

SUMMARY.

The Lone Star mining property is situated on the ridge between Upper Bonanza and Eldorado creeks about 20 miles by road southeasterly from Dawson, Yukon Territory, Canada.

The creeks named are credited with a production of over \$65,000,000 in placer gold, the distribution and characteristics of which indicate that it must have been derived from ore deposits in the area covered in part by the Lone Star claims.

The surface workings of the Lone Star mine have exposed a zone of mineralized schist 200 feet in width, part of which is ore averaging something over \$4.00 per ton in gold (at \$35.00 an ounce). This zone strikes North 30 degrees West and dips 25 degrees East. It has not been extensively prospected on surface and the underground workings are so located that they have only crossed its extreme southern end, where the gold-quartz veinlets are not as numerous nor as rich as in the open cut.

Study of the ore shows that there is an earlier stage of quartz-pyrite mineralization in the schist which in the locality of the Lone Star workings averages 35 cents per ton, or less. Also there is a later gold-quartz vein stage in which occurs rather coarse gold sometimes associated with pyrite and galena. Assays of these small veins often show \$100 to \$200 gold per ton, sometimes much more. They have enriched the lean schists locally to a sufficient extent to make low grade ore.

The extent and grade of such ore bodies may only be determined by systematic trenching to depths of 3 feet or more.

There is also the possibility that somewhere in the belt of mineralized schist there may exist veins of the later quartz large enough to mine separately as high grade ore.

Such discoveries have not been made in the past because the rich quartz veinlets were easily eroded and covered by soil, moss, and forest growth. Most of the prospecting in the past has been done on large barren masses of pegmatitic quartz which have prominent outcrops and are easily traced by float fragments.

The property is recommended for systematic exploration.

REPORT ON THE LONE STAR MINE

Klondike District

DAWSON, YUKON TERR., CANADA

Location and Extent of Property.

The Lone Star property is situated about 13 miles air line distance and 20 miles by road southeasterly from Dawson, Yukon Territory (Canadian Alaska), Canada. It is near the head of Victoria Gulch, on the ridge between Upper Bonanza and Eldorado creeks.

It comprises five crown granted claims, and seven eligible for grant, covering an area about one mile in length by one half mile average width.

General Conditions.

The claims are reached by wagon road from Dawson. The first 17 miles of the road follow the valley of Bonanza Creek, part of the distance on the old railroad grade. The remainder up the ridge to the property is quite steep, with some very heavy grades which could be avoided easily by re-location of parts of the road. The territorial government builds and maintains roads and everything possible is done to assist mine development.

Supplies are obtained at Dawson where they are brought down the Yukon river by steamer and barge from Whitehorse which is the terminus of the White Pass and Yukon Railway connecting with Skagway, Alaska, on tidewater.

Electric power was used on the property from the line of the Northern Light and Power Company; with a dredging operation still active in the district, there is now a possibility of again obtaining electric power, but the line to the mine will have to be rebuilt.

Water for a large mill may be had from Bonanza Creek or from the Klondike River.

The topography of the mineralized area favors open cut operation and access by tunnel for underground mining is possible to a depth of 1500 feet.

Bedrock is exposed at surface or by trenching to depths of 3 to 5 feet.

Timber is rather scant as the area was cut over during placer operations and the second growth is slow.

Climatic conditions are not greatly different from those of the mining districts in Northern Michigan and Minnesota, or the central region of Ontario, except that the mean temperatures from November to April are somewhat lower. On the other

hand, the Spring "breakup" is more rapid and long summer days favor surface operation. Open pit mining could be carried on for a longer period than in the iron ore mines of the Mesabi District in Minnesota, and probably could continue all winter without serious difficulty, as the snow fall is much lighter and the proportion of clear weather is greater in the Dawson District. Total annual precipitation ranges from 10 to 15 inches rather uniformly distributed. Housing for surface plant such as is provided in any of the northern districts would be adequate in the Yukon Territory, but water pipes on surface need special protection as the frost zone is deep.

Geological Conditions.

The rocks of this area consist largely of light gray and greenish sericitic and chloritic schists of the Klondike series. Locally less altered types are seen to be gneissoid in texture and appear to have been derived from granite porphyry or related rocks.

The schists of the Lone Star area are much crumpled and distorted. The main trend of schistosity is North 30 degrees West, and local variations are from 20 to 45 degrees northwest. Prevailing dips are 40 to 60 degrees southwest. A well marked secondary line of shearing has a more northerly trend, local strikes ranging from a few degrees east of north to 30 degrees west of north, the dips are 20 to 40 degrees east.

Occasional faults were noted corresponding generally to the main lines of schistosity noted above, but they appear to be of slight importance.

South of the Lone Star camp two dikes of rhyolite porphyry were seen, one of which was encountered in old workings about half a mile south, and the other crossing the main ridge southeast of Victoria Gulch about one and one half miles or more away, and continuing up the east slope of Ready Bullion Gulch still further east. The latter is a large dike, 50 feet or more in width, strike North 65 degrees West, dip 70 degrees northeast. The rhyolite is much later than the Klondike schists, shows no evidence of shearing, and has large quartz crystals in a fine textured groundmass. It is not known whether it is in any way related to the ore bodies of the area.

Veins.

There are three types of veins in this locality, as seen in the Lone Star workings. Much importance was early attached to the occurrence of quartz veins by Canadian Geological Survey and other Government engineers, and most of their sampling seems to have been done with the idea of proving the

association of gold with the larger quartz masses. The results of this work were uniformly negative, and led to the theory that the gold was derived from a general disseminated mineralization in the Klondike schists. This theory is not supported either by the distribution of the placer gold of the area, or by observation of the details of ore occurrence as far as they are known at present.

Bonanza and Eldorado creeks were much richer in placer gold than any others in the district, and their gold was clearly derived from the ridge between them. The mineralization in the schists, even in the comparatively small area covered by the Lone Star claims, is seen to be confined to certain definite lines, and there are great widths of formation which show no mineralization whatever.

Quartz Pegmatite Veins.

The most prominent, and probably the oldest veins of the district, are of white quartz with occasional feldspars and small hornblende crystals. They are classed as quartz pegmatites, and are of the type known to prospectors as "bull quartz" veins. They carry only small amounts of gold, as a rule, and the local occurrence is no exception, for none of these veins has ever proved productive. However, as they form the most prominent outcrops and are readily traced, they have been the object of most of the prospecting in the district.

Quartz-Pyrite Stringer Zones.

The second type of vein comprises numerous stringers or lenses of quartz found over considerable widths of the schist formation. The individual veinlets are not continuous either on the strike or dip of the formation, but they conform to the planes of schistosity and are crumpled and broken. Associated with the quartz is much pyrite usually crystallized in perfect cubes. The stringers are rarely over 6 inches in width, usually range from a half inch to 2 inches in thickness.

The gold content both of the pyrite and of the zones as a whole, is small. For example, the average of 28 samples taken by the writer in the North Drift, Main Tunnel, is 35 cents per ton, or 0.01 ounce gold.

With no other mineralization present, the veins or deposits of this type are of no economic importance. They, along with the pegmatite veins, have contributed most of the quartz pebbles of the White Channel deposits in the Klondike placer area.

Gold-Quartz Veins.

These veins are only slightly known at present, and yet they are the most important ones in the area. Those seen in the Lone Star open cut and mine workings are small, ranging from an inch to 4 inches in thickness. They clearly cut across the planes of schistosity in most cases, and are not crumpled or lenticular in shape like the quartz veinlets of the stringer zone type described above. They strike North 20 to 30 degrees West, and dip usually 25 degrees or less to the East. Near surface they show black stains, probably due to manganese oxides, and locally yield considerable free gold in the pan. Below the zone of oxidation occasional patches or particles of galena (lead sulphide) and zincblende (zinc sulphide) are found with these later quartz veins along with pyrite which is the most common sulphide mineral.

Gold is found either isolated in small particles, or associated as free gold with the sulphides, which probably are also gold carriers. It is reported that a pocket of rich sulphide ore was found in the open cut near where the shaft was sunk, but none of this material was seen in place by the writer. From hand specimens saved by the owners it seems to be similar to the sulphide bunches associated with the later quartz veins.

In panning samples from the open cut, gold was found adhering to pyrite pseudomorphs (iron oxide cubes left by alteration of original pyrite), and it is likely that there has been some secondary enrichment due to the deposition of gold on pyrite in a very shallow surficial zone. But free gold was also found well below the zone of oxidation, always in veinlets of the later quartz.

On the other hand, the quartz-pyrite stringers of the earlier type yielded no free gold whatever, although a large number of samples were panned, both from the open cut and from the underground workings.

The small gold-quartz veins do not have prominent outcrops. Even if there were several of them within a width of a few feet, it is doubtful if they would show in place at surface. The surest way to find them is to trench across their line of strike and pan or assay material from the trenches. Panning is an excellent guide to the presence of gold in these veins, and after checking against assays it is possible to judge values with a fair degree of accuracy.

Prospecting and Development.

In spite of the fact that the placer gold of Victoria Gulch, No. 7 Pup (a tributary of Victoria), and O'Neill Gulch was evidently derived from the Lone Star area, comparatively little prospecting has been done along right lines either on the Lone Star property or elsewhere in the district. As mentioned above, most of the work in the past was done on the prominent outcrops of barren quartz pegmatite veins.

On the Lone Star property work was started on the Corthy vein which proved too low grade to work. When this fact became apparent the open cut, see map sheet No. 1, was driven 300 feet with the idea of making a mill run test of the schists. It did not follow a vein or any particular line of cross fracturing, and it cut across the strike of the later quartz veins at an angle of 20 degrees or more. The Gold-Quartz veins evidently carried gold enough to enrich the low grade schists to a point where the operation showed some promise, but with only a small mill of 30 tons daily capacity it was not successful.

Considerable trenching was done in the early stage of prospecting but it was in the wrong places to pick up the productive zone to the northwest. Such an extension is suggested by the small amount of trenching done in the summer of 1935 under the direction of the writer. See Map Sheet No. 2. Samples 40, 42, 43, and 56 average \$2.62 gold per ton, sufficient to encourage further surface prospecting in this direction.

After the rich sulphide pocket was found in the open cut, a shaft was sunk to explore its downward extension without results except that a small vein of high grade quartz (assay value of the best sample \$283.85 per ton) was found on the 22 Foot Sublevel, (see Map Sheet No. 3, sample No. 71). This vein dips flatly to the east and apparently did not show anything of importance in the old tunnel workings (samples 92 to 99 inclusive).

The New Tunnel, which reaches a depth of nearly 100 feet at the face, has 639 feet of workings which expose a considerable width of schist with low grade quartz-pyrite mineralization, samples 75-88 inclusive, and 103-115, inclusive, Map Sheet No. 3. The crosscut, first 235 feet of the tunnel workings from the portal, ought to cut the southern continuation downward of the flat dipping veinlets of later quartz seen in the open cut and on the 22 Foot Sublevel, but these seem to have no important extension in this direction.

Ore Deposits.

The records of mining in the open cut in 1912, 1913, and 1914 show 8,435 tons of ore mined and milled with a recovery of \$24,977.55, or a little less than \$3 per ton. Assuming that the recovery, which was by amalgamation only, was 75%, the gross value of this material would have been \$4 per ton, which with gold at \$20 an ounce represents 0.2 ounce, worth \$7.00 per ton at \$35 an ounce, the 1935 price of gold in the United States. A shipment of 1860 lbs. of sorted sulphide ore to the Selby Smelting Works at San Francisco, returned \$2,078.71.

The writer does not question the veracity of this record, but reference to the assay plan of the open cut, samples 1 to 34, inclusive, Map Sheet No. 2, shows the unsatisfactory results of channel sampling. These samples were taken at intervals of 20 feet along the cut, and are mostly 5 foot lengths taken at right angles to the planes of schistosity or the flat dipping veinlets of later quartz. For all practical purposes they may be given equal weight.

Even including a high sample, No. 21-\$129.85, and No. 14-\$13.65 (which is of a 2 inch later quartz veinlet), the average is \$4.98 per ton (gold at \$35 an ounce), excluding these the average falls to 80.5 cents per ton.

The difference of \$5 sample average against \$7 milling average is undoubtedly due to the fact that the sampling does not properly evaluate the high grade veinlets. Possibly the cut included important portions of high grade later quartz veins now covered by the material which has caved from the north wall.

It is quite impossible to say whether extending the open cut to the northwest would give a similar average to that of the milling recorded. It is equally impossible to predict the result of another cut across the formation along the line of the long trench. Here samples 42 to 57 show an average of 88 cents per ton for 150 feet of trench.

All that may be said at present is that there is evidence of a large body of low grade ore in this locality. It has a flat dip and has not been sufficiently explored to prove its extensions.

No estimate of tonnage can be made on the data available.

Possibilities.

The quantity and distribution of placer gold taken from the adjacent creeks indicate that there may be much more important ore bodies in this locality than the one partially developed.

Eldorado and Upper Bonanza creeks were estimated to have produced prior to 1907 over \$65,000,000 in placer gold, which is about two thirds of the total for the district to that date. Most of this came from two to two and a half miles of channel on each creek, along with the bench gravels, and was derived from a very small area compared to that of other less productive creeks.

The tributary gulches of Upper Bonanza and Eldorado which head on the central ridge between them, carried coarse gold, sometimes in place in quartz, in their upper portions, and Gay and Victoria gulches were important producers. But the gulches which come down from the opposite slopes away from the central ridge, were barren except where they cut bench gravel deposits.

These facts indicate, that the most important source of gold in the Klondike District is in the ridge between Eldorado and Upper Bonanza creeks, and probably near the head of Gay and Victoria gulches.

The Lone Star property covers a very important area above Victoria Gulch, 7 Pup (a tributary of Victoria) and O'Neill gulch. The mineralized zone partly exposed by the Lone Star workings appears to be the extreme southern end of one of the deposits from which the placer gold was derived.

As the area has been only slightly prospected aside from the Lone Star workings, there is an excellent chance that very good results will follow further trenching with short tunnels to prospect the best showings.

Equipment now on the property is adequate for the next step in prospecting, including making mill runs. There is a bunk house for a crew of 8 to 12 men which may be put in shape for winter housing at small expense. Mine equipment consists of a 170 cu. ft. Sullivan air compressor, three air drills, a 15 H. P. kerosene engine, blacksmith tools, and a mine car. The mill has four 900 lb. Joshua Hendy stamps in two triple discharge mortars, two amalgamating plates 9 X 4.5 feet, and one Isbel table. The compressor is small and the drills are now quite old but have not had a great deal of use.

The stamp battery foundations would probably have to be repaired or replaced and some repair work is

necessary on the mill building. The tramway about three quarters of a mile in length must be rebuilt, though the sheaves can be used again.

Conclusions.

The Lone Star property is worthy of more thorough prospecting by trenches across the continuation of the main line of mineralization.

At the same time a general examination of the entire ridge between Upper Bonanza and Eldorado creeks should be made.

Respectfully submitted,

J. H. Farrell.

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