is as follows:

(a) Hauled about 800 feet from wharf to lake, where loaded on scows.

(b) Two mile tow on Cougar Lake by gasoline launches to "Middle Lending."

(c) One and one-quarter mile portage by sledges over "punchoon" trail 4 feet wide, to landing on Bear Lake.

(d) Reloaded on scows, and then four mile tow by gasoline launch on Bear Lake to wharf nearest mine.

(e) One mile haulage on sledges over punchoon trail 4 feet wide, to warehouse at mine camp, roughly 250 feet above level of Bear Lake.

(f) Supplies for use in mine hoisted from elevation of camp to Tunnel No. 3 level, elevation 481 feet above sea level, on inclined tramway.

In case ore development warrants installation of additional equipment at mine, and building of mill, this transportation problem will have to be given further serious consideration and lines of levels should be run to determine whether (owing to probability of there being a closed season for transportation on lakes during part of year) it is not advisable to put in a narrow gauge railroad or tram line instead of using wagon roads or a combination of lake transportation and hoists.
The Surf Inlet region, according to Mr. F. W. Holler, is reported as having a recorded precipitation averaging close to 180 inches per annum. On account of this heavy rainfall, it rains almost incessantly during most of the months of summer and fall. Occasional heavy snow storms interspersed with short cold spells occur at intervals during the winter months, December to March, although the winters are considered, on the whole, as fairly mild. Probably, by making adequate preparations, work could be conducted without interruption during the winter as well as during the summer months.

The "abominably frequent" rain storms interfere to some extent with surface work, owing to laborers shirking as a natural result of personal discomfort through working in the rain, but the climate is not such as should prevent continuous mining and milling operations.

Water and Water Power:

The heavy rainfall of this district together with the comparative nearness to the chain of five lakes assures an abundance of water for mining and milling purposes.

The connecting series of lakes of different elevations, with the rapids or waterfalls intervening between them; or between the lower one, Cougar Lake, and the sea level at Surf Inlet; afford opportunities for the development of adequate water power for all milling and mining operations likely to be undertaken.

The elevation of the lower end of Cougar Lake above sea
Water and Water Power (Cont’d.):

Level is approximately 30 feet, and the waterfalls and rapids forming the outlet from this lake to the sea, together with the configuration of the surrounding territory, form an admirable water power site for the erection of a hydro-electric power plant to develop the 900 or 1000 horse power deemed necessary for the contemplated 400 or 500 ton mill and for all mining operations.

Timber:

A heavy growth of both large and small growth fir, cedar and pine timber suitable for building and mining purposes occurs in abundance on practically all the lower slopes of the mountains of the immediate vicinities of both the mine and mill sites, as well as over the whole general region.

Lumber can be bought and laid down at Surf Inlet wharf for only a slight advance over Vancouver prices.

In case of future extensive building in the vicinity of the mine or camp it may be deemed advisable to erect a saw mill near the mine to eliminate cost of transporting large quantities of timber from the sea coast, although for preliminary work it seems more economical to purchase all lumber for building purposes.

Freight and Passenger Rates from Vancouver:

Steamship Freight rates Vancouver to delivery on dock at Surf Inlet ................. $4.50 per ton.
where weight of articles less than 1 ton.
In case of exceptionally heavy pieces of machinery special rates are arranged.
Freight and Passenger Rates from Vancouver:

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<td>Vancouver to Surf Inlet</td>
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Cost of Freighting Surf Inlet Wharf to Mine:

Owing to lack of facilities and necessity of several handlings of supplies in transferring freight from wharf to seows on lakes, portaging between lakes and hauling from wharf on upper lake to mine, present costs on transferring freight from Surf Inlet wharf to the mine, approximate $15.00 to $18.00 per ton.

Labor and Mining Costs:

- **Machine Men**: $5.50 per day.
- **Ordinary Laborers**: $3.00 per day.
- **Skilled labor** graduated in proportion to above.

Labor, which at present is plentiful, is obtained through employment agencies in Vancouver. Laborers are constantly changing at mine during rainy seasons, due to abominable weather. This condition may cause labor scarcity during normal periods of national prosperity. Mr. F. W. Holler estimated the cost of mining, under present conditions, as follows:

- **Drifting**: $22.00 per foot.
- **Sinking**: $24.00 per foot.
- **Raising**: $18.00 per foot.

As working conditions become more normal these costs can
Labor and Mining Costs (Cont'd.):

undoubtedly be greatly reduced.

Equipment and Buildings:

Property now supplied with the following equipment:

Machinery:

7-Drill Ingersoll-Rand Air Compressor.
5 Air Drills of Ingersoll-Rand Leyner Type.
2 Boilers of 40 H.P.
1 Small Dynamo for Electric Lighting.

Buildings:

7 Board Buildings (new), as follows:
1 Compressor-boiler House Building
1 Office Building and Superintendent's Quarters.
1 Mess Hall and Kitchen.
3 Bank Houses, accommodating 20 men each.
1 Assay Office (in process of fitting up).
1 Pneumatic Construction Storehouse and Vegetable House.
2 Blacksmith Houses (small).
3 Old Log Buildings near Tunnel No. 2 (not in use).
Several Buildings at "Middle Portage."

Boats:

1 High Power 44-foot Passenger Gasoline Launch, "Full Moon," for mail and miscellaneous service to Butteville, (distance 60 to 70 miles) 4 (6x5") cylinders - 85 to 90 H.P. gage.
1 - 5 H.P. Motor Boat for towing freight on lakes.
1 - 6 H.P. Motor Boat for towing freight on lakes.
Present Mine Workings:
(See accompanying geological maps).

Tunnel No. 1 Workings (Elevation 985 feet above sea level, approximately):

- **X-cut** ..................... 78 feet in length.
- **Drifts** ..................... 185 feet, of which 47 feet on Main "West Vein."

Tunnel No. 2 Workings (Elevation Level 650, 2 feet):

- **X-cut** ..................... 810 feet.
- **Drifts** ..................... 810 feet.
- **Raise No. 1 (Air Shaft)**: 270 feet on incline 390 on vein.
- **Raise No. 2** ............. 15 feet.
- **Winze** ..................... 12 feet (?) - (Filled with water).

Tunnel No. 3 Workings (Elevation 481 feet above sea level):

- **X-cut** ..................... 443 feet (Drift 193 feet from portal).
- **Drift** ..................... 167 feet.

Geology:

Gneissoid Granite:

The main and almost sole rock of the district is gneissoid granite, which shows in all rock exposures noted between Surf Inlet landing and the mines, and forms all the adjacent mountain masses.

Both biotite and hornblende granite were abundantly present. In certain more limited areas, and grading into
the granite, was a granitic rock showing some striated feldspars and more abundant ferromagnesian minerals which probably represents a monzonite or granite-diorite differentiation phase of the same intrusive body as the granite.

The gneissoid structure is prevalent throughout all phases of the huge granite mass but shows pronounced bending only in the more biotitic phases. In places, especially where hornblende is a conspicuous constituent, the gneissoid structure is only faintly marked, and this would indicate that the stresses which caused the pressures and movements which resulted in the development of the gneissoid structure were not exceptionally great.

Basic Dike Rock:

A couple of dikes of very basic rock cut across No. 2 Tunnel 100 to 150 feet from the mouth. The smaller of these two dikes is only 3 inches to 10 inches wide while the larger dike varies from 4 to 8 feet in width. The larger of these dikes, though irregular in outline, has a nearly vertical attitude where again exposed with a width of 9 feet in No. 1 Raise about 50 to 60 feet above No. 2 Tunnel level.

This rock, which is black when fresh and brownish where weathered, is probably a diabase.

These dikes, from all evidence attainable, are much more recent in origin than the veins for they cut through the veins. In the exposure in No. 1 Raise the dike faults
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the vein between 1\2 and 2 feet, the upper or east portion of the vein being downthrown.

These basic dikes probably had no connection whatever with the formation of the ore bearing veins.

The Ores:

The ores of the Surf Inlet mine are low grade ores averaging, in the richer blocks, about $8.48 per ton in value, in which all of the values are in gold except about 25 or 30 cents per ton in silver. While the general average of the ore blocks determined was only $8.48, yet limited portions of the vein give assays as high as $30.00 to $62.00.

The values in the vein material are confined almost entirely to the quartz, or quartzose portions of the vein zone; the highly crushed and altered sheared granite areas and seams with which the quartz veins and lenses are associated carry no values except in rare instances, and these are usually where recent movements have caused pay quartz ore to be involved with the sheared granite or surface waters have caused slight enrichment of the gold values in the crushed granite immediately below the footwall side of the quartz bodies.

The quartz consists in the main of a milky quartz which has all the characteristics of a pegmatitic quartz. In places, especially on the margins or extremities of ore bodies, the quartz is sometimes associated with a little orthoclase or albite feldspar and altered micas. In certain areas the quartz is glassy and semi-transparent.
The Ores (Cont'd.):

Sulphide Minerals:

The quartz is usually associated with greatly varying amounts of sulphides, chiefly iron pyrite, both coarsely crystalline and fine grained, but with noticeable amounts of copperiferous pyrite or chalcopyrite and lesser amounts of white arsenopyrite. These sulphides occur either as discontinuous bands or seams in the quartz roughly parallel to the strike of the orebodies, or as blotches or minute specks irregularly disseminated through the quartz mass.

Some of the quartz is practically free from sulphides while in other places seams of ore a few inches to several feet wide occur which have the sulphides comprising 25% to 75% of their mass.

The values in the ores are chiefly associated with the sulphides and as a result white quartz free from sulphides is usually very low in grade and sometimes barren.

The highest grade ore almost invariably shows more or less fine grained pyrite or else copperiferous pyrite or chalcopyrite; therefore these sulphides are considered the chief ore bearing minerals and their abundance in the ore can usually be used as an indication of the grade of the ore.

Coarsely crystalline pyrite and arsenopyrite do not seem to be so closely associated with the gold values and their presence in abundance does not necessarily indicate a good grade of ore.

In certain places, where recent crushing has taken place
The Ores (Cont'd.):

in the sulphide ores, thin films of black pulverised pyrite occur along cracks or slip planes.

This black pulverised pyrite, however, can be easily mistaken for black oxide of copper, which occurs in rare instances along oxidised portions of the veins, where yellow iron oxide stains are common.

Molybdenite (MoS₂) was also noted as a rare constituent of the ores. It occurs as thin scales or small hexagonal, steel gray, plate-like crystals in vugs or along cracks in the quartz. Small amounts of molybdenite were noted in Tunnel 2, associated with some of the ores which gave the highest assay returns, but it was not in sufficient quantity to allow of determining whether it was closely associated with high values or not.

The Gangue Minerals:

In addition to the main gangue mineral quartz, small amounts of a white feldspar, probably albite, were also present, especially near the margins or extremities of some of the narrower bodies. However, some of the albite occurred as a minor gangue mineral associated with some of the high grade ore.

Small albite lenses occurred at rare intervals along the fault or sheared granite lead being drifted upon in Tunnel No. 3; these, however, carried only "traces" of gold and silver.

Dark, highly silicified and altered, partially replaced granite fragments, also form a notable percentage of the vein
The Ores (Cont'd.):

material in certain localities.

Ore Occurrence and Strike of Veins:

The quartz ores occur as very irregular vein like bodies and as roughly lenticular masses occurring erratically distributed along a broad irregular shear zone 150 to 300 feet in width in gneissoid granite. These irregular quartz masses, which are sometimes overlapping, have a general strike to the NNW or NW and dip 30° to 80° westerly.

The general strike of the broad combined quartz and sheared granite vein zone, from surface evidence, appears to be about NW and the average dip about 30° to 40° to the west.

A study of the geologic plans which accompany this report will give the best idea of the erratic occurrence and great irregularity, both as regards strike and dip, of the bodies or lenses of quartz of various sizes and shapes which occur along the zones of sheared granite. The broad quartz body which is exposed over nearly the whole length of "500 ft. x-cut" (B) practically pinches out before "650 ft. x-cut" (C) is reached - that is, it pinches out within a distance of 50 feet. Again, the strong "east" vein, 5 or 6 feet wide, which shows in No. 1 Tunnel workings (and seems to correlate perfectly with the lead in the drift from the west breast of the "350 ft. x-cut" (G) on No. 2 Tunnel) has apparently pinched going downward and on Tunnel No. 2 is only an insignificant irregular vein only a few inches to 2 feet wide. Of course there has not been
The Ores (Cont'd.):

Sufficient development along this lead on Tunnel No. 2 to prove that quarts does not come in again farther south along the lead.

An even better example of the lack of continuity of the quarts bodies is seen in the main tunnel of the adjacent property belonging to the Fugalev Mining Company, where in a tunnel over 1000 feet in length some six small, more or less vertical, ore shoots (20 to 60 feet in length and only 1½ to 4 feet in width) were developed which were lenticular in cross section. The ore of some of these shoots grades laterally into practically barren quarts. These small, lenticular quarts bodies or shoots in the Fugalev tunnel were separated from each other by intervening barren granite shear zones 100 to 225 feet in length. The lowest Fugalev tunnel, which is claimed to be on the footwall or east lead, shows practically no quarts, although there is a strong quarts vein showing above on the surface.

East or Footwall Vein: The vein-like quarts mass with the greatest regularity and continuity is that which is exposed in the west drift of the No. 2 Tunnel. This extends from an outerop 50 feet in front of the mouth of No. 2 Tunnel, with several swells and contractions but with an average width at right angles to the dip of over 6 feet, to a point 500 feet in from the portal. Along this same line the quartzose vein material at No. 1 Raise, continues on an inclination of about 39° up to surface (a distance on the incline of some 270 feet). Considerable irregularity in
The Ore (Cont'd.):

the width of the quartz along the two sides of this raise, however, was noted.

This "East" or "Footwall" vein, at a point 500 feet in from the portal, seems to pinch and its place is taken by flat, lenticular quartz bodies with great variation in strike and dip.

"The "East" vein, which has a general strike of about N30°W in No. 2 Tunnel (where it appears to run diagonal to the strike of the main vein zone), pinches in width to the south of No. 2 Tunnel mouth and where exposed in the "Powder Tunnel," only 100 feet south, is only 1 foot wide and has the normal N50°W strike of the vein zone on surface between No. 2 Tunnel and the Fugalei claims.

The next most continuous quartz mass is one which extends from point N1900-35 in "350 ft. x-cut" (G) of No. 2 Tunnel, almost due north across east breast of "P" x-cut to the north breast of the present north drift from the "650 ft. x-cut" (A), a distance of 325 feet. This large quartz body, which has a nearly north-south strike and a steeper dip (50° to 60° west) than the East vein, did not show in surface outcrop at all.

The so-called "West" or "Footwall" vein which shows in No. 1 Tunnel and probably also in the west drift from the "360 ft. x-cut" (G) on No. 2 Tunnel level, is not a parallel vein to the "East" or main tunnel 2 vein lead, but is an irregular quartz lead which in surface outcrop near No. 1 Tunnel has a N50°W strike but underground is seen to swerve
The Ores (Cont'd.):

around to a N350E direction toward a probable junction with either the "East" vein or with one of the "Intermediate" quartz bodies. This junction may account for the large showing of quartz vein material in the vicinity of "600 ft. x-cut" (B) on Tunnel 2.

The erratic occurrence of the quartz bodies and their existence as lenticular masses which are prone to pinch out either laterally or vertically within short distances prevents one who is at all conservative from figuring the quartz ore bodies as continuing for any great distances beyond the outcrops or the exposures in the underground works, either along the strike or the dip.

The Mineralised Belt on Surface:

The dense mass of fallen timber and the thick growth of moss, which together almost completely cover all the rock faces along the mountain slopes as well as in the valleys, hide the vein outcrops the whole length of their strike with the exception of three or four places where mountain freshets have washed the debris from the surface of the rocks along gullies.

Good exposures of both the "West", and "East" or "Main", vein leads show in the gulch along which are located the portals of Tunnels No. 1 and No. 2.

Another good exposure of the "East" vein showed in outcrop in the shallow gulch located some 175 feet north of the air-shaft where Raise No. 1 from Tunnel 2, comes to surface.
The Mineralized Belt on Surface (Cont'd.):

While endeavoring to follow the vein leads to the north on surface, Mr. Holler and myself succeeded in finding a quartz vein showing some sulphide, at a point roughly 2000 feet to the north of the present workings. This vein lead, however, was only about 15 inches wide and apparently pinched out before continuing 160 feet to the northward for no trace of the vein along its strike was noted although practically continuous rock exposures occurred for a considerable distance across and at right angles to its strike.

A couple of other gullies to the north showed almost continuous rock exposures across the line of strike but no further sign of the vein lead was detected. This led me to the conclusion that at points 2000 to 2600 feet north of the present workings on the veins the veins had either pinched out completely or were so insignificant in size that they were valueless.

A quartz outcrop is reported as occurring a mile or two farther north but whether this outcrop has any connection whatever with the Surf Inlet vein zone would be pretty hard to prove.

Between the mouth of No. 2 Tunnel and the "Powder Tunnel" (located some 100 feet south and at only 5 feet lower elevation) the "East" quartz body, which strikes N30°E and has a width of 30 feet on the horizontal near the mouth of Tunnel 2, pinches to two small quartz leads only 4 inches and 1 foot in width respectively, which have the changed strike of N-5 to N60°W.
The Mineralized Belt on Surface (Cont'd.):

Between Tunnel 2 and Tunnel 3 no outcrops occur and owing to the great variation in strike of the main veins, as just indicated, the locations of the "East" and "West" vein leads in the vicinity of Tunnel 3 level cannot be decided upon with exactness.

Farther south there is a fair showing of quartz vein material in the bed of Paradise Creek, near the boundary between the Surf Inlet and Pagsley groups of claims.

Although the general strike of the main quartz bodies in Tunnel 2 for the greater part of their extent was NNW, yet the determined average strike of the belt on surface between the east outcrops just above Surf Inlet Tunnel 2 and the "East" or "Footwall" lead on the Pagsley claims across the valley to the south is N50W, and the dip is 89° to the west.

The distance between Tunnel 2 and the Pagsley workings is a long one for correlation of such irregular vein leads, but the change in strike of the Tunnel 2 "East" vein to between N-3 and N60W in the "Powder Tunnel", together with evidence from surface outcrops on the Pagsley claims, seems to indicate that they belong to and are one and the same vein belt.

The Pagsley Group and Other Adjacent Mining Properties:

Upon the Pagsley claims a good surface showing of 6 feet width of quartz with some sulphides occurred along what is termed the "East" or "Footwall" vein in the gulch just north of the shaft on this "East" vein. Although there was a good
The Pugasley Group and Other Adjacent Mining Properties (Cont'd.):
surface showing on this "East" vein, the Pugasley lowest tun-
nel (which started on a quartz lense a few feet in diameter
and which was driven to develop this "East" vein and supposedly
ly upon it) followed for its whole length of 575 feet a shear
zone in granite which was practically devoid of mineralisa-
tion. Provided this tunnel followed the right vein lead, it
was sufficiently long to have extended beneath, and to have
developed in depth, the good quartz showing on surface.

The Pugasley Main or Upper Tunnel developed for its length
of 1060 feet, what is termed the "West" or "Hanging" vein,
which is approximately parallel to the East lead and about
100 feet distant from it. The vein on this Main Tunnel
shows some six lenticular shaped quartz ore shoots from 20 to
60 feet in length and 1/2 to 4 feet in width, separated from
each other by 100 to 225 foot stretches of a barren sheared
granite lead.

Two or three of the larger shoots were worked from the
tunnel level up to surface and to a certain but unknown dis-
tance below the tunnel level. The ore which was mined and
shipped from these shoots is claimed to have averaged slight-
ly over $20.00 per ton, but the aggregate tonnage was compar-
atively small and the mine probably never paid, due to high
costs of mining in addition to necessity of drifting through
so much barren sheared granite when exploring for new ore
shoots.

Width of stoped ground in some of the small shoots men-
tioned indicated greater strength of mineralisation at certain
The Pugaley Group and Other Adjacent Mining Properties (Cont'd.):

points above the tunnel level than at the depth of the tunnel.

The possibilities for developing ore on the Pugaley group appeared to be confined to the ore that might be opened up by putting raises up from the lowest tunnel on the Pugaley to develop the quartzes showing on surface along the Pugaley "East" vein; and to the ore that can be obtained by developing the six small shoots above mentioned, at greater depth, provided the shoots have not already been bottomed by the winzes sunk from Pugaley Upper Tunnel level.

Regarding the advisability of acquiring the Pugaley group of claims, wish to state that this property does not appear, from data collected during my brief examination, to offer possibilities for the development of any very large tonnages of ore and, therefore, unless the claims can be acquired at a very nominal figure, I would not advise the purchase of the property, especially since a good profit could probably be made by milling any ores the Pugaley Company may be able to produce, in the mill erected for the Surf Inlet mine.

In case the quartz ore of the Surf Inlet Tunnel No. 2 veins is found to extend to Tunnel No. 3 level, and provided the veins show marked strength, the average dip of those veins should be figured out and it should then be calculated how far the veins could continue on that dip before they left the west side lines of the Surf Inlet claims and entered the claims located by Mr. Wells and associates. In case the distance is short, a working option on these west claims of
The Fugasley Group and Other Adjacent Mining Properties (Cont'd.): Mr. Wells should be arranged for, provided a reasonable price is asked.

Distribution of Ore Values:

The distribution of values within the vein material is even more erratic than the occurrence of the quartz bodies along the sheared granite vein zone.

The crushed and sheared granite streaks along the zone, according to the assay plan, carry little or no values. Possible exceptions to this general condition are the sheared or schistose granite along the footwall of the main quartz vein in No. 1 Tunnel and a couple of points in No. 2 Tunnel where considerable quartzose vein material has been involved with the sheared granite as a result of recent movements, or where surface waters have caused a slight concentration of the gold values along the footwall side.

A study of the assay maps will bring out vividly the very erratic distribution of values within the quartz masses themselves. This appears mainly due to the fact that the major portion of the gold and silver values are associated with the sulphide minerals - pyrite and cupriferous pyrite or chalcopyrite, which are constituents of most of the ores and which occur very erratically disseminated or scattered through the ore as blotches, specks or discontinuous streaks.

The copper bearing sulphides and fine grained pyrite seem to be associated with the higher values.

A great deal of dependence will have to be placed on as-
Distribution of Ore Values (Cont'd.):

Saying in the mining of the ores because large portions of the quartz veins are too low grade to be worked profitably and will have to be left in place.

White milky quartz, practically free from sulphides; or vein material showing fragments of dark, only partially replaced, granite in a matrix of white quartz; or quartz showing blotches of orthoclase feldspar, altered mica and having practically no sulphides, are phases of the vein material which are usually so low in values as to be worthless as ores.

S A M P L I N G.

Results of Sampling:

The assay returns from the 65 samples taken under my supervision are plotted upon the geologic maps herewith submitted. These returns, and the sampling done, checked the sampling done by Mr. Roy King as closely as could be expected from the erratic occurrence of the ore values. Accordingly I have combined the results of sampling by Mr. King with my own in order to calculate the "possible" or "prospective" ore indicated by the ore exposures.

Method of Estimating Possible Ore:

The limited amount of work which has been done on the veins has not blocked out any ore and there is no "proved" or "probable" ore, from an engineer's point of view. However, in order to have some figures on ore tonnages and values upon
Method of Estimating Possible Ore (Cont'd.):

which to base an estimate of the prospective worth of the Surf Inlet property, I have taken the areas of probably pay ore indicated upon the assay plans of the No. 1 and No. 2 Tunnels, and have outlined the irregular horizontal block sections shown on the accompanying "Block Map." Then, assuming that the quartz bodies, outlined as ore, continue to an assumed height or depth consistent with the erratic occurrence of these deposits, I have estimated the tonnages and average values of the seven blocks taken, in order to arrive at an idea of the total "possibly pay ore" indicated by the ore showings.

Without more raises and winzes in the ore already exposed on the levels, no idea whatever can be obtained of the pitch of the ore shoots or the vertical extent of the ores. Therefore, please note that I do not consider the seven blocks outlined as representing actual conditions of occurrence of the ore, but their total tonnage simply represents my guess on the ore tonnage that ought to be in the mine, based on present showings and geological evidence.

In these estimations the average value of the ore in each block was carefully determined by giving proper weight to intervals between the samples, and by obtaining the average value by dividing the sum of the products of the sample widths by their assay values, by the sum of the widths.

The shapes of the various "ore blocks" were obtained by carefully obtaining the areas of vein material showing on the
Method of Estimating Possible Ore (Cont'd.):

horizontal plan of each block, and using these horizontal areas to calculate the areas of the blocks at right angles to the dip of the veins, and then using the measured or assumed altitude of the blocks along dip to complete the figures.

After the volume in cubic feet of each block was figured out, the tons of ore in each block were calculated by assuming 14 cubic feet of quarts ore in place to the ton.

**ORE BLOCKS.**

<table>
<thead>
<tr>
<th>Tunnel No. 2 Vein.</th>
<th>Tunnel No. 1 Vein.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions of Base</strong></td>
<td><strong>Approx. AV. Width</strong></td>
</tr>
<tr>
<td><strong>Block</strong></td>
<td><strong>In Feet</strong></td>
</tr>
<tr>
<td>1</td>
<td>250</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARY.**

- Blocks 1 to 5 multiplied by 2
- Tunnel No. 1 Vein Blocks
- Total Gross Value of Indicated "Possible" or "Prospective" Ore
Ore Blocks (Cont'd.):

**Block 1:** Extends from a point 40 feet northwest of mouth of Tunel 2 to center of No. 1 Raise, and from the floor of No. 2 Tunnel level 171 feet up Raise No. 1 along dip of vein. South side of block considered 20 feet in height and 7.5 feet in width.

**Block 2:** Extends from No. 1 Raise north along Tunnel 2 level for approximately 200 feet, and the south face of block equals cross section of vein material in No. 1 Raise to height of 117 feet. (Same face as used for north face of Block 1). North face of Block 2 assumed to have same area as south face and assumed area of top of Block 2 same as area on Tunnel 2 at right angles to the dip of the vein.

**Block 3:** An "intermediate" quartz body lying just west of Block 2. Assumed to extend for distance of 50 feet along dip above Tunnel No. 2 and to have upper face of block parallel to base at right angles to dip of 40° on Tunnel 2 and of an area equal to one-half the base.

**Block 4:** Irregular block with maximum width of vein material showing in "600 ft. x-cut" (3). Block of ore considered as having height of 50 feet along average dip of 34° to west. Upper face of block assumed equal to one-half area of base and to be parallel to base, which is considered as area of quartz body on Tunnel 2 at right angles to dip of vein.

**Block 5:** South most highly mineralized portion of large "Intermediate" ore body, which is assumed as having a height of 50 feet along an average dip of 63° to west, and with
Ore Blocks (Cont'd.):

Block 5 (Cont'd.):

the upper face of block assumed as equal to one-half the area of vein material on Tunnel 2 level at right angles to dip.

Block 6: Wedge shaped block of ore considered as existing along the "West" or "Tunnel 1 Vein" between the floor of Tunnel 1 and the floor of drift on "West Vein" on Tunnel 2. Upper face considered as area of section of vein at right angles to dip on Tunnel 1, 117 ft. length, x 6.5 ft. average width. Base of block considered as area of cross section of small exposure of vein on Tunnel No. 2 (length 35 ft. x average width 8.21 ft.). Altitude of block = 243 feet = perpendicular distance between floors of two tunnels along dip of vein.

Block 7: Ore assumed on "West" or "Tunnel 1 Vein" above floor of No. 1 Tunnel. Block considered as having its base and upper face both equal to upper face of Block 5 (that is, equal to area of vein exposed in No. 1 Tunnel taken at right angles to dip) and with an assumed average altitude above Tunnel 1 of 30 feet.

Ore Block Summary:

The sum of the tonnages and gross values of Blocks 1 to 5 represent the number of tons and value of what I consider the "indicated ore" on the "East" and "Intermediate" veins between surface and Tunnel 2 level. Assuming, with some reason, that these vein leads will all continue below No. 2...
Ore Blocks (Cont'd.):

Ore Block Summary (Cont'd.):

Tunnel and that they will produce as much ore of same value below Tunnel 2 as they will above the level, the total "indicated" ore along the "East" and "Intermediate" veins is double that for Blocks 1 to 5, or 48,244 tons of $6.17 ore of gross value of $594,128.08.

As the drift on Tunnel 2 on what seems to correspond to the downward extension of the "West" or "Tunnel 1 Vein" indicates that this "West" vein has pinched, it is unwise to assume any more ore along this "west" vein below Tunnel 2 level.

Accordingly, adding the tonnages for Blocks 6 and 7, or the estimated ore on the "West" vein, to the above totals for the "East" and "Intermediate" veins gives a grand total for the present "Indicated" ore in the whole mine of 52,812 tons of $6.43 ore of gross value of $443,932.20.

COSTS DEVELOPMENT & CONCLUSIONS.

Estimated Costs of Mining and Milling the Ore:

Without going into the matter of costs thoroughly, Mr. Bradshaw was of the opinion that $3.50 per ton would probably cover cost of both mining and milling, and also allow for metallurgical losses (approximately 9% or 10%) and for a 2% per ton development charge. This amount, however, to be the minimum figure used in any calculations. Of this $3.50, $1.75 is to cover cost of metallurgical treatment.
Estimated Costs of Mining and Milling the Ores (Cont'd.):

Therefore, to be conservative, I suggest, as a basis for figuring that $5.75 per ton be used as the estimated combined cost of mining and milling the Surf Inlet ores.

Estimated Net Profit of Indicated "Possible Ores":

Since $8.48 per ton was my average calculated value for the indicated ores in the mine, and figuring $5.75 per ton as the total cost covering mining, milling, metallurgical losses and development the net profit per ton would amount to ($8.48 - $5.75) $4.73.

52,200 tons x $4.73 = $246,906.00 Profit from the estimated "possible" ores in the mine at present.

Regarding No.3 Tunnel Workings:

The mouth of Tunnel No.3 is located some 1577 feet S12 1/2W of, and 569.2 feet below, the mouth of Tunnel No.2.

As seen on accompanying geological map of Tunnel No.3, a strong sheared granite and gouge vein or fault lead was encountered in the x-cut tunnel at 185 feet from the tunnel mouth. This shear zone, which varied from 5 to 8 feet in width, was barren, or showed no more than traces of values, for the entire distance of 157 feet which had been exposed by the drift now being run upon it to come beneath the No.2 Tunnel workings. This lead had an average strike of approximately N 2 E, with a local strike of N 4 E at the east breast and of N 6 W where it enters the south face of the tunnel.

A few small lenses, a few inches to 2 feet in length, of white feldspar (probably albite), associated with a little
Regarding No. 3 Tunnel Workings (Cont'd.):

pegmatite quartz, were the only evidences of likely vein material along this lead and specimens from these lenses gave only traces in the assay returns.

A second, but less pronounced, shear zone was passed through by the x-out tunnel between 250 and 260 feet from the portal.

The only other possible vein lead was a pegmatite dike about 1 foot in width which crossed the tunnel 180 feet in from the portal. This carried no values.

An effort was made to correlate the main sheared granite lead in Tunnel 3 with either the so-called "Foot" (East) vein or with the "Hanging-wall" (West) vein of Tunnel No. 2.

No surface outcrops of the veins occurred between the "Powder Tunnel" and No. 3 Tunnel, and therefore all deductions had to be based upon the following data:

The Strike of "Footwall" or "East" vein lead on surface between a point on outcrop above Tunnel No. 2 and a point at same elevation on what is supposed to be the same footwall lead on the Pugsley group was 56°W.

Dip of this footwall vein lead on mountain slope to south of Pugsley mine = 80° dip west above and 40°

Dip west below.

Strike of Footwall (East) vein in Tunnel 2 = 82°W.

Strike of Footwall vein in "Powder Tunnel" = N-S to 86°W.

Average of 15 dips recorded by King on Footwall vein Tunnel 2 = 46°40'W.

Average of 39 dips recorded by Garrey on Footwall vein Tunnel 2 = 45°W.
Regarding No. 3 Tunnel Workings (Cont'd.):

Average of 11 dips recorded by Garroy on Tunnel 3 vein lead

With a difference of 369.2 feet in elevation between Tunnels 2 and 3, and a decided dip to the west, the "East" or Footwall vein of Tunnel 2 should be found a considerable distance to the west at the elevation of Tunnel 3. The amount of this horizontal displacement for this elevation of 369.2 feet and for various dips is as follows:

For 45° dip W the horizontal displacement = 370 feet.

- 43°5° " " " " " " = 397 "
- 40° " " " " " " = 441 "
- 39° " " " " " " = 455 "
- 38° " " " " " " = 472 "

In case it is assumed that the average strike of the "Footwall" vein between Tunnel 3 and Tunnel 2 is the same as the surface strike given above - that is, NES° - then the "Footwall" vein with a flat dip of only 30°W, projected from Tunnel 2, would intersect the Tunnel 3 level in a line running through the mouth of Tunnel 3, while with a dip of 45°W the vein would project to a point 100 feet outside, to the east, of the mouth of Tunnel No. 3.

On account of the "Footwall" vein projecting to locations entirely outside of the Tunnel No. 3 workings on the basis of the determined surface strike of the vein, it at first led to the conclusion that the sheared granite lead in Tunnel 3 was possibly the "West" or "Hanging-wall" vein lead instead of representing the "East" or "Footwall" vein as supposed.
Regarding No. 3 Tunnel Workings (Cont'd.):

However, aside from a couple of insignificant west-dipping fractures which strike under the "Powder Shed" a short distance east of No. 3 Tunnel, no evidence of a possible vein lead, occurring in the rock outcrop which extended for 150 feet east of the mouth of Tunnel 2, was detected on surface.

Again, in case the strike of the "Footwall" vein happened to be E-3 instead of N50°W, then assuming a dip of 39° west, the "Footwall" vein would have a horizontal displacement between the two tunnels of 455 feet and the projection of the "Footwall" (East) vein from Tunnel 2 would coincide with the sheared granite lead now being drifted upon in Tunnel No. 3.

Since this "East" or "Footwall" vein changed its strike some 22° to 26° in the distance of 100 feet between Tunnel 2 and the Powder Tunnel, to the south, it can be easily seen how the vein could vary the 5° in its strike, necessary to cause the "Footwall" vein of Tunnel 2 to project to the location of the sheared granite lead in Tunnel No. 3 drift.

Therefore, it cannot be definitely stated which vein the Tunnel 3 barren vein lead corresponds to and accordingly, if possible, the Tunnel 3 lead should be continued to be drifted upon to the northward until a point beneath the main quartz showings on Tunnel 2 has been reached, when correlation with the vein leads on Tunnel 2 can probably be made, but in case it is still impossible to correlate the vein leads crosscuts both to the east and the west should be run until the limits of the general vein zone shown on Tunnel 2 have been definitely determined.
Suggested Development Work and Recommendations:

**On Tunnel No. 3:**

1250 ft. of drifting to come beneath Tunnel No. 2........@ $18.00 per ft. = $22,500.00

1000 ft. of drifting on vein leads on Level 3 beneath Tunnel 2 workings........18.00 " " = 18,000.00

1000 ft. of x-cutting on Tunnel 3 level..................15.00 " " = 15,000.00

1150 ft. for 2 raises on dip of vein material between Tunnel 3 and Tunnel 2 levels..................10.00 " " = 11,500.00

500 ft. of x-cutting from above raise at intermediate points..........................4,500.00

**On Tunnel No. 2:**

300 ft. raise from 600 ft. x-cut on Tunnel 2 to surface to prove up ore showing on Tunnel 2. Raise necessitated by extremely low grade of ore showing in Raise No. 1...........3,000.00

100 ft. of x-cutting from above raise at point 100 ft. above Tunnel 2..........................1,500.00

245 ft. raise along "West" vein between Tunnels 2 and 1.................................2,450.00

**On Tunnel No. 1:**

60 ft. of raising for 2 raises on "West" vein between No. 1 Tunnel and surface......................600.00

Total Cost of advisable development work $79,060.00

**Costs:**

Costs assumed for estimating expense of above development work:

Drifting.................. $18.00 per foot
Crosscutting.............15.00 " "
Raising....................10.00 " "

GEORGE H. GARREY

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Suggested Development Work and Recommendations (Cont'd.):

These figures are considerably lower in amount than the work is actually costing at present on account of unusual working conditions, but these cost figures can possibly be attained or even reduced.

Recommendations:

The most important piece of development work, of course, is the continuing of the No. 3 Tunnel drift, now being run, until it comes beneath the center of the quartz area showing on Tunnel 2, and the running of east-west x-cuts at right angles to this drift, until the east and west limits of the 300 foot sheared granite vein zone have been reached, and then the drifting north and south along the strike of any quartz bodies encountered during this work.

Of course in case fair sized bodies of new ore are not opened up by this development work on No. 3 Tunnel level, the proposition on the basis of the present option is a poor one and the option should be dropped.

Even provided quartz bodies of fair size and value are encountered on No. 3 Tunnel level, extensive development work to actually put the ore "in sight," at least as "probable ore," should be done before the Company makes the $150,000.00 cash payment or starts the erection of the contemplated 400 to 500 ton mill and 1000 H.P. hydro-electric plant, for the erratic occurrence of the quartz bodies combined with the treacherous occurrence of the values within those quartz bodies themselves, makes the proposition a very risky one.
Suggested Development Work and Recommendations (Cont'd.):

unless the ore bodies have been thoroughly developed both vertically and horizontally.

Accordingly, my advice is not to make these large expenditures until after the above outlined development work, or its equivalent, has been completed. The carrying out of all this work will undoubtedly take more time than until July 1, 1915, and accordingly (provided the findings on Tunnel 3 level in the next two or three months warrant it) I recommend that an extension of time on the option be obtained if this can possibly be arranged.

Estimated Costs for Proposed Power Plant and Mill:

As Messrs. Bradshaw, Holler and Cleaveland had gone into the subject of the hydro-electric power plant for the property, I gave this subject no attention. Mr. Bradshaw, however, estimates that an adequate dam and power plant with all necessary equipment could be installed for... $75,000.00

A 400 to 500 ton mill for treatment of ores would probably cost a minimum of... $250,000.00

Estimated Total Necessary Expenditures:

To be spent per terms of option before Jul. 1'15... $75,000.00

For additional development work to prove up mine satisfactorily... $50,000.00

For cash payment July 1, 1915, with interest at 6% from April 1, 1916... $152,250.00

For hydro-electric power plant and its equipment... $75,000.00

For 400 to 500 ton mill... $250,000.00

Forward... $602,250.00
Estimated Total Necessary Expenditures (Cont'd.):

Forward.................................................. $602,250.00
Working Capital, to be supplied by purchaser,
per Option.................................................. 100,000.00
For improving transportation facilities................. 30,000.00
TOTAL................................................................. $732,250.00

Conclusions Regarding Possibilities Based on Ore Occurrence:

While good sized lenticular bodies of quartz, embracing fair sized tonnages of low grade but payable gold ore, occur on the Surf Inlet property, yet the bulk of the geological evidence points to a very erratic distribution of these ore bearing quartz lenses, both laterally and vertically along the sheared granite vein zone. That is, the quartz occur either as isolated lenses or as aggregates of lenses scattered at long intervals along the 160 to 300 foot wide crushed or sheared granite zone and having long stretches of practically barren sheared granite between the portions of the belt in which the lens or clusters of quartz lenses occur.

The group of lenticular quartz bodies in the vicinity of Tunnels No. 1 and 2 on the Surf Inlet claims appear to be the most important group along the whole Surf Inlet-Pugsley mineralized belt, and the only one which possibly has much prospective value.

The "West" or "No. 1 Tunnel" vein appears to diminish in size in the poor exposures in the gulch just south of No. 1 Tunnel, while the main "East" vein of No. 2 Tunnel gives every evidence of pinching out entirely in the neighborhood of the "Powder Tunnel" 100 feet to the south.
Conclusions Regarding Possibilities Based on Ore Occurrence (Cont.):

The limits of the quartz vein material to the northward have not been determined as yet in the north breasts of No. 1 and No. 2 Tunnels, and accordingly ore possibilities exist in the debris covered area along the vein zone to the north of these two tunnels. However, it should be kept in mind that surf ace observations made by me seemed to indicate that the vein zone had pinched and practically disappeared before a point approximately 2000 feet north of the present mine workings had been reached and, therefore, that it is within the range of possibility that the ore bearing quartz might extend for but a short distance beyond the present north breasts of the Tunnel 1 and Tunnel 2 workings. Nevertheless my opinion is that the main, and almost the sole, possibilities for further ore development upon the Surf Inlet properties lie in the finding of possible extensions of the present ore bearing quartz bodies in the area immediately north of the present workings, and in the possible downward extension of the same general cluster of quartz lenses as are exposed in the present mine workings.

In case the sheared or schistose granite of the vein zone, which encloses the lenticular bodies of quartz, was itself mineralized to even a moderate extent as a result of mineralized quartz stringers or veinlets running through the schistose mass and thus showing that the shear zone originated prior to the period of ore deposition, I should be much more optimistic about the ore extending to considerable depths.

However, the sheared granite zones appear to be practi-
Conclusions Regarding Possibilities Based on Ore Occurrence (Con.):

Cally barren of values, and are almost devoid of anything resembling mineralized quartz stringers, and therefore most of the movements resulting in the crushing and shearing of the granite which has not been replaced by quartz was subsequent to the main period of ore deposition.

Accordingly I look for the ore bearing quartz masses to have an erratic distribution down along the dip of the vein zone, the same as they are known to have along the strike of the zone.

As pressures increase with depth, the effects of the shearing movements are likely to become more pronounced with depth.

I do not expect the quartz masses showing on Tunnel 2 level to have increased in size or importance upon Tunnel 3 level, and it is a very serious question if they will not actually be found to have diminished in size. However, this is a point that can only be decided by development work, and the fair sized tonnages of workable ore on Tunnel 2 justify the continuing of explorations for the possible extensions on Tunnel 3 of the group of quartz ore bodies showing on Tunnel 2.

Conclusions:

In order to get back in profits the total estimated capital outlay of $792,250.00 with interest, it is necessary to develop at least 125,000 tons of ore of value similar to estimated Blocks 1 to 5 ($8.17), in addition to the 52,200 tons
Conclusions (Cont'd):

of "possible" ore calculated as indicated in the vicinity of the present workings.

Therefore it would be unwise to put in an expensive mill and power plant unless at least 200,000 tons of ore, averaging $8.00 per ton or better, have been developed in the mine.

By "developed ore" I mean ore that has actually been put in sight as "proved" or "probable" ore by workings on three sides, for, owing to the very erratic distribution of ore values on this particular property, it would be very risky to expend large sums on installation unless sufficient ore was actually in sight to insure practically the entire return of your investment.

Since sufficient work has not as yet been done upon the Surf Inlet properties to block out ore so that even the 52,200 tons of estimated "possible" ore can be considered as "probable" ore, these properties must be considered simply as "prospects," and owing to the erratic occurrence of ore values in the quartz bodies themselves, the proposition resolves itself into a gamble as to how great tonnages of pay ore can be developed along the pitch of the ore bodies between the present showings above Tunnel 2 level and the contemplated development workings on Tunnel No. 3.

Provided the pay quartz bodies represented by Blocks 1 to 5, continue with the same size they have on Tunnel 2, to Tunnel 3 level, I figure approximately 300,000 tons of ore could be developed above Tunnel 3.

Of course, if the quartz lenses on Tunnel 3 level are of
Conclusions (Cont'd.):

sufficient size or abundance to warrant one in figuring with
definiteness that an equivalent of a tonnage of 200,000 tons
of $8.00 ore exists between Tunnel 3 and the Tunnel 2 present
workings, and between the latter and surface, then it would
be conservative to assume that sufficient additional ore could
be developed in the region east of the present Tunnel 2 work-
ings and in depth below the Tunnel 3 level to assure a fair
profit on the investment.

Since the "East" or "Footwall" vein (which at present is
the main quartz ore belt of the mine) shows great irregularity
and also evidences of pinching out in the north breast of
Tunnel No. 2, and since the large "Intermediate" quartz body
showing in the northwest part of Tunnel 2 exposes only very
low values or traces of the ore minerals where drifted on to
the north for 90 feet, the prospects for large ore develop-
ment in the area to the north of the breasts of the Tunnel 2
workings are not bright.

While quartz ore of just as good grade as occurs above
may be found to extend from Tunnel 2 to Tunnel 3 level, and
although fair sized quartz bodies may be found on Tunnel No.
3 level, yet the bulk of the information collected regarding
the ore occurrence both on the Surf Inlet property and on the
Puglsey group does not encourage one to expect either that
the pay ore deposits will increase in size with depth or that
these deposits will extend to great depth.

In conclusion, I might state that while the Surf Inlet
Conclusions (Cont'd.):

property has considerable merit and latent possibilities which upon development might reveal a sufficient tonnage of low grade pay ore to insure a fair profit on the necessary total capital outlay, yet I do not consider from present indications and showings that the property offers promise of ever developing into a great big mine - by this I mean a mine which is likely to pay several millions in profits.

Very respectfully submitted,

Geo. H. Garrey.