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WAVERLY TANGIER MINES LIMITED (N.P.L.)

REVELSTOKE MINING DIVISION
KOOTENAY DISTRICT, B. C.

674517

WAVERLY TANGIER MINES

REVELSTOKE MINES DIVISION

KOOTENAY DISTICT

BRITISH COLUMBIA

THE WAVERLY MINES COMPANY

CAPITALIZATION

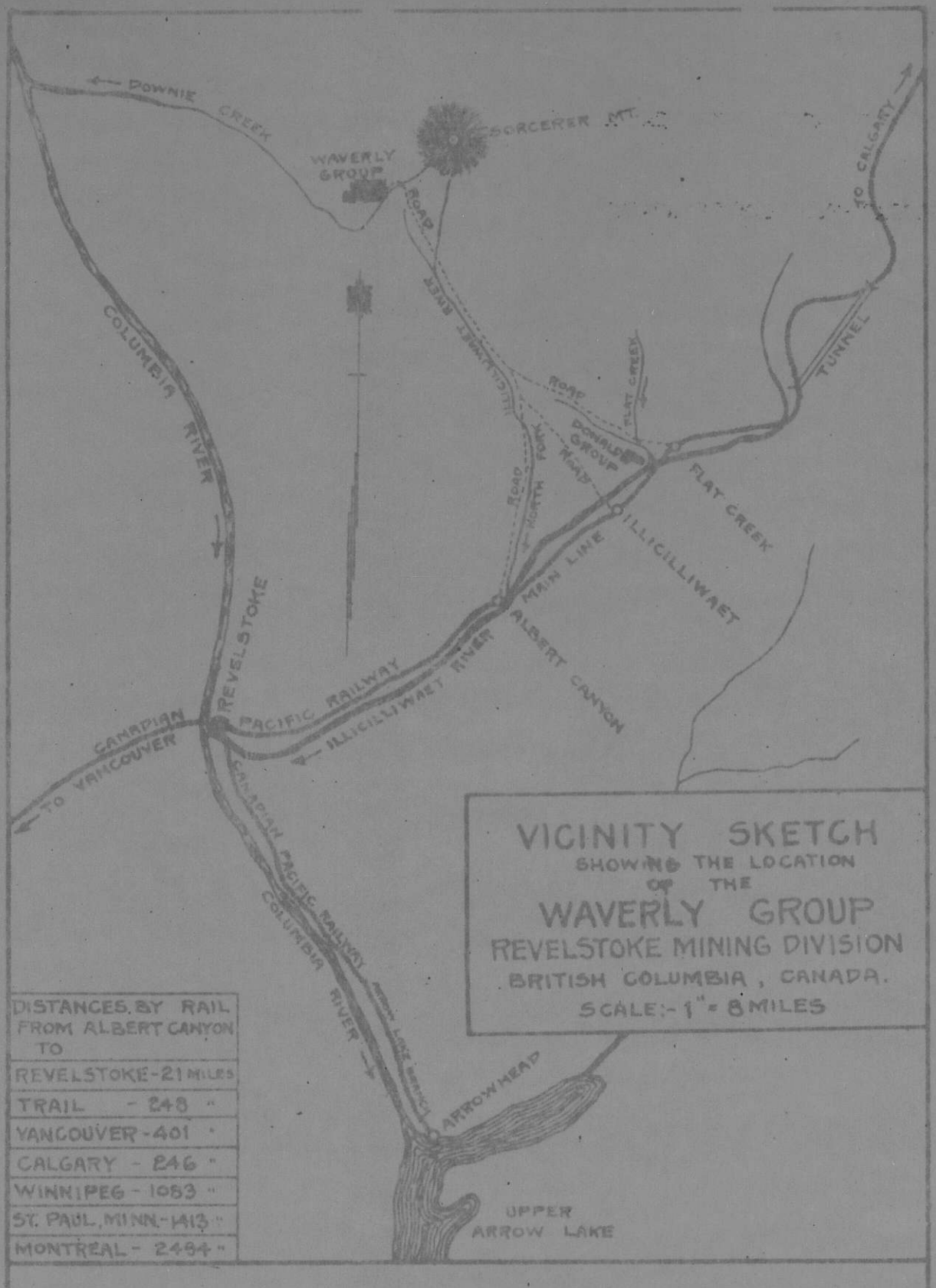
The Waverly Mines Company is capitalized for $ $600,000 divided into 600,000 shares, assessable, of a par value on One dollar; Incorporated under the laws of the State of Washington. 250,000 shares remain in the treasury.

OFFICERS OF THE COMPANY

C.D.Martin	President
Frank Nealy	Vice President
George H. Walters	Secretary and Treasurer

BOARD OF DIRECTORS

C.D.Martin	President Martin Grain & Milling Co. Cheney Washington President Cheney National Bank Cheney Washington	
N. A. Rolfe	Banker	Chaney Washington
G. H. Walters	Walters Investment	Spokane Wash.
L. M. Lisco	Federal Service	Spokane Wash.
Frank Nealy	Retired Farmer	Spokane



VICINITY SKETCH
SHOWING THE LOCATION
OF THE
WAVERLY GROUP
REVELSTOKE MINING DIVISION
BRITISH COLUMBIA, CANADA.
SCALE:- 1" = 8 MILES

DISTANCES BY RAIL FROM ALBERT CANYON TO
REVELSTOKE - 21 MILES
TRAIL - 248 "
VANCOUVER - 401 "
CALGARY - 846 "
WINNIPEG - 1083 "
ST. PAUL, MINN. - 1413 "
MONTREAL - 2484 "

WAVERLY MINES

TO ACCOMPANY REPORT OF

Chas. O. Adams
MINING ENGINEER
SPOKANE, WASH.

SEPT. 1, 1921

REPORT ON THE WAVERLEY-TANGIER MINES

LOCATION.

This property is situated twenty-six miles north and west of Albert Canyon, a station on the main line of the Canadian Pacific Railway, twenty-one miles east of Revelstoke, in the Revelstoke Mining Division, Kootenay District, British Columbia.

DESCRIPTION

The group consists of three Crown Granted claims and five locations. They are situated in two adjoining groups covering all the valuable ground, with a total area of 410 acres.

PHYSICAL LOCATION

The location is at the head-waters of the North Fork of Downie Creek and one and a half miles below the divide between it and the North Fork of the Illecillewaet River, the streams being tributaries of the Columbia River on the west side of the Big Bend. The Waverley and Montague and two locations cover the steep mountainside on the north of the creek, from an elevation of 5800 to 7200 feet above sea level. The other group is located along the creek below and immediately south, and consists of the Tangier Crown Granted and three locations covering extensions. The elevation at the Tangier shaft is 4800 feet above sea level. The country is in the Selkirk Range and surrounding the property are some of the highest peaks and largest glaciers of the famous Canadian

Rockies. The twenty-six miles of road leading to Albert Canyon from the property follows the scenic North Fork of the Illicillewaet River on an easy grade. This road was built some years ago and in spite of its neglect fully 75% would be passable for wagons today. This shows that it would not be difficult to keep the road in the best shape. Numerous reports have been made on the property and all of them have rated it as a property of great promise of becoming one of the largest mines in British Columbia.

GEOLOGY

The geological formation is in either the Upper Beltian or Lower Cambrian. The Country rock consists of a series of conformable beds of limestones, talc slates, argillaceous limestone, and occasional beds of Calcareous sandstones. All have a Northwest and Southeast strike, dipping to the Northeast. This series of rocks were subject to the effects of the general uplift which produces faultings, fissurings and slipping favorable to the formation of mineral veins. The rock being limestone was readily replaced by the mineral in the mineralizing solutions.

There are two well defined fissures formed, up which the mineral bearing solution ascended; the one on the Waverley vein, and the other the No. 3 Tangier vein; the dip, strike and general occurrence of these two fissure veins are identical. Off of these fissures occur chimneys of ore, some of them have been opened up.

Near the Waverley vein there are evidences of several

chimneys in surface outcrops, one of which was opened up extensively. On the Tangier two chimneys were opened up; the one outcropped on the surface while the other was found at 100 feet depth. In both cases the Waverley and Tangier, the chimneys are on the footwall of the fissure veins. They are very rich in the same minerals as the main fissure veins, serving to prove the richness of the main fissures from which they originated. The Geology is particularly favorable for large, rich and regular deposits of Silver-Lead ores.

DEVELOPMENT

The work done upon the property consists of 1900 feet of drifting; 400 feet raise and 45 foot winze on the Waverley: 100 ft. of two compartment shaft, 100 ft. winze and 470 ft. or drifting on the Tangier.

ORE BODIES

The ore bodies opened up most fully were the chimneys. The ore on the Waverley shows now, conservatively estimated, 10,000 tons of an average $25.00 per ton, the ore running 4% Lead, 20 oz. Silver and $1.60 in Gold per ton.

The Waverley vein or Mother lode is remarkable for its uniform outcrop both in its regularity of dip, strike, width and value of the ore. It can be traced for 3000 feet on the surface by the yellowish oxidized lead ore which assays 16% Lead, 22 oz. Silver and 80¢ Gold. This has a width of 5 feet, dipping at an angle of 65° towards the northeast. This is remarkably high value for an oxidized lead outcropping. The winze that was sunk 45 feet on the vein showed a uniform

width, dip and value thruout. A vein sample of the full width of five feet (not a picked or a select sample but a general sample), assayed 42.1% Lead, 118.8 oz. Silver and $5.80 in Gold. This ore at the present prices would be worth $156.00 per ton.

This uniformity of the outcrop is an indication of its uniformity with depth, for while the vein can be traced easily for 3000 feet on the surface, it can be found even farther. Such regularity of values and characteristics of veins are rare except in cases of the most productive mines known.

On the Tangier the 100 foot shaft has proven up an ore chimney with a width of 8 feet and length of 80 feet that assayed 8 to 15% Lead, 30 to 80 oz. Silver, and $10.00 Gold; or a value of $[illegible].00 to $70.00 per ton. Roughly it is safe to say that there is $100,000 worth of ore here. Another chimney was found at this shaft that did not outcrop on the surface: this was explored to a depth of 100 feet below the 100 foot level. While not enough work was done to estimate the full extent or average value of this chimney, a sample taken from 60 tons on the dump sorted out as it would be for direct shipment to the smelter gave 31.2% Lead, 1.3% Copper, 43 oz. Silver and $9.60 in Gold, or a value of $83.00 per ton. More work on this chimney would prove it equally as large as the one at the shaft.

The fissure vein on the Tangier can be traced on the surface for 1000 feet and by occasional cuts for several thousand feet, the greater part of it being covered with surface

drift and gravel. It is exposed along the bank of the creek, and is well mineralized, containing an average of over 5% Lead and 10 oz. Silver in Sulphides that can be concentrated. This vein was proven at a depth of 100 feet, and gives promise of being a very valuable source of ore when properly developed. It has a width of 5 feet dip of 65° Northeast, the same as the Waverley.

PROSPECTIVE VALUE

IT has the highest prospective value. It is seldom seen where there are so many indications all pointing to the occurrence of large and dependable bodies of ore. It comes as near being a certainty as is possible in mining. With little development there will be opened up and ready for mining enough ore, the profit from the extraction and sale of which will more than repay the cost of the property and all the money necessary to open up and equip it.

The question of transportation is one of the most important, but in this case there are no great obstacles to be overcome. There is absolutely no difficulty in constructing a first class wagon road on reasonable grades with comparatively light work to Albert Canyon. The old road was built by contract with little or no thought of making it a permanent or suitable road for hauling, yet, today, after years of neglect, except in a few short sections it is comparatively in good condition, but whatever the cost might be to construct a high grade auto road, the Provincial Government will stand one-half of the cost; and as it is a 24-mile downgrade to Albert Canyon the conditions

are perfect for cheap hauling.

WATER POWER

Water power can be developed right on the property and no long, expensive transmission lines are needed to deliver the power to the mine. Downie Creek has a fall of 600 feet just below the Tangier shaft and with the minimum recorded flow of water, 600 horsepower could be developed. There is 1000 ft. fall with about half the flow of water above the Tangier which could be utilized and a minimum of 400 horsepower developed. The normal flow of the creek is more than double the amount stated, but these figures are the very lowest. This flow of water is dependable, as the sources of the Downie Creek are in the large glaciers above the property.

TIMBER

There is ample saw and mine timber on this and adjoining the property, and at the time the property was being developed they had a sawmill and cut all the lumber used in the buildings. Lime could be burned for masonry work if desired, as all the engine beds and other masonry work was laid with mortar from lime burned on the ground. If there was occasion for it, cement could be burned from the argillaceous limestones which abound.

Taking everything into consideration it is almost impossible to find another property with all the earmarks of a big mine such as this one. I know of only one Silver-Lead property that had as richly a mineralized and as uniform an outcrop as the Waverley and Tangier and that was the Bunker Hill

and Sullivan mine in the famous Coeur d'Alene Mining District.

The promise is almost a certainty and the conditions required to make it one of the largest silver-lead producers in North America are ideal. This together with proper development, and equipment for economical operation, and funds to put everything in the best possible shape of operation, and intelligent direction of the work, will make the mine a valuable property.

CONCLUSION

Having in the last three years examined in Idaho, Washington and British Columbia a dozen or more dividend-paying and producing mines with a view to investment in their stocks; and having carefully gone over a score or more of properties in various stages, from the raw prospect to practically developed mines (for the purpose of finding one that could be honestly and conscientiously presented to the investing public), for the purpose of converting the investment into a dividend-paying, producing property and thereby reap the large rewards accruing (just the same with no more risk than the Hayden-Stone, Jackling, Anaconda, Phelps-Dodge and Guggenheim interests do to their own profit of millions of dollars annually, simply because they take the minimum of chances), of all of the many examined the Waverley-Tangier Group is the only non-producing property that affords an opportunity of this kind.

Considering any of the large dividend-paying mines with no more development work, it outranks them all. Even the

Hercules, the premier Bonanza Silver-Lead Mine of the Coeur d'Alenes, never had the showing and never did have the high grade Silver ore of the Waverley-Tangier Group.

If I personally had the money or the credit to borrow the money required for the opening up and development I would personally finance it and not a share of the stock would be sold, to anyone. It is sure to be a big winner with good management and equipment.

Dated Spokane, Wash., Oct. 20th, 1917.

(Signed) J. H. Eby

Mining Engineer.

By

M. DEVLIN YOUNG, M. Sc.

B. C. Mining Engineer

LOCATION:

The Waverley mines are located 76 miles from Albert Canyon, B.C., a station on the C. P. R., 21 miles east of Revelstoke, and at the headwaters of Downie Creek and the North Fork of the Illecillewaet River, B.C., Canada, at an elevation ranging from 4,200 feet to 5800 feet above sea level, and 3000 feet above Albert Canyon, over a river grade, of about 4%, until reaching the summit, where a 10% grade is followed for a mile, thence 2 miles over an even grade to the mine.

DESCRIPTION:

The Waverley property consists of 16 claims, 2 being Crown Granted (Same as U. S. Patent), the remaining 14 claims are entitled to Crown Grants, having all necessary requirements completed to obtain same. In all, there is over a mile square of well mineralized ground covered with a plentiful supply of valuable timber, for all purposes, and an ideal location for natural power on the Frontier claim, where a series of falls totaling 600 feet, which will furnish 1000 H.P., sufficient to operate the entire property. At the foot of these falls, on a flat, covered with large timber, is a mill site suitable for power plant and reduction works.

GEOLOGY:

The general formations, observed on the property, are a continuous conformable bands of lime and slaty shale, on the Waverley Montague claims, and at the Empire claim 1000 feet lower this formation merges into an argillaceous lime and schist. This locality has been subjected to a severe fracturing, occasioned by the general up-lifting of this mineralised belt, which exhibits far into the Slocan district. These fractured zones have admitted ascending solutions to percolate along the faulting planes, depositing their commercial values promiscuously within the fissure system of veins. This applies to the Waverley-Montague claims, while at the Empire mine, 1000 feet lower, the formation becomes more massive, and merges into an argillaceous lime, exhibiting changes, presumably entering the Vaccea Zone, from where most likely the ascension of mineralisation by solution originated, causing the upper claims to contain their oxidised ores.

VEIN FORMATION:

The intensity of the Waverley vein might be erroneously termed a dyke but its filling is mostly formation impregnated by mineralised solutions, at intervals not being confined to its walls, although, at these points good ore is always found.

This vein is more than fifty feet wide, and plainly traced 3000 feet on the surface. This length is confined to the hanging wall, where much high grade ore is found its entire length. The foot wall was encountered by a cross-cut and is

well mineralized are pronounced. The filling being fractured formation, with quartz and calcite veins following along the striation. Such faulting and pressure slips are found, where ore deposition is often found. It is quite possible this whole vein will be filled with the same character of ore, as the writer has samples across 75 feet on all levels, even at the lowest, 550 feet below No. 1 tunnel. This mineralization was undoubtedly caused by the ascension of solution from the Vadose Zone and deposited its commercial values where the formation was impervious. I am much of the opinion that these walls will converge at the lower levels, and the vein filling will be more or less regularly filled with commercial ores. The Tangier veins are more regular and their fillings are quartz and calcite with shoots of ore of good dimensions. One vein is 8 feet wide and the other 15 feet. These veins can be depended upon as producers of gold-silver, lead-copper ores for an indefinite time.

The veins on both properties have the same strike and dip. Northeasterly and southeasterly with a dip ranging from 65 to 80 degrees to the east.

Vein Minerals:

Ores found on the Waverley are: Lead-silver, with light gold values. On the Tangier, gold, silver, lead, copper and zinc and some white iron. (Marcasite). The Tangier carries exceptional gold values, running as high as 2 oz., but averaging about $6.00.

There is a considerable shipping ore on both properties, and an immense amount of concentrating ore. These large veins

will furnish an unlimited tonnage of ore, for an indefinite period of time.

ASSAYS:

These samples were taken by myself, and part by the owners, and assayed by Ird-Cowan and checked by myself.

[illegible] Tunnel

	Gold oz.	Silver oz.	Lead %
6½ ft. beginning from footwall, in first stope	0.04	13.6	4.8
5 feet following	0.13	12.	3.1
12 " "	0.05	26.5	1.7
13 " "	0.06	18.2	4.7
5 " "	0.01	13.7	42.2
7 " "	0.06	22.6	3.7
12 " "	0.09	11.	5.8
10 " "	0.02	14.0	14.6
Select hard	0.25	96.5	24.4
" soft	0.04	27.8	12.6

[illegible] Tunnel

Top of Winze 4 ft.	0.15	37.-	34.4
Bottom " 4 "	0.20	69.7	27.5
Croping North	0.16	15.6	9.1
" "	0.10	44.6	17.5
" "	0.05	32.8	22.5
Short tunnel			
North 3 ft.	0.09	11.9	19.8
Winze 3 ft.	0.07	20.4	18.7

Tangier:

200 ton dump	0.32	25.4	17.9
200 ton coarse	0.05	32.6	19.5
Select dump	1.61	95.7	26.7
" "	1.07	70.2	27.6
Winze	0.60	61.9	28.

At the time of this sampling, the lower levels could not be sampled, owing to the ladders being broken, and the #3 tunnel had caved, but recent investigations disclose ore in every level, and in like measurements. There is a chute of ore I sampled in No. 3 level, estimated at 1,500 tons assaying $60.00 per ton, amount-

ing to $4,250.00 not taking the ore below into consideration. It is also estimated there is 100,000 worth of ore stored in the #6 tunnel, and 10,000 tons ranging between #6 and #8 tunnels. Also 1500 tons available for measurement in the Tangier, besides about 500 tons on the dump. This is positive ores, probable ores are several times this amount, while possible ores would be too extravagant to exaggerate.

When the Waverley vein is reached 100 feet lower, a tonnage to last an indefinite period of time will be developed. About a mile north, it is claimed the Waverley vein shows up clearly and carries a heavy sulphide ore. This is not unreasonable as at this point pressure the vacuose zone has been entered.

TRANSPORTATION:

The means devised by the present company will greatly reduce the cost of transportation. It has been arranged to use caterpillar trucks, hauling horse loads, which the present road under construction will maintain. Two writer has proposals from several firms professing to demonstrate their trucks asserting delivery can be made for $5.00 per ton, including maintenance and depreciation. It is the intention of the company to be prepared to start delivery of ore about the first of August, 1924. As a further means of economy in ore delivery, it is planned to install an aerial tram, reducing the distance to 20 miles. Power is obtainable along the entire route. One firm questioned relative tonnage if an electric [illegible] would be installed. This firm asserting with the excellent quality and quantity of timber,

with tourist travel, this would be quite feasible. It might be mentioned this canyon is one of the most picturesque in B. C.

CONCLUSION:

I receive no hesitation in stating the Waverley-Tangier Mines can be made to be producers of commercial ores in vast quantities for many years. The properties contain the merits and invite the closest inspection. With the facts mentioned in this report, I can see no reason why the propert, should not be a revenue producer. Quite true, operations must be judiciously nursed and much development be done on the Waverley where drifting will disclose ore chimneys, similar to the ores now shown. There are 1200 feet of surface showings which can be drifted on, and be made producing. All the work in the Waverley is by tunnel on a 30 degree slope, making depth in short distances. The ground is mostly self-sustaining and easily drilled.

The Tangier veins require no comments as the high gold values within the large veins makes this an attraction. Economic conditions prevail at both properties and only require systematic development. There is a large positive tonnage developed, also vast tonnage as probable, and inexhaustible possible reserves.

H. ORVILLE YOUNG,

Albert Canyon, B. C.

Jan. 26th, 1924.

(Signed) H. Orville Young.

NOTE: All figures were ascertained when lead was low also copper values low.

REPORT ON THE MAVERLY MINES

REVELSTOKE MINING DIVISION

KOOTENAY DISTRICT

BRITISH COLUMBIA, CANADA

REPORT ON LOWER WORKINGS

By

Chas. O. Olsen, E. E.,
Spokane, Washington.

September 1, 1921.
July 24, 1922.

REPORT ON WAVERLEY MINES

1. TO WHOM IT MAY CONCERN:

I am not interested in the ground in any way and am not a stockholder of the company. I am prepared to go to the ground at any time and make a joint examination with any reputable Mining Engineer for the purpose of verifying any of the statements contained in the following report. At the time of the examination, owing to a cave near the portal of No. 3 tunnel and the bad condition of the timbers in the winze below No. 2 tunnel, I was unable to inspect the lower workings on the Waverley Vein.

Comparing the results obtained from my samples on the upper workings of the Waverley to those shown on the assay maps of the old company, I found them to check fairly close and for this reason deemed it advisable to incorporate a copy of them in this report.

2. GEOGRAPHY AND TOPOGRAPHY:

The immediate country is typical of the Canadian Rockies, being situated in the main ridge of the Selkirk Mountains. Surrounding the property are some of the highest peaks and largest glaciers of the famous Canadian Rockies.

3. GEOLOGY:

The geological formation is generally accepted as belonging to the Beltian period. The country rock consists of a series of conformable beds of blue and grey limestones, talc slates, argillaceous limestones and occasional beds of calcareous sandstones,

argilaceous slates and interbedded sheets of schist. All have a Northwest and Southwest strike, dipping to the Northwest. This series of rocks were subject to the effects of the general uplift which produces faulting, fissuring and slipping favorable to the formation of mineral veins. The rock being limestone was readily replaced by the mineral in the ascending mineralizing solutions. (See Map No. 5)

4. LOCATION:

The property is situated twenty-six miles north and west of Albert Canyon, a station on the main line of the Canadian Pacific Railway, twenty-one miles east of Revelstoke; in the Revelstoke Mining Division, Kootenay District, British Columbia.

5. PHYSICAL LOCATION:

The property is located at the headwaters of the North Fork of Downie Creek, one and a half miles below the divide between it and the North Fork of the Illecillewaet River. The Waverley group extends along and covers the steep mountain side on the north of the creek from an elevation of 5600 to 7200 feet above seal level. The Tangier group is located along the creek bottom immediately below and south of the Waverley Group at an elevation of 4800 above sea level. (See Map No. 1)

6. TRANSPORTATION:

The mine is reached by a once good wagon road, but which has been by time and neglect, owing to washouts, fallen trees, and undergrowth, reduced in places to only a trail over which the trip can be made by horseback. The expense required

to repair the briages, fix the corduroys and place the road in good shape for packing in supplies and small machinery for development work would be nominal.

7. HOLDINGS:

This property of the Waverley Mines Company consists of eight full claims, each 1500' x 1500' and two fractions, viz: - Mountain Cost, Montague, Waverley, Summit Lode, Black Bear, Tiger, Tangier, Silver Tip. Montague Fraction and Tunnel Fraction. (See Map. No. 2)

8. TITLES:

The Waverley, Montague and Tangier claims are Crown granted. The remaining claims are held in compliance with the provincial laws.

9. PAST PRODUCTION:

Note on Assay Map of Tangier workings, 15 tons of ore shipped from the 20 foot level.

Assay as follows:	Gold	1.8 oz.
	Silver	150 oz.
	Lead	25%

Note assay map of Waverley workings, 40 tons of ore shipped from No. 2 tunnel.

Assay as follows:	Gold	.12 oz.
	Silver	160 oz.
	Lead	58%

This ore was taken from the mine to the R.R. by rawhiding it over a rough trail.

10. ORE DEPOSITS:

The ore deposits may be put in two classes, true fissure veins and replacement deposits. The gangue of the fissure vein is quartz, while in the replacement deposit the residual rock is replaced.

The fissures are conformable to the general bedding of the country rock, having an average strike of N. 40 deg. W. and S. 40 deg. E. with a varying dip of from 56 deg. to 80 deg. to the Northeast.

There are two regular deposits traversing the group, the upper or Waverley deposit being a bedded replacement deposit, while the lower or Tangier deposit may be classes as bedded fissure vein.

11. WIDTH OF VEINS:

Tangier Vein: This varies from 18 inches to 5 feet on the surface of the main vein. The vein on the 100 foot level shows a width of from 3 to 5 feet.

Waverley Vein: The hanging wall portion of the vein which is exposed by outcrops and open cuts on the surface shows a varying width from 18 inches to 4 feet. It is in most places richly mineralized with carbonates and some sulphides. In No. 2 tunnel the vein shows a total width of about 64 feet with a 14 foot horse of lime in the center.

12. VEIN MATERIALS:

The veins are enclosed in walls of calcite and are composed of quartz galena, Tetrabedute (grey copper) with

some hydrous feric oxide, resulting from the decomposition of iron pyrites and occasionally stepliamite (Brittle silver) and cerargyrite (horn silver). The Tangier vein carries more gold than the Waverley vein, the gold values being found in the iron pyrites.

13. CONTINUITY OF VEINS:

The Waverley vein is remarkable for its uniform outcrop both in its regularity of dip strike and value of the ore. The outcrop can be traced for over 2,000 feet on the surface and maintains a strike of N. 40 deg. W and S. 40 deg. E. with a dip of 65 deg. to the Northeast. (See Map. No. 4)

In the Montague Tunnel showing the vein is 4 feet wide.

Two outcrops occur between this point and the East line of the Montague. At this point there is an outcrop of 18 inches of high grade carbonates. Near the portal of No. 1 tunnel the vein shows considerable galena. About 250 feet southeast of No. 1 tunnel there is an open cut which shows 12 inches of galena and carbonates.

The Tangier vein can be traced for over 2,000 feet by open cuts and outcrops. This vein also has a strike of No. 40 deg. W. and So 40 deg. E. with a dip of 65 deg. to the Northeast.

The hanging wall of this vein is a schistose formation which at the present time does not appear in the East cross-cut

of the 100 foot level of the Tangier workings. The open cut on the Black Bear shows about 18 inches of ore carrying a small streak of grey copper.

14. SAMPLING OF DEPOSITS:

All sampling was done with a geology pick. Some few picked samples were taken. The samples were picked clear across the vein, the cutting being caught in a powder box. This was taken outside, broken and quartered down to the required size for sacking. In the case of the broken ore piles and dumps, the grab method of hand sampling was used.

I was assisted in the sampling by Wm. Farrell and G. T. O'Grady.

15. GRADE OF ORE:

This has been determined by assaying samples by W. H. Stowell & Company, as follows:

See Map No. 19 for results of assays of Samples No. 51-8 from the Waverley vein.

See Map No. 20 for results of assays of Samples Nos. 9-16 from the Waverley vein.

See Map No. 21 for results of assays of Samples Nos. 17-23 from the Waverley vein.

See Map No. 22 for results of assays of Samples No. 24-32 from the Tangier vein.

16. WHERE SAMPLES WERE TAKEN:

Sample No. 1 across 2 feet on East Side of the winze 20 feet below No. 1 Tunnel on the Waverley Vein. At this point the ore showed a tendency to split and this sample was taken across the intervening material. (See Map No. 7)

Sample No. 2, across 2 feet of East side of the winze 20 feet below No. 1 Tunnel on the Waverley Vein. (See Map No.7)

Sample No. 3, across 18 inches of ore in the South cross-cut in No. 1 Tunnel on Waverley vein. (See Map No. 7)

Sample No. 4, across 14 inches of ore in East end of No. 1 Tunnel on the Waverley vein. (See Map No. 7)

Sample No. 5, across 2 feet of carbonate ore at the portal of No. 1 Tunnel on the Waverley vein. (See Map No. 7)

Sample No. 6, picked specimen of carbonates from same place as sample No. 5.

Sample No. 7, picked sample of galena from outcrop North of No. 1 Tunnel on Waverley vein. (See Map No. 4)

Sample No. 8, across 2 feet of calcite in face of West drift No. 3 in No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 9, across 16 feet in West drift No. 2 of No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 10, across 6 feet of ledge matter in face of West drift No. 2 of No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 11, Grab sample of Various piles of ore stored in drifts in No. 2 Tunnel. Total tonnage samples - 325. (See Map No. 8)

Sample No. 12, across 16 feet on South side of No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 13, across 34 feet of ore on South side of No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 14, across 5 feet in same place as sample No. 12. (See Map No. 8)

Sample No. 15, across 14 feet Horse in No. 2 Tunnel. (See Map No. 8)

Sample No. 16, across 15 feet of Black ore on North side of No. 2 Tunnel on the Waverley vein. (See Map No. 8)

Sample No. 17, across 32 feet of brown ore on North side of No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 18, across 2 feet of ore in West Portal drift of No. 2 Tunnel. (See Map No. 8)

Sample No. 19, across 10 feet of ore in stope above No. 2 Tunnel on Waverley vein. (See Map No. 8)

Sample No. 20. Picked sample of steel galena from dump at Montague workings supposed to be from bottom of the winze. (See Map No. 4)

Sample No. 21, across 4 feet of ore in winze on Montague East line on Waverley vein. (See Map No. 4)

Sample No. 22, across 18 inches of ore in outcrop near Montague East line on Waverley vein. (See Map No. 4)

Sample No. 23, across 6 inches of carbonates and 6 inches of sulphides in open cut above No. 1 Tunnel on Waverley vein. (See Map No. 4)

Sample No. 24, across 5 feet of East drift on 100 foot level of Tangier workings. (See Map No. 17)

Sample No. 25, Grab sample of dump at collar of winze in East drift of 100 foot level or Tangier workings. This is presumed to be the last material taken out of the winze. (See Map No. 17)

Sample No. 26, across 4 feet in West drift of 100 foot level of Tangier workings. (See Map No. 17)

Sample No. 27, Grab sample of ore piled below Tangier shaft dump. Total tonnage here - 240. (See Map No. 15)

Sample No. 28, Grab sample of shaft dump at Tangier workings. Total tonnage here - approximately 190. (See Map No. 15)

Sample No. 29, Picked sample of small streak of grey copper in 18 inch outcrop of Tangier vein on Black Bear claim. (See Map No. 15)

Sample No. 30. Grab sample of material picked down from 18 inch outcrop of Tangier vein on Black Bear claim. It not unfrequently happens that when a comparatively wide outcrop carries but a small streak of pay, that in taking a grab sample of the muck pile thus picked down, one might fail to get a small piece of the pay, which would accordingly cause the sample to show no value. (See Map No. 15)

Sample No. 31. Picked sample of steel galena from winze in East drift of 100 foot level of Tangier workings. (See Map No. 17)

Sample No. 32. Picked sample of iron pyrites from ore pile below the Tangier shaft dump. This sample was taken to determine the source of the gold which shows more values in the Tangier vein than in the Waverley vein. (See Map No. 15)

17. [illegible]

This consists of 675 feet of drifting and cross-cutting, 110 feet of double compartment shaft, 100 feet of winze and several open cuts. (See Map No. 17)

A vertical double compartment shaft was sunk for a depth of 100 feet. A small surface tunnel North of the shaft was run in and encountered the ore. Connection being made with the shaft at the 50 foot level. Records show a small stope was started from this 50 foot level and continued to the surface, the ore being stored in a pile below the shaft dump. At the time of the examination the shaft connection was full of ice and the portal was caved so was unable to examine this level. At the 100 foot level east and west drifts were run encountering two shoots of ore one east and one west of the shaft. The ore shoot in the east drift being wider and having a stronger showing was prospected by a 160 foot winze. At the time of the examination this was partly filled with water, but a grab sample of the material around the collar was taken. There is also a note on the old map giving the assay value at the bottom. (See Map No. 18)

North cross-cut No. 1 was driven Northward from the shaft. This encountered a water course on which small east and west drifts were run. Several calcite veins were also cut the last of which was prospected by considerable east and west drifting and cross-cutting.

As the hanging wall of the Tangier vein on the surface shows a schistose formation, I do not believe the No. 1

cross-cut is in [illegible] to cut it. At the present time the formation on the surface does not show up in the cross-cut. (See Map No. 10)

16. DEVELOPMENT OF THE EAST VEIN.

This consists of 2485 feet of drifting and cross-cutting, 470 feet of raises and winzes and several open cuts. (See Map No. 6)

The development on the Montague claim is principally composed of stripping all of this work exposing a good milling grade of ore. A short cross-cut tunnel under the westerly outcrop encountered the vein at a distance of twenty feet and a winze, 17 feet deep was sunk on the vein. The vein maintains its persistent dip and strike in this winze with a very good showing of ore. (See Map No. 4)

East of this on the Waverley claim the vein was opened up by No. 1 Tunnel, 99 feet long. This tunnel passed through the ore and was driven almost parallel to it for some distance. Near the face the ore was cut a second time. A winze has been sunk near the portal of the tunnel to a depth of 45 feet, the lower portion of which is now caved and inaccessible. (See Map No. 7) A sample taken as low as possible (15 feet below the collar) showed a very good grade of ore.

No. 2 Tunnel, [illegible] feet lower down, is a cross-cut 220 feet in length, at a distance of 86 feet the foot wall of the large mineralized zone is reached; drifts East No. 1 and West No. 1 were driven along this wall for distances of 50 and 35 feet, respectively. The latter or West No. 1 drift breaks

through to the surface. At the intersection of the main tunnel and east and west drifts a small stope was started. A sample taken along the sides of the stope showed some very rich values. (See Map No. 3)

The main tunnel was then continued 245 feet further, passing through 60 feet of mineralized ground 14 foot horse like. (See Sheet No. 11), and 10 feet of mineralized ground. Several samples were taken across this zone. Another east No. 2 drift was driven along the hanging wall at a point 165 feet from the portal. West drift No. 2 was driven for 110 feet and west drift No. 3 for 60 feet, the latter following a calcite seam.

West drift No. 2 cut the hanging wall at a point 30 feet from the face but while at the present time does not show ore of commercial value is in the mineralized zone. It is for this reason that I have advised a continuation of this drift to develop the showing on the surface to the west. (See Map No. 2)

Several short drifts and a raise 25 feet in length have been run at various points all showing a good grade of ore, the material all being stored in the various drifts as marked on Map No. 3.

On the first drive east No. 1, already referred to, a winze was sunk down 110 feet at which point an offset is made to connect with a raise 250 feet above No. 3 tunnel. The vertical depth between the two tunnels is 360 feet and three intermediate levels have been turned off from this shaft.

named the 150 foot and 300 foot levels, which means they are respectively that distance below No. 1 tunnel. (See Sheet No. 18)

As the lower levels were inaccessible at the time of the examination will refer to following maps for the development work:

150 foot level -- See Map No. 9
300 foot level -- See Map No. 10
450 foot level -- See Map No. 11
No. 2 Tunnel -- See Map No. 12

All of the above maps were taken direct from the tracings as made by the old company showing assay values of the breast in progress.

19. LABOR:

Wages of the camp are similar to those prevailing in other British Columbia Mining Camps.

20. SMELTERS:

Smelters are located at Grandby and Trail, B. C., and at Northport, Washington. Trail is the nearest, being distant 240 miles.

21. TIMBER:

There is an abundance of saw and mine timber on the ground for all mining and milling purposes.

22. WATER:

Water power would be very cheaply developed on the property to meet all the requirements of extensive operations. Lownie Creek Falls 600 feet a short distance below the Tangier shaft and the minimum flow in exceptionally cold weather before snow fall is sufficient to develop approximately 600 horse power.

There is a record fall in Bonnie Creek about three-fourths of a mile above the Tangier where the water falls 1,000 feet from Summit Flat. This fall has a flow of approximately 50% of the lower falls. As the streams have their sources in the glaciers in the surrounding mountains, they are therefore uniform and dependable. No long distance transmission lines are necessary to get this power to the workings as the sites are on or adjoin the property. (See Sheet No. 25)

23. OTHER IMPROVEMENTS:

These consist of numerous timber sheds, blacksmith shops and cabins on the Waverley and Tangier claims. There is an extensive net work of trails connecting all of the Waverley workings. (See Map No. 3)

24. ILLUSTRATIONS AND PICTURES:

All illustrations were made from checking old maps by observations on the ground with the exceptions of the workings which were inaccessible at the time of the examination. They were taken direct from assay maps of old company and marked accordingly.

On account of continued cloudy and rainy weather during the time of the examination I was only able to get a few pictures, these being time exposures. (See Sheet No. 22, 24 and 26)

25. ORE DEVELOPED IN TANGIER:

The ore developed is divided into two classes, broken and in place.

The report includes the ore pile below the Rangler shaft dump and that portion of the shaft dump containing the material hoisted from sinking the winze on the 100 foot level.

Owing to insufficient development very little ore can be classed as "positive ore" or "Ore Blocked-out," the bulk being classed as "probable ore" or ore partially blocked out. (See Map No. 20)

ESTIMATE OF BROKEN ORE IN PLACE:

Place	Assay Per Ton	Amount	Gross Value
Ore pile	$30.64	100 tons	$3,064.00
Shaft Dump	25.61	240 tons	6,144.00
Total		400 tons	$10,116.00

ESTIMATE OF ORE IN PLACE:

Positive ore (Ore Blocked out)

Block "B" above 100 foot level	3,000 tons

Probable ore (ore partially blocked out)

Block "A" above 100 foot level	1,800 tons
Block "C" below 100 foot level	3,000 tons
Probable Ore Total	4,800 tons

The total tonnage is estimated of Positive and Probable ore in place 7,800 tons. Very few samples were taken so that it is only possible to place an estimated value on the ore. The grab sample from around the winze showed a value of $76.52, while the face of the 100 foot level showed $1.05. The

50 foot level was inaccessible but the ore pile on the dump evidently came from there. The shaft dump contains the material hoisted from the development work on the 100 foot level. As a basis for estimating the value of the ore in place an average of the values obtained from all of the samples taken is used. An average of samples No. 24, 25, 26, 27 and 28 gives $25.92 which would place an estimated gross value on the ore in place at $202,176.00.

26. ORE DEVELOPED IN MAY 1914.

The ore developed is divided into two classes, "Broken" and "In Place".

The Broken Ore includes the ore pile on the Montague Dump, the ore pile at the portal of No. 1 Tunnel and the ore stored in the various drifts in No. 2 Tunnel. (See Map No. 8)

Owing to the insufficient development no ore can be classed as "Positive Ore" but is classed as "Probable" or partially blocked out ore. (See Map No. 27)

ESTIMATE OF BROKEN ORE

Place	Value per ton	Amount	Gross Value
Montague	$6.65	60 tons	$399.00
No. 1 Tunnel Dump	35.90	125 tons	4,846.50
Stored in No. 2 Tunnel	32.63	325 tons	27,568.25
Total		510 tons	$35,976.25

ESTIMATE OF ORE IN PLACE:

"Probable Ore" or "Ore Partially Blocked Out" Block "A" above No. 1 Tunnel	990 tons
Block "B" above No. 2 Tunnel	19,440 tons
Block "C" Montague Mines	400 tons
TOTAL	20,830 tons

The total tonnage as estimated of partially blocked out ore is 20,830 tons. The width as shown in No. 2 Tunnel is 50 feet but in making the estimate I have used an average width of 12 feet. As a basis for estimating the value of the ore in place I have taken an average of the values obtained from samples No. 2, 3, 4, 5, 9, 10, 11, 13, 14, 16, 17, 18, 19, 21, 22, and 23, which gives $27.61. This would place an estimated gross value on the ore in place at $479, 282.30.

The above estimate does not include any ore between No. 3 and No. 2 tunnel. Using the same width as above (12 feet) there should be 65,900 tons of ore between the 350 foot level and No. 2 Tunnel which could have been classed as "Probable Ore" had the levels been accessible.

27. RECOMMENDATIONS:

1. I would advise that the cave near the portal of No. 3 tunnel be cleaned out. Would also advise that timbers be placed in the Tunnel wherever required to make a safe working tunnel.

2. I would advise that the timbering in the raise between No. 3 tunnel and No. 2 tunnel be inspected and retimbered wherever required to make intermediate levels accessible for

examination. would also advise that the raise be divided by a row of stulls and lagged for the entire length. This would give a chute and a manway, also by sinking from No. 3 tunnel to No. 2 tunnel. This chute would provide a place to store the bulk of the ore to be obtained from development work on No. 4 tunnel.

3. I would advise that the west drift No. 2 in No. 2 tunnel of the Waverley be continued to the Montague claim. would also advise that in driving this drift connections be made to:

(a) Winze in No. 1 tunnel

(b) Rich outcrop near the Montague east line

(c) Winze on Montague claim

Cross-cuts should also be driven at intervals to cut both the foot-wall and the hanging wall. (See Map No. 28)

4. If the development from the No. 2 tunnel brings the expected results would then advise:

(a) A similar development from the 250 foot level.

(b) Continuation of No. 3 tunnel to cross-cut foot-wall and hanging wall.

(c) A similar development from No. 2 tunnel. (See Map No. 29)

5. I would advise the installation of a small gasoline air compressor and air drill with which to carry out the plan of development outlined.

6. would not advise any further work to be done on the Tangier at this time. At the present time the Tangier is solely a shaft proposition, which is expensive to develop.

In the event the expected results being obtained at the Waverley, the eventual working tunnel would be driven from a point below the falls. From this tunnel the Rangier could be prospected very economically.

7. Would not advise the expenditure of a great deal of money on the present road to Albert Canyon. Would only advise that it be put in shape sufficiently to permit of easy access to the mine with supplies and such small machinery as needed in development work. The eventual outlet for ore will be a water grade road to Flat Creek, a station on the Canadian Pacific Railway, where rail transportation can be obtained to the Trail Smelter. This road is now under construction, and will be shorter from Six to Seven Miles. (See Map No. 11)

8. GENERAL CONCLUSIONS:

(a) The property of the Waverley Mines Company is one of exceptional merit. The strong persistent showing of the Waverley vein with a constant dip and strike from the open cut above No. 1 tunnel to the winze on the Montague claim and the rich values obtained on or near the surface give almost certain promise that large ore bodies will be opened up with the proper development.

The Rangier vein has an equally strong surface showing.

(b) Water power can be cheaply developed on the property to meet all the requirements of extensive operations.

(c) The cost of the construction of a first class

(d) All recommendations for development work were made on the strength of the strong and rich surface showings west of No. 1 tunnel. The surface showings give every indication that two additional rich shoots of ore will be encountered in the next 600 feet of drifting.

(e) The surface showings on the Waverley vein, the values obtained, the geological conditions, the showings and values obtained in No. 2 tunnel, the ongoing and exceptional value obtained in the small stope above No. 2 tunnel. All these are evidence sufficient that the company is fully warranted in the expenditure of the money required to carry out the development work as outlined for No. 2 tunnel.

The proposed development work on the 450 foot level and No. 3 tunnel is contingent on the results obtained from the development on the No. 2 tunnel.

(f) In making this examination I was accompanied by Mr. Wm. Farrell, Geo. H. Walters of Spokane, Washington, and B. F. O'Grady, Assistant Resident Engineer of Eastern Mineral Survey District No. 5, Revelstoke, B. C.

Respectfully submitted,

(Signed) Chas. W. Olsen

Mining Engineer

September 1, 1921

REPORT ON LOWER WORKINGS

of the

WAVERLEY MINES

1. TO WHOM IT MAY CONCERN:

On July 19 to 20, 1922, I visited and made an examination of the lower workings on the Waverley vein to complete my report of September 1, 1921.

At the time of my visit to the property August 17-29, 1921, this portion was inaccessible, due to a cave near the portal of No. 3 tunnel.

The object of my present visit was to take sufficient samples to prove the existence of the ore body in the lower levels, check the original assay maps, and determine the position of the ore on the No. 3 tunnel level.

Prior to shipping or milling operations pending the construction of the road would advise a very close sampling throughout at distances about 5 feet apart. This would enable your foreman to intelligently mine the portions which can be shipped direct and eliminate considerable expense in sorting. The lower grade portions may then be left intact, pending the construction of a mill.

2. 100 FOOT LEVEL:

After drifting 40 feet west from the winze a crosscut was run north for 10 feet in ore. The drift was then continued westerly for 30 feet on the footwall and another crosscut run northerly for 16 feet in the ore.

Sample No. 48 is a sample of picked ore which could be hand-sorted from the richer portion of the vein on the foot-wall.

3. 250 foot L.V.L: Main level was started in a westerly direction on what was thought to be the footwall of the main vein. This is the top of what is known as the "Blind Lead" on No. 3 tunnel.

At a point about 40 feet from the winze a northerly No. 1 cross-cut was driven for about 140 feet. At 40 feet this cut the footwall of the main ore body and at 85 feet the hanging wall, showing the ore shoot to be 45 feet wide on this level. Drifts were then run east and west on the footwall for a distance of 130 feet. A drift was also run along the hanging wall for a distance of about 60 feet in a westerly direction.

Sample No. 49 is a sample of picked ore which could be hand-sorted from the richer portions of the vein on the foot-wall and hanging wall.

4. 350 foot L.V.L:

This level was started from the winze and run in a westerly direction on what is known as the "Blind Lead."

At a point about 40 feet from the shaft No. 1 North Cross-cut was started and driven for about 140 feet. This cross-cut cut the foot wall of the main ore body at a point 70 feet from where it left the main drift. This shows the ore shoot to be 30 feet wide on this level. A 50 foot west drift and 60 foot east drift was then driven on the footwall.

At the end of the east drift No. 2 North cross-cut was driven for 30 feet.

Sample No. 30 is a sample of picked ore which could be hand-sorted from the richer portions of the vein on the footwall and hanging wall.

5. No. 3 TUNNEL:

This is a cross-cut tunnel run in a northerly direction. At a point about 600 feet from the portal an ore body known as the "Blind Lead" was cut. This was drifted on east and west. Due to this being taken as the downward continuation of the ore body in No. 2 tunnel, a raise was started in the east drift to connect with a winze which was sunk from No. 2 tunnel.

After determining that the main ore body lay to the north the tunnel was continued for 30 feet, encountering a calcite seam with some low grade ore. This was drifted on westerly for a distance of 30 feet.

The tunnel has since been continued northward a distance of 40 feet and at the time of my visit was just entering a very defined wall having a parallel strike and dip to the ore body above and heavily enclosed in calcite. This I believe to be the footwall of the main ore body.

6. BROKEN ORE:

Stored in 150 foot level	- 80 tons
Stored in 250 foot level	- 50 tons
Stored in 350 foot level	- 60 tons
Stored in No. 3 tunnel	- 20 tons
Estimated, Stored in Chute	- 90 tons
Total Broken Ore	310 tons

7. ORE IN PLACE:

This is considered as "Probable Ore" or ore partially blocked out. Using an average length of 100 feet as developed on the 150, 250 and 350 foot levels, a height of 250 feet and a mean width of 25 feet, would give a tonnage of 57,000 tons of partially blocked out ore.

8. SHIPPING ORE:

The best portions of the vein lie on the footwall, there being from 3 to 5 feet that can be sorted to give a grade of ore similar to sample Nos. 47 and 50.

Sample No. 47 is a mixture of hand-sorted ore from all the levels.

Sample No. 48 - 150 foot level

Sample No. 49 - 250 foot level

Sample No. 50 - 350 foot level

There are some places where rich ore shows on the hanging wall but at present the amount of development work on this portion of the vein is limited.

9. RECOMMENDATIONS:

I wish to impress at this time the importance of developing the extreme rich surface showing on the Montague claim. This can be done either by continuing the west drift on No. 3 tunnel or by driving a new cross-cut. It is under this showing where the high grade shipping ore is to be expected.

The ore body which has been developed is a wide replacement deposit with richer portions on the footwall and

hanging wall, the intermediate portions being a good mill feed. This necessitates hand sorting for shipping without milling operations.

The vein on the Montague is a great deal narrower and in the bottom of the winze showed 3 feet of nearly clear ore. From this showing one can reasonably expect that at depth a very high grade clean shipping ore would be encountered. This would eliminate the expense of sorting.

Would recommend the installation of one or two drill gasoline plant to economically carry out this development with as much speed as possible during the construction of the road.

Would also recommend sufficient work to be done in the face of No. 3 tunnel to determine the position and extent of the main ore body on the No. 3 tunnel level.

10. GENERAL CONCLUSIONS:

As stated before, no attempt was made to sample closely, this being a matter to attend to later.

A close sampling every 5 feet would, I am sure, give a very good average grade of ore for the entire width as mill feed.

In view of the showings throughout the mine would state that, in my opinion, the Company is justified in the expenditure of funds to carry out the development as outlined.

Respectfully submitted,

(Signed) Chas. W. Olsen

Mining Engineer.

Spokane, Washington,
July 24th, 1922.