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REPORT No. 2

ON THE PROPERTIES OF

Portland Canal Mining and Development Co., Ltd.

INTRODUCTION—In December, 1907, a rather full report on the property of this company was made by me. I have again visited the mines (August, 1908) and made a more extensive examination than weather conditions permitted on my former visit. A week was spent at the property and a number of questions were gone into which had not seemed pertinent formerly. These will be dealt with in due course in this report.

LITTLE JOE and LUCKY SEVEN MINERAL CLAIMS—The Company has purchased these claims from the former owners, and final payment will be made in December on the bond under which they are being held and operated.

GIPSY VEIN—The workings on the Gipsy claim were visited and examined. An intrusion of porphyritic rock has cut the country slates in a northeasterly and southwesterly direction. This is almost at right angles to the principal veins of the district. Later, the mineralizing solutions, following the main vein system percolated along the line of weakness, formed by the contact between the porphyry and slates, and there deposited their burden of metallic salts. This constitutes what is known as the Gipsy vein which dips about 70 degrees to the southeast.

As might be expected, there is little similarity, except in the nature of the mineralization, between this and the main vein system exposed on the Little Joe and Lucky Seven claims, from which the Gipsy vein is undoubtedly a branch. The porphyry, which forms the foot wall, is distinctly aphanitic and the ore deposit is irregular in size, but of high grade in places.

DEVELOPMENT—A shaft, 70 feet in depth, has been sunk on the outcrop without disclosing any ore body of economic value, although but a few feet away from the collar of this shaft the ore is three feet in width where it outcrops on the creek bank. About 30 feet northeast from the shaft, a cut has been put into the outcrop just back of the blacksmith shop. Here two streaks of ore show 6 inches and 8 inches respectively in width.

ASSAY VALUES—All assay values in this report are figured upon a basis of \$20.00 per oz. for gold, 55c per oz. for silver, and \$4.50 per cwt. for lead.

GIPSY ASSAYS—An average sample, taken by me, from the 6-inch ore streak back of the blacksmith shop assayed:—Gold, 0.03 ozs. Silver, 3.4 ozs. Lead, 1.5 per cent. Total value, \$2.26 per ton.

An average sample from the 8-inch streak gave:—Gold, 0.30 ozs. Silver, 3.4 ozs. Lead, 3.5 per cent. Value per ton, \$10.59.

An average sample from the 3 feet of ore outcropping on the creek bank, taken by me, assayed:—Gold, 1.20 ozs. Silver, 5.4 ozs. Lead, 5.0 per cent. Value per ton, \$31.47.

Much higher assays than this have been had from this point, and, at some convenient time in the future, it may be well to further investigate this occurrence by doing a little more work on it.

LITTLE JOE VEIN, DEVELOPMENT—All of the recommendations made by me for the development of the ore body on the Little Joe and Lucky Seven claims have been carried out and the results are very satisfactory. Three open cuts east of the No. 1, or A, tunnel have been made and all of the three tunnels have been driven ahead on the vein. A complete assay outfit has been installed and has proved itself most useful.

UPPER OPEN CUT—This working is located 359 feet in an easterly direction from and 105 feet vertically above tunnel No. 1. It is driven 15 feet into the outcrop of the vein which it exposes for a width of fully 10 feet. This entire width is fairly well mineralized, and shows some good seams of galena. Surface oxidation extends downward about two feet and carbonates of iron and lead are present. One good specimen of cerusite was observed.

ASSAYS—A sample of the carbonates, taken more with the idea of showing the extent of the surface enrichment than because of its economic value, assayed:—Gold, 0.85 ozs. Silver, 10.75 ozs. Lead, 12 per cent. Value per ton, \$32.71.

An average sample of the lower 8 feet in width of the vein at this point taken by me, assayed:—Gold, 0.15 ozs. Silver, 3.0 ozs. Lead, 2.4 per cent. Value per ton, \$6.81.

After picking out the coarsest pieces of rock—about 25 per cent. of the total weight—the remainder assayed:—Gold, 0.20 ozs. Silver, 3.4 ozs. Lead, 2.7 per cent. Value per ton, \$8.30.

SORTING—Rough sorting was done in this and the other cases mentioned later for the purpose of arriving, as nearly as might be, at the average ore that could be broken from these cuts when the rock was roughly sorted from it. The vein shows strongly at this point, is fully 10 feet in thickness, and dips about

30 degrees to the west. The mineralization consists of pyrite, blende and galena abundant in the order named.

MIDDLE OPEN CUT—This is 165 feet east from and 47 feet above tunnel No. 1, is about 30 feet in length, and shows the vein 10 feet in thickness in the face. The dip at this point is about 30 degrees to the west. The surface oxidation is more extensive at this point than at the upper open cut and a considerable bed of carbonates is exposed. The mineralization is of about the same extent as in the upper cut, but there is a larger proportion of galena present.

ASSAYS—An average sample from the lower 8 feet of the vein in this cut, taken by me, assayed:—Gold, 0.15 ozs. Silver, 11.7 ozs. Lead, 5.38 per cent. Value per ton, \$14.27.

By roughly sorting out the rock, which weighed about 42 per cent. of the whole, a sample of ore was obtained which assayed:—Gold, 0.20 ozs. Silver, 18.0 ozs. Lead, 9.28 per cent. Value per ton, \$23.25.

LOWER OPEN CUT—This cut is 61 feet east from and 17 feet above tunnel No. 1. It is driven into the vein for a distance of about 10 feet and shows 8 feet of the thickness of the same, although the foot wall has not been exposed. The upper four feet is somewhat oxidized and mixed with wash and shows but little mineralization. The lower four feet shows good ore with a larger proportion of galena than is shown in either of the other open cuts.

ASSAYS—An average sample of the lower four feet of the vein, taken by me from this cut, assayed:—Gold, 0.20 ozs. Silver, 20.0 ozs. Lead, 7.6 per cent. Value per ton, \$21.84.

After rejecting the rock, which amounted to about one-third of the weight, the remainder ran as follows:—Gold, 0.24 ozs. Silver, 26.66 ozs. Lead, 11.61 per cent. Value per ton, \$29.90.

The high values here are possibly due to the fact that some of the oxidized ore may have been included, as no separate assay was made on it from this cut.

On both sides and beyond the limits of this working, the vein outcrops strongly for a distance of 30 feet.

From the high values obtained here and the excellent showing in the No. 1 tunnel, which is only 60 feet distant, I am inclined to think that a high grade ore body will be open in the immediate vicinity of this cut.

TUNNEL No. 1 or A.—This drift on the vein has been continued from 26 feet to 70 feet in length and is entirely in ore except at those points where the wall rock has been entered. The average width of the ore is about 4 feet, but at many points its entire thickness has not been shown.

ASSAYS—An average of twenty average assays, taken from 26 feet to 70 feet from the portal, show a value of:—Gold, 0.25 ozs. Silver, 14.6 ozs. Lead, 5.8 per cent. Value per ton, \$18.25.

This almost exactly checks my sampling of this tunnel from 10 feet to 26 feet last November and may be safely taken as a fair average of the ore body exposed.

Two samples of the ore from this tunnel showing native silver assayed:—Gold, 2.60 oz. Silver, 538.5 ozs. Lead, 0.0. Value per ton, \$348.17.

Gold, 0.98 ozs. Silver, 293.1 ozs. Lead, 0.82 per cent. Value, per ton, \$180.80.

The assays of these samples are interesting as showing that the gold values increase with the silver, a condition which one would hardly expect if the native silver were due to secondary enrichment.

TUNNEL No. 2, or B.—This tunnel is in 110 feet in a westerly direction from and 38 feet vertically below tunnel No. 1.

A little work has been done in the face this year and its length is now 124½ feet.

ASSAYS—Two average samples of 21 inches and 36 inches in thickness and from ore 26 feet and 8 feet in from the portal of this tunnel, assayed:—

Gold, 0.20 ozs. Silver, 9.0 ozs. Lead, 9.97 per cent. Value per ton, \$17.92.

Gold, 0.30 ozs. Silver 8.65 ozs. Lead 10.93 per cent. Value per ton, \$20.58.

A general average of the ore dump of perhaps 100 tons at this tunnel gave:

Gold, 0.30 ozs. Silver, 11.9 ozs. Lead, 5.05 per cent. Value per ton, \$17.08.

A sample from a rich streak in cross cut No. 2, about 15 inches in width, assayed:

Gold, 1.20 ozs. Silver, 48.8 ozs. Lead, 4.29 per cent. Value per ton, \$54.70.

So little change has been made at this point that the comments made on this tunnel in my former report apply equally now. There is a good ore body exposed that can be mined quickly and cheaply when the time comes to do so.

TUNNEL No. 3, or C.—This tunnel is located 177 feet northwest from tunnel No. 2 and 53 feet below it. It is at this point that most of the work has been done since my former visit to the property. About 185 feet of drifting and cross cutting has been done and the present face of the new working is in 186 feet from the portal. The vein was followed by swinging the drift to the east from a point about 30 feet from the mouth and is now showing some good ore in the face. The mineralization in this tunnel is very scattered—except at the face—and I do not think that the main ore shoot, which shows so strongly in the other two tunnels has as yet been reached. There is no doubt but that the vein has been followed correctly, although some slight faultings show near the face. No dislocation of the vein is apparent and I think that the ore in the face is the first of what I hope will prove the extension downward of the ore in the workings above.

ORE SHOOTS—A very large proportion of the contents of most ore bearing veins is composed of veinstone or gangue which is unproductive and worthless. The ore bodies of economic value usually take the form of more or less regular masses in the vein and commonly in the form of either chimneys or lenses. Such masses are called ore shoots. In a vein of this character they are likely to have a considerable extension in a downward direction—chimneys—and to be of rather regular form.

FURTHER WORK—The No. 3 tunnel should certainly be continued as this will eventually become the main working of the property through which all ores will be extracted. Rises from this level will eventually be made to those above for the purpose of affording easy and economical egress for the ores from a higher horizon.

ASSAYS—A sample of two feet in thickness of ore in the face of the No. 3 tunnel, taken by me on August 12th, 1908, gave the following result:

Gold, 0.16 ozs. Silver, 2.4 ozs. Lead, 8.4 per cent. Value per ton, \$12.08.

MAP—The small map accompanying this report shows approximately the relative position of the various workings and also the probable direction of the downward extension of the known ore shoot.

HIGH GRADE ORES—During my former examination, the high values, obtained from some very slightly mineralized quartz samples, suggested the presence of tellurides and also seemed to make the feasibility of concentration by the ordinary methods doubtful. More careful investigation, with better facilities and data, has forced me to the conclusion that no tellurides exist. The high grade ores in this mine, both of gold and silver, are due to segregation and, possibly, to secondarily enriching influences. Argentite, in connection with the native silver, is common and one specimen of native gold was found in the ore pile at the No. 2 tunnel. In ore of this character it is easy to mistake a high grade bit of ore for a piece of barren quartz as the metal may not show on the surface of the specimen.

CONCENTRATION—Having come to the conclusion that practically all the values in the ore exist either as sulphides or native, the possibility of materially raising the grade of the ore by concentration suggested itself. Certain preliminary tests had been made at the mine which gave promising results. A large general sample was therefore taken from the No. 1 and No. 2 tunnel dumps of what appeared to be the average low grade ore. This sample was crushed and quartered and assayed at the mine with the following result:—Gold, 0.20 ozs. Silver, 10.0 ozs. Lead, 4.58 per cent. Value per ton, \$13.62.

MANNER OF TESTING—This sample, weighing 117 pounds, was taken to Spokane and crushed to 30 mesh and run over a small Wilfley concentrating table in the laboratory of C. M. Fassett. After concentration the concentrates were again run over the table in order to determine whether a separation of the lead from the iron concentrates was possible or advisable. The complete success of both these processes is shown in the report of C. M. Fassett which is attached hereto and to which reference is now had.

REMARKS ON RESULTS OF CONCENTRATION TESTS—It will be seen that the assay on the general sample, as made by Fassett, is somewhat lower than the assay obtained at the mine. This is probably due to the fact that in commercial assaying the same care is rarely taken as when some special sample is being tested.

As all the ore was crushed to pass through a sieve of 30 meshes to the inch, much of it was really fine enough to pass through one of 100 meshes to the inch. In actual practice this would be avoided, as it is an axiom of concentrating to crush only as fine as is necessary to separate the ore from the rock. This means that much of the slime loss, as shown in the actual test, will be avoided. Not more than one-half—possibly one-third—the loss in slimes, shown in this report, will be made in practice, and this will increase the percentage saved by just that amount. The results obtained are good, but they can be bettered.

No second concentration will be necessary to separate the lead from the iron concentrates. This is being done in one process in many mills with complete success. I would mention the Slocan Star mill at Sandon, B.C., as a notable example. The advisability of such a separation is manifest when consideration is taken of the fact that not only does the lead product become much more desirable for a lead furnace but the bulk of the concentrates—the iron product—becomes a desirable ore for the copper furnaces and should command a very low smelting charge.

PROFIT—The exact prices for treatment can only be obtained from the smelters; and the costs of mining and concentration are matters of estimate. Therefore any figures would be necessarily only approximate and, possibly, misleading. It is evident from the results of the tests that, with proper concentrating facilities, substantial profits are assured.

ORE IN SIGHT—While a glance at the map makes it apparent that no ore may be considered actually blocked out in the mine, yet, with the ore body exposed in the three open cuts and penetrated—but not passed through—by the tunnels Nos. 1 and 2, a considerable amount of ore is certainly available for immediate extraction. Conservatively figuring the blocks of ground above the No. 2 tunnel and below open cut No. 3 with the ore of a thickness of 5 feet and allowing 10 cubic feet to the ton in place, we have about 20,000 tons which may be reasonably considered available. Either the opening of the ore shoot by the No. 3 tunnel or the demonstration of its continued width in the upper tunnels—which will be shown when they are driven ahead in the course of development—will greatly increase this figure. I have no fear as to the amount of ore that this vein can produce with proper development.

CONCENTRATING MILL—With development in the mine advanced to its present stage and the fact demonstrated that the ore will concentrate easily and profitably, it seems manifestly proper to consider the construction of a mill for its treatment.

LOCATION—This mill should be located at some convenient point in the Bear River Valley where water power can be utilized and somewhere in the immediate vicinity of the mouth of Glacier Creek has been suggested. The Company has staked water rights to the amount of 1,000 miner's inches of water on Glacier Creek and this will furnish abundant power for all purposes. This location also commends itself, as the mill

would be on the traveled line to nearly all of the other mines in the district, many of which are undoubtedly concentrating propositions. By making the mill a custom plant, to a certain extent, a profitable business might be transacted.

The mill should consist of a unit of say 50 tons daily capacity which could be added to as necessity required. Crusher and rolls, with a chilian mill for the fine grinding, suggest themselves; and jigs, Wilfley tables, and some good slimer with the necessary screens, elevators, and settlers complete the plant. Such a mill is simple and can be made up to date and very economical.

SAW-MILL—It will be necessary to install a small saw-mill to furnish lumber and timbers for the mill and tramway; and its erection should be begun at once.

TRAMWAY—The questions of transportation are important ones in this connection, and the one which should receive the most careful consideration is the moving of the ore from the mine to the mill. A first class aerial tramway of the Riblet, or some similar pattern should be built as soon as the location of the mill is determined upon; if at the mouth of Glacier Creek, the length of the tram would be about 7,500 feet and its inclination something less than 16 degrees from the horizontal. This is entirely feasible, both as regards its length and inclination, and the contour of the country is altogether favorable for its construction and favorable operation.

TRANSPORTATION—Some means of transportation should be provided from the mill to Stewart at the head of Portland Canal. The valley of the Bear River is open and of moderate grade, and there is no difficulty in building an excellent wagon road between these points. If found desirable, a tram road, similar to those in operation in many logging districts, can be constructed.

The substantial bridge across the Bear River about three miles above Stewart, which was built last year by the Government, has helped out the situation at this point materially. The construction of a main line trail, which will reach many of the mines, is now contemplated, and will further assist in solving the transportation question.

At Stewart a wharf must be built, as the tide flats of the Bear River are uncovered at low and inaccessible for boats of any size at high tide.

CONCLUSION—After careful consideration, I wish to recommend the construction of a concentrating mill and the necessary connections in the way of Tramway, Road and Wharf as the best and most expeditious method of making these mines profitable. Development at the mine should be prosecuted diligently and care taken in the selection of the plant and power installation at the Mill. If this is done, the Company will have an enterprise of immediate profit and great future possibilities.

(Signed) W. J. ELMENDORF.

SPOKANE, WASH., August 22, 1908.

P.S.—Final payment on Bond amounting to \$17,000 was paid on December 17th, 1908.

MR. W. J. ELMENDORF,
City.

Dear Sir,—Herewith find report of concentration tests on your sample of ore:—

Sample weighed 117 pounds and was crushed to 30 mesh.

Assays—	Lead. Per cent.	Silver. Ozs.	Gold. Ozs.
Heads	4.3	9.6	0.16
*Concentrates, 48 lbs.	9.0	17.3	0.31
Tailings2	2.9	0.03
Concentration 2.4 tons into one.			
Saved in concentrates	87.2 p.c.	75.1 p.c.	80.7 p.c.
Left in tailings	2.9 p.c.	17.8 p.c.	10.9 p.c.
Slimed	9.9 p.c.	7.1 p.c.	8.4 p.c.
Concentration of above Concentrates—			
Heads	9.0	17.3	0.31
Concentrates 10½ lbs.	30.4	25.0	0.34
Tailings (Iron)	2.7	15.0	0.30
Concentration 4.51 tons into one.			
Saved in concentrates	74.9 p.c.	32.0 p.c.	24.3 p.c.
Left in tailings	23.4 p.c.	67.4 p.c.	75.0 p.c.
Slimed	1.7 p.c.	0.6 p.c.	0.7 p.c.
*Concentrates.			
Assay—Insoluble	11.20 per cent.		
Iron	29.60 per cent.		

Respectfully submitted,

C. M. FASSETT.