

GEOLOGICAL REPORT OF MT. CLEVELAND TIN MINE.Introduction.

The distribution and dimensions of ore bodies on the Mt. Cleveland leases as well as the history of the mine, access, etc. have been described in detail by A.M. Reid in Bulletin 34 (1923) of this survey (pages 150-166) and will not be repeated here.

The Mt. Bischoff Company acquired the leases in 1935 and spent £5,000 in developmental work to prove the ore bodies at levels below the known workings. This work consisted of the following:-

- (1) A cross cut 50' below Hall's open cut (No. 11 workings). This intersected Hall's lode, 105 feet from the mouth and a drive was cut along the NW wall of the lode for 120 feet.
- (2) A cross cut 50 feet below Henry's open cut (No. 13 workings). This intersected some small ore bodies but did not find the main ore body of the surface workings. The reason for this is quite clear when the structure of the lode is appreciated (see below).
- (3) A cross cut from the end of the No. 2 workings to pick up the Battery lode about 50 feet below the old No. 3 workings on this lode. The cross cut intersected the Battery lode and a drive was cut along this lode for 80 feet.
- (4) A cross cut to intersect Luck's lode about 50 feet below the old No. 8 workings.
- (5) A number of surface trenches were cut to trace the surface extension of Hall's lode to the SW. In addition a number of bore sites were marked out for horizontal diamond drilling but as far as I am able to ascertain these were not drilled.

A plan showing all these workings is attached.

The area was briefly examined in January, 1945, by Mr. Q.J. Henderson and the present writer. All underground mapping and sampling has been done by Mr. Henderson. All surface work and structural interpretation has been done by the writer.

Regional Structure.

The country rocks are slates, tuffs and cherts in which no fossils have been found, and which are provisionally regarded as of lower Palaeozoic age and correlated tentatively with the Farrell and Dundas slates. These strata are strongly folded along axes trending NNE to NE and have a prevailing dip to the NW. Much faulting of a minor character is present, and it is possible that large strike faults are also present.

These rocks are intruded by large bodies of basic and ultrabasic plutonic rocks which outcrop extensively in the Whyte River valley, their boundary approaching within 25 chains of the lodes. A.M. Reid mentions also "small protusions of porphyry"

and shows two porphyry dykes on his map in the vicinity of the lodes. No outcrops of porphyry were seen by the writer though insufficient search was made to be able to deny their existence.

Granite is known to outcrop 3 miles away to the SE and 3½ miles away to the SW, and there may be nearer outcrops in the geologically unexplored country to the SE.

It is assumed that the lodes are the result of mineralising vapours and solutions from the granite and are not related to the basic intrusions.

Local Structure of the Lodes.

All the ore bodies are replacement deposits, which conform to the folded structures of the sedimentary rocks, not to fractures or fissures. Tuffs are selectively replaced in preference to slates. There has also been intense local silicification of slates.

The lodes of Henry's cut, Hall's cut, No. 12 workings, and all the Luck's lodes (No. 8, 10 and 16 workings) are all developed on the troughs and adjacent limbs of synclines (see plan and sections). It is possible that the Battery and Smithy lodes are also opposing limbs of a slightly recumbent syncline.

Correlation of Lodes.

(1) Luck's Lode.

As a result of structural interpretation the following correlations are made: The ore body in Luck's No. 3 level and Mt. Bischoff Company's No. 4 cross cut is the same lode as that worked in No. 16 workings and is also the same as that worked in No. 10 workings and the Kaki open cut. The ore body in No. 8 and No. 10 workings may be expected to meet in depth on about the 210' level. If the Mt. Bischoff Company's No. 4 cross cut is extended a further 100 feet it should cut through the same ore body again with the opposite underlay. (see section). If traced on the surface the beds would be found to meet on the synclinal axis in the manner shown on the plan. But of course it cannot be assumed that the replacement of the tuff by ore will persist throughout this course.

(2) Luck's Upper Lode.

The ore body in the drive on Luck's No. 2 level is the same orebody as south dipping lodes in the No. 3 south-east drive of Luck's No. 1 level. They may be expected to meet at approximately the 330' level (see section).

(3) Hall's Lode.

This is a trough-shaped ore body lying in the bottom of a syncline. It is not connected with either the Luck's lodes, or Henry's lode or the Battery or Smithy lodes. It is probably the same ore body as that worked in the open cut of No. 12 workings although the physical connection of the two has probably been removed by erosion.

The Mt. Bischoff' Company's No. 1 cross cut in the 260' level only just caught the edge of this ore body. If 20 feet lower or 20 feet further to the NE the cross cut would have passed beneath the lode. At its centre this ore body may be expected to cut out on about the 200' level.

(4) Henry's Lode.

This is another trough-shaped ore body on a synclinal axis. The Mt. Bischoff Company's No. 2 cross cut passed completely beneath it. A rise of about 20' from this cross cut should find the orebody. (see section). (This estimate may prove too low, because the data available concerning the angles of dip are rather scanty).

(5) Smithy and Battery Lodes.

The Smithy lode is the same orebody as that worked in No. 4 workings. The orebody followed by the drive at the end of the No. 3 cross cut off the end of No. 2 workings is the battery lode cut at a lower level than the old Battery workings (No. 3 workings). These two lodes are parallel and both underlay to the NW, the Smithy lode very steeply and the Battery lode at more moderate angles. It is possible that these two lodes are opposing limbs of an overturned syncline, and that they meet in depth at somewhere about the minus 60' level in which case they would cut at that level, or not far below.

Ore Reserves.

Nearly all the oxidised ore has already been removed. A limited quantity of oxidised ore said to be of good grade is still left in Luck's workings.

Hall's lode has been proved to the 260' level, 50' below the old workings. As the full width of the lode has not been proved in the prospecting drive, only 4,000 tons of ore can be regarded as proved.

Estimated ore down to 260' level in Hall's lode is 80,000 tons. As the orebody may be expected to cut out at about the 200' level the total ore in this body is probably about 100,000 tons.

Information is more scanty on the other ore bodies but the following estimates of probable ore will serve as a basis in considering the dimensions of treatment plant which might be required.

|                        | <u>Probable Ore.</u> |
|------------------------|----------------------|
| Hall's Lode            | 100,000 tons         |
| Henry's Lode           | 7,000 "              |
| Luck's Lodes           | 80,000 "             |
| Battery & Smithy Lodes | 10,000 "             |
|                        | <hr/>                |
|                        | 197,000 "            |
|                        | <hr/>                |

The total ore removed from these lodes in past operations is 36,311 tons.

Character of Ore.

The lodes consist of fine grained sulphide ore with pyrrhotite as the principal mineral, together with chalcopyrite, pyrite, arsenopyrite, quartz and cassiterite (Ref. Bull 34 p. 152).

Six samples were collected under the supervision of Mr. Henderson from the Mt. Bischoff Company's prospecting drive below Hall's cut. The samples were taken across the full width of the drive at 20' intervals, and may be taken as representative of this portion of Hall's lode.

Results of assay by the Chief Chemist in the Department's laboratory are as follows:-

|    | <u>Description.</u> | <u>Tin Percent.</u> |                      |                         |
|----|---------------------|---------------------|----------------------|-------------------------|
|    |                     | <u>Total</u>        | <u>Vanning Assay</u> |                         |
|    |                     |                     | <u>Percent Tin</u>   | <u>Percent Recovery</u> |
| 1. | 106' from X cut.    | 0.97                | 0.84                 | 86.6                    |
| 2. | 86' " " "           | 1.53                | 1.29                 | 84.3                    |
| 3. | 66' " " "           | 0.70                | 0.53                 | 75.7                    |
| 4. | 46' " " "           | 1.06                | 0.82                 | 77.5                    |
| 5. | 26' " " "           | 0.66                | 0.54                 | 81.8                    |
| 6. | 6' " " "            | 0.93                | 0.79                 | 84.9                    |

These samples, and a number of samples taken by A.M. Reid from the other exposures, (See Bull. 34) indicate that the average grade of sulphide lode material runs almost 1% total tin.

Conclusions.

From the foregoing statement it is apparent that there is sufficient quantity of nearly 1% sulphide ore present in this field and workable by adits to warrant the reopening of the mine, provided a satisfactory treatment process is available to make this grade of ore payable.

Recommended Further Development Work.

It is recommended that the Mt. Bischoff Company's No. 4 cross cut be extended a further 100 feet to prove the NW limb of Luck's lode on No. 4 level, and that a raise be cut from the Mt. Bischoff Company's No. 2 cross cut to prove the bottom of Henry's lode.

Recommended Further Prospecting Work.

Since all the lodes so far worked contain abundant pyrrhotite, they should be readily picked up by magnetometer surveys. I therefore recommend that arrangements be made with the Commonwealth Geophysicist to carry out a series of magnetometer traverses in a NW-SE direction and spaced 4 chains apart across an area bounded on the NW by a NE line through the NW corner of mineral lease 9382, and on the SW by a NE line through the SW corner of mineral lease 4243 and on the NE by a SW line through the NE corner of mineral lease 4243 and on the SW by a SE line through the SW corner of mineral lease 9382. This would involve in all about 2½ miles of magnetometer traverse. Short intermediate traverses would be necessary to follow up indications detected in the primary traverses.

A geologist from this department should accompany the geophysical party and plot all geological data along the traverse lines.

This programme should pick up all the outcropping ore bodies with the minimum time, effort and cost.

Sgd, S.W. CAREY

GOVERNMENT GEOLOGIST.

Department of Mines,  
8th March, 1945.

10th April, 1945

MEMORANDUMMOUNT CLEVELAND TIN MINE.

The following additional information has been received from the Chief Chemist and Metallurgist in connection with samples of ore submitted by you for assay:-

|          |        |        |    |         |      |           |
|----------|--------|--------|----|---------|------|-----------|
| Reg. No. | 76 - 1 | ..     | .. | Sulphur | 13.5 | per cent. |
| "        | "      | 77 - 2 | .. | "       | 11.4 | " "       |
| "        | "      | 78 - 3 | .. | "       | 11.4 | " "       |
| "        | "      | 79 - 4 | .. | "       | 10.2 | " "       |
| "        | "      | 80 - 5 | .. | "       | 18.4 | " "       |
| "        | "      | 81 - 6 | .. | "       | 12.4 | " "       |

Composite sample of equal quantities from 1,2,3,4,5 and 6.

|                 |    |    |    |      |           |
|-----------------|----|----|----|------|-----------|
| Sulphur         | .. | .. | .. | 12.9 | per cent. |
| Copper          | .. | .. | .. | 0.39 | " "       |
| Acid Insoluble  |    |    |    | 39.8 | " "       |
| Pb, Sb, Bi, As. |    |    |    |      | Nil       |