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BROOKSTEAD MINE
ST. PAUL'S VALLEY
A.W. + G.A.C. FREEMAN
by
W.E. Hitchcock

37-069

Brookstead Mine, St. Paul's Valley
by
W. S. Hitchcock
13/5/57

556

Leases- These consist of:-
 196 P 30 ac.
 M
 259 P 30 ac.
 M
 261 P 31 ac.

Water Right 5 S.H.

General Description- The mine is located in the Avoca mining district and is reached from Avoca township by a good road to Royal George P.O. and thence by track of length about 1 1/2 miles. This track is used for motor traffic and, with a small expenditure, would be suitable for transport of machinery, supplies and ore.

Climatic conditions are good. The prevailing rock is granite and the lodes consist, primarily, of well defined fissures, of up to 2-3 inches wide, with a filling of a dark quartz and containing tin oxide, tourmaline, fluospar and some pyrite. From these fissures mineralisation has penetrated and altered the wall rock to a somewhat dense greisen which also carries these minerals. The tin oxide is coarse grained and, at the present depths of the workings, is not associated, to any excessive degree, with chalcoppyrite and arsenopyrite. These minerals were noted but the ore may be classed as reasonably clean.

The lodes, examined, are in the hill slopes rising, to the west, at 25-30 degrees and, to the east, at about 10 degrees from the Main Creek which is a tributary of St. Pauls' River and which flows through 196P/M

The granite rock, down to adit levels, is fairly soft. At depth, in the shaft on Christoe's Lode, it shows hardening but may be considered as good working ground which, as seen in the open cuts, stands well.

Water supply for dressing purposes is available from the Main Creek and ~~fuel~~ timber supplies are available for fuel and mine supports.

Operations have been carried on, intermittently, over a number of years and, in the early stages, consisted of sluicing the overburden along the lines of lodes. From this work tin oxide was obtained from the detrital matter and from enrichments exposed in the uncovered lodes. Recently a small concentrating mill, consisting of a rock breaker, rolls and table, was installed. The tonnage capacity of this mill is small and the facilities for recovery indifferent. This resulted, in the effort to meet the high milling costs and low recovery, in the necessity for selection of the higher grade ore and thus systematic ore breaking was impossible.

It may be stated that, where ore occurs in well defined shoots, selection is permissible but, in this class of lodes where the enrichments are erratic it is fatal to continuity of operations.

Following this a winze was sunk on the Main Lode and a shaft on Christoe's Lode and these works have provided data as to the behaviour of the ore at depth.

Workings:-

These consist of :-

Main Lode- Adit, winze, shallow shafts and trenches

Christoe Lode- Adit, shafts and tranches.

Hancock's Lode- Shallow shaft, open cut and trenches.

East of Main Creek- Shallow shafts and open cuts.

In detail these are as follows:-

Main Lode:- Starting from the lowest surface elevation, and going west, the first opening is a shaft of depth 25 ft. This was full of water and could not be examined. Next, at some 25 ft. higher, an adit has been driven on a general course of N 70-75° W. for a distance of 422 ft. For the first 253 ft. stoping has been done in places. At 183 ft., a winze has been sunk to a depth of 64 ft. This winze was unwatered but could not be inspected. At 392 ft. a crosscut has been driven for 19 ft. in the direction of Christoe Lode. The lode is continuous along the adit to 422 ft. which is the present face.

From the first mentioned shaft, the lode has been exposed by open cuts, shallow shafts and trenches for a length of 700 feet in a westerly direction. The lode passes from 196P/M through vacant ground into 259P/M. It is probable that this lode, which is a strong well defined body, continues still further to the west.

From the adit, at from 282 ft. to 422 ft. samples, totalling 27, were taken at 5 ft. intervals, from the roof of the adit. Of the winze 5 samples were taken from the ore dump and 10 samples were taken from the surface exposures over a length of 370 ft.

Christoe Lode:- This lode is distant, at the entrances of the adits of the respective lodes, some 80 ft. north of Main Lode. Its trend is slightly more northerly and, at the end of its surface workings, it is 110 ft. distant.

Starting from the east, the first is a shaft of depth 54 ft feet and, going west, an adit has been driven 105 ft.

(M)

Along the surface, going west, the lode has been exposed by sluiced open cuts making a total length of 430 ft. At the western end an old water race is showing and this appears to have been the limit to which the lode could be sluiced.

The bulk of the ore has been ^ost^oped out over the adit.

One sample was taken from the face of the adit, six from the shaft and four from the surface exposures.

^{196P} The western end of the surface workings is near the boundary of ^{196P} 259P/M within which it occurs.

^{196P} Hancock's Lode:- This lies near the northern boundary of section ^{196P} 259P/M and consists, going east, of a shaft, then an open cut from which a short adit has been driven. Beyond this the lode has been exposed by a sluiced open cut for a total length of 222 ft.

Two samples were taken from the open cut at the brow and face of the short adit.

East of the Main Creek:- These workings are in the vicinity of the S.E. corner of ^{196P} 299P/M and consist of an area from which the soil has been removed by sluicing. In this work, various veins have been exposed of which one has been followed, to the west, by pits and cuts.

Five samples were taken from these workings.

Conclusions:-

Sampling:- In this work it had to be considered that the general grade of the ore is influenced by the proportion of enrichments which occur. In the first place, as the fissures carry higher values, the proportions of these entering into the samples is important, then, as regards the greisen, the enrichments in this rock requires that intensive sampling is required over a large number of faces rather than large samples from fewer faces. As it was impracticable to carry out intensive sampling over the whole of the exposures, two localities were selected viz. Main Loyde Adit and Shaft on Christoe Lode.

Another factor was that in the surface exposures, these had been made in the search for enrichments and consequently that, sampled, may be regarded as being, to a certain extent, impoverished by that work. Again, the ore being dense, it was not practicable to take samples by cutting grooves across the face and chipping had to be done. In the faces, thus chipped, there would be, at the time of blasting when these faces were exposed, a certain amount of spillage of the tin oxide at the fractures and thus chipped samples would be somewhat lower than from a cut groove.

In regard to the samples from the winze dump, this ore included the wall rock broken over the width of the winze which is approx. 42 inches and of which the actual vein width would be something like 20 inches. From this dump it was stated that some had been removed for milling but I do not think that it was possible to make much selection. The grade of the average of the samples rather suggests the mixing. Making a correction for dilution the actual grade would be in the vicinity of ^{196P} 1%.

Taking a broad view of all the circumstances, it appears that, for Main Lode and Christoe Lode, an average value of say 1% would be a reasonable assumption.

Conclusions:- Main and Christoe Lodes present two well defined lines of mineralisation extending over lengths of 700 and 430 feet respectively without having reached the limits. These lodes are nearly vertical and, at the lower levels, could be worked from one shaft. Hancock's and the veins east of the creek are of minor importance at the moment.

As stated, it appears that an average assay grade of ~~2~~ 1% is a reasonable assumption. In mining there would be a certain amount of dilution with a corresponding ~~xxxxxxx~~ increase of tonnage. This indicates that any milling plant would require to be of such character as would allow of capacity and low operating cost on the lines that it would probably be better from a point of economics to mill the waste rock than to pick it out.

Before, however, a plant of this type can be justified, it is necessary that sufficient reserves be developed to provide tonnage for continuous operations. Such development work would be primarily that of extensions of Main and Christoe Adits together with winzes on these lodes. Assuming that these developments are satisfactory, the matter of a main shaft would then have to be considered. With some excavation, a suitable site, near the entrances of the adits on the two lodes, could be obtained.

In the course of the development work, which would be largely on ore, a considerable tonnage would be broken and the matter of disposal of this would have to be provided for. Dump room could, of course, be found but it would then be a matter of delivery to the mill later on.

For the treatment of the ore, a typical plant would consist of a rock breaker followed by stamps or ball mill- in this case stamps would be probably most suitable- and concentrating appliances such as tables and strakes.

It would be quite feasible to install a pilot plant of say five heads of heavy stamps with concentrators and which would be first unit of a larger plant. The cost of milling, with such a plant, would be higher than with a complete plant although the recovery could be the same. This would be offset by saving the cost of dumping and conveying from the dump to the mill later on.

In the event of developments not proving sufficient ore to justify a large plant, this pilot plant could be utilised to handle that which had been developed.

Another inducement would be that, after the capital cost of the installation has been met, some revenue from the developmental work would be obtainable. Again the tested value of the ore would be known.

As it stands now, there is sufficient ore in sight, and likely to be obtained, to justify the erection of this plant which would require to be efficient both in working cost and recovery- otherwise it would be a repetition of the recent happenings. It would be also necessary to regard it as an adjunct to the development work and not as a direct revenue producing unit.

The next point is the relative monetary value of the ore and the cost of mining and treatment.

If an ore content of 1% is assumed and a recovery of 80% which I consider can be safely regarded- the recoverable content becomes 0.8%. Applying this to tin metal prices thus:-

At £ 225 effective tin metal price at mine then p.t. =	36/-
250	40/-
275	44/-

The effective price would be London metal price less returning charges plus exchange and then less realisation charges between the mill and market. This, of course, could be expressed as a unit price but the former is used for illustration.

As to costs- these, at the moment, are in a state of flux and it is difficult to make a firm estimate. Taking into consideration the fact that the proportion of non-producing development would be small, that the ore would be fairly easily mined and that the facilities for cheap working are good, a tentative cost of between 30/ and 35/- may be regarded as obtainable under present conditions.

As to the finance which would be required for the preliminary equipment and the carrying on of the development work, this is a matter which involves the design and layout of the plant which would consist of the pilot plant, a small compressor and the necessary facilities for working and consequently comes outside the scope of this examination.

In conclusion I would like to record the assistance rendered by the Secty. for Mines, Mr. J. B. Scott, in making available a member of the Gov't Assay Staff during the examination and of the assistance of the Gov't Assayer, Mr. W. St. C. Manson in the matter of assays.

Attached to this Report are:-
Assay Plan
Assay Tabulation.

Wm S. Willmott

15-5-37

SAMPLING

12-13-14-16 May. '37

Sample No.	Width, inches.	Assay, tin metal.	Locality.	Notes.
1	18	0.40 %	Main Lode, Adit.	5' from face
2	22	0.71	" "	10 "
3	18	1.33	" "	15 "
4	11	1.95	" "	20 "
5	19	0.32	" "	25 "
6	19	0.37	" "	30 "
7	24	1.02	" "	35 "
8	15	0.42	" "	40 "
9	24	1.06	" "	45 "
10	18	0.65	" "	50 "
11	22	0.45	" "	55 "
12	22	0.05	" "	60 "
13	22	0.37	" "	65 "
14	17	1.34	" "	70 "
15	15	0.55	" "	75 "
16	30	1.76	" "	80 "
17	27	0.70	" "	85 "
18	14	0.45	" "	90 "
19	16	0.40	" "	95 "
20	27	0.85	" "	100 "
21	15	0.30	" "	105 "
22	14	0.10	" "	110 "
23	15	2.50	" "	120 "
24	15	0.25	" "	125 "
25	14	0.06	" "	130 "
26	22	0.14	" "	135 "
27	29	4.60	" "	140 "

Average of 27 samples:-----width-----19.5 inches, tin metal 0.803%

1 A	12	0.75	" "	surface
1 B	12	9.17	" "	"
1 C.E.	72	0.48	" "	"
1 C.W.	72	1.49	" "	"
1 D	57	0.74	" "	"
1 X.N.	42	0.50	" "	"
1 X.S.	15	0.33	" "	"
1 Y	48	0.52	" "	"
1 Z	51	2.40	" "	"
1 E	12	0.09	" "	"

Average of 10 samples:- width # 39.3 inches, tin metal 0.93%

W 1	42 assumed	9.50	" "	from winze dump.
W 2	42 "	0.60	" "	" "
W 3	42 "	0.30	" "	" "
W 4	42 "	0.50	" "	" "
W 5	42 "	0.50	" "	" "

These samples carry
abt. 50% dilution.

Average 5 samples:- width 42 inches, tin metal 0.48%

B 1	66	0.78	East of Main Creek,
B 2	14	0.14	" " " "
B 3	grab	0.75	" " " dump.
B 4	10	0.35	" " " "
B 5	15	0.30	" " " "
B 6	14	0.80	" " " "
B 7	grab	0.50	" " " dump.

Average 5 samples:- width 20 inches, tin metal 0.60%

2 " grabs " " 0.62

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BROOKSTEAD MINE. (2)
 SAMPLING 12-13-14-16 May. '37

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Sample No.	Width, inches.	Assay, tin metal.	Locality.	Notes.
28	18	0.11%	Christoe's Adit	Face.
S 1	14	6.10	"	Shaft. at 50' down W
S 2	16	0.50	"	" " 48' " E
S 3	18	0.10	"	" " 46' " E
S 4	15	2.00	"	" " 41' " W
S 5	18	0.25	"	" " 38' " W
S 6	18	0.20	"	" " 38' " E

Average 6 samples:- width 16.5 inches, tin metal 1.34%

D 1	36	0.30	"	Surface
D 2	24	2.90	"	" " vein 10" rock 14"
D 3	25	0.90	"	" " " 14 " 11"
D 4	48	3.10	"	" " min. rock 48"

Average 4 samples :- width 33 inches, tin metal 1.12%

C 1	15 22	0.90	Hancock's Lode.	face adit.
C 2	22 15	0.40	"	" " brow "

Average 2 samples:- width 18.5 inches, tin metal 0.70%

Assays made at Gov't Assay Laboratory, Launceston.

Summary.

Main Lode	27 samples	av. width 19.5 in.	tin metal 0.803%	Adit
" "	10 "	" 39.3	" "	Surface
" "	5 "	" 42	" "	Winze dump
Christoe Lode	1 "	" 18	" "	Adit face
" "	4 "	" 33	" "	Surface
" "	6 "	" 16.5	" "	Shaft
East of Creek	5 "	" 20	" "	Surface cus
" "	2 "	" grabs	" "	" "
Hancock's Lode	2	" 18.5	" "	Adit.
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Wm. S. Hatcher
 15-5-37