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Old Mines on Zeehan Lodes.

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Montana No 2

① Location and Access.

The Montana No 2 Mine is situated at the extreme western end of Main Street. It is thus 2 miles from the Zeehan Station.

The Main Shaft is only 1 chain from Main Street and accessible therefrom on level ground.

② History.

This mine was originally the No 1 Queen. It has the distinction of being the scene of the first actual mining operations at Zeehan. This was in 1887, the first actual work being shallow cuts on the lode outcrops near the creek. The Main Shaft was started in 1890.

The Silver Queen Company was the first to start large-scale mining operations and in addition was the first to pay dividends.

By 1893 the Main Shaft was down to 922 feet with levels at 105 ft and 908 feet. In 1902 the Zeehan-Montana Company took the mine over after the original Silver Queen Coy had entered on a period of mismanagement and internal dissension. The shaft was sunk to 510 feet and levels opened at 300 ft, 400 ft and 500 ft. Operations continued until 1913 when, with the final closing down of the Smelters, Zeehan folded up. Nothing has been done since.

③ Output and Profit.

In 1893 the Silver Queen headed the list of outputs up to that time with 3725 tons of galena. From 1893 until its sale to the Zeehan Montana it produced 6,500 tons. As the Montana No 2, the production was 6,000 tons of galena. The total production has therefore been 16,225 tons of galena.

Up to about 1900 the operations in this mine were definitely profitable. By that time, however, bad mining methods had accumulated considerable trouble and difficulties. Stormy meetings of shareholders in Hobart were frequent and eventually the No 1 Queen was sold to the Zeehan-Montana Coy while the No 2 Queen was reformed as the Zeehan-Queen. The operating of the mine by the Zeehan-Montana Coy was profitable, but actual profits are obscured by its being jointly accounted with Montana No 1.

Twelvetrees in 1910 describes the general outcome of work in Montana No 2 as: "Working results cannot be regarded as satisfactory." Yet the fact remains that it was continued by John Grey right up to the final closing of Zeehan. It was in production earning revenue while the final 200 feet sink at Montana No 1 was in progress.

(4) Geologic Environment.

(a) Country Rock.

It is an intriguing fact that in none of the old reports is there any specific information as to the rock-series in which the main workings are located. All that is mentioned is "slate". It is significant that nowhere is there a reference to melaphyre or spilite in connection with Montana No 2.

Recent mapping indicates that the country rock in the vicinity of the Main Shaft is part of the Rubicund Quartzites + Slates. However, the long eastern crosscut is in Keratophyric Tuffs + Slates at least in its eastern portion. In the immediate neighbourhood of the Main Shaft outcrops are obscured by dumps and debris.

(b) Position Relative to Regional Structural Pattern.

The Montana No 2 mine is located between two important Tear Faults or Tear Fault Groups. The Montana Tear Fault system (Nos 1 to 6 Slides) must pass on its way eastwards north of the Main Shaft. The Oonah Tear Fault on its way to join the Montana Tear Fault north of the New Mount Zeehan Shaft, must pass south

The West Crosscut at the N02 level passed out of the Nuteena formation at about 750 feet west of the Main Shaft into the Melaphyre formation. It is incidentally of interest that it was beyond this front that lode intersections were made after a long blank.

The geological boundaries shown in the accompanying plan south of Main Street - Trial Harbour Road are those of Dr Prider & B. Webb. Northwards of this, they are based on Twelvetrees & Ward's map and are sketched as a basis for future detailed field work.

of the Montana No 2 Shaft.

It would appear therefore that the Montana No 2 mine is wedged in between these two faults. But there is no mention of these major slides or faults in the old records, although in Twelvetrees report of 1910 [1] slides are mentioned several times as ending or faulting the lodes. The slides are not emphasised and the impression is gathered that they are of minor magnitude. But nevertheless there is indicated that the typical "ore makes under the slide" is operating in perhaps a somewhat minor degree. The following occurs inter alia:- "No 2 lode at No 4 level splits as it goes north. To the south the ore makes under a slide, and is picked up again 50 feet in to the west. This is now being driven on. Beyond are two slides which have heaved the lode 9 feet a few times."

It is the Donath Tear Fault which, in conjunction with possible minor faults, has caused the much-disturbed area at the Trial Harbour – Corinna Road junction immediately to the west of the mine workings. It

(5) The Lodes.

(a) Number and Spacing.

There were two lodes worked in the Montana No 2. These are known as Nos 1 & 2 lodes. In addition there is "a mass of mixed silica, pyrite and siderite in which pyrite strongly predominates. This is only partially exposed and its precise form is not known." [2] According to Waller this unnamed lode carried disseminated galena. (W) Nos 1 & 2 lodes are 140 feet apart at No 1 level at the main crosscut. However, they diverge rapidly northwards, but converge southwards.

(b) Proved Length and Width.

Good descriptions of both Nos 1 & 2 lodes have been given by Waller at Nos 1 & 2 levels and by Twelvetrees and Ward at Nos 2, 3, 4 & 5 levels. The following descriptions of each lode at each level are taken boldly from these sources:-

(1) Geol Surv. Tas Bull 8 pp 135-137.

Although the old mine plans show no 'slide', there is disclosed a north-west drive which is probably of great significance in regard to the position of the Montana Tear Fault. At 300 feet east of the Main Shaft on the No 2 Level East Crossent a drive was put out for 200 feet on a bearing of 310°. The plans, cross-section and records make it quite certain that this was not on a lode. What, therefore, were they following? The position of the drive is just where the Montana Tear Fault should be, on its path from the Montana mine to its junction with the Ooral Tear Fault. The bearing of the drive corresponds to that which the fault should take to effect this junction. It would thus seem that the old miners encountered the tear fault in their east Crossent and recognising the 'head' drove along it. It is interesting to speculate as to what will happen further north-westwards and south-eastwards. This introduces the principle of driving along the 'slides', originally but tentatively suggested by Waller.

is portable that the location of the fault is at the extreme southern end of the workings on No 1 lode at No 1 level. The deeper levels did not reach that far south.

In addition again are eight lodes cut in the East and West Crossents at No 2 level. Nos 3A, 3 + 4 lodes were cut at 730ft 780 ft and 825 ft respectively west of the Shaft. Nos 5, Trotter's 6 + 7 and 7A lodes were cut in the East Crossent at 540 ft, 840ft, 990 ft, 1170ft and 1230ft respectively. None of them were driven on, more than a few feet and no information is available as to their character. The only reference is by Twelvetrees + Ward who discribe the East Crossent as having located 'nothing of importance'.

Into the picture now come the lodes worked at the 88 ft level from No 5 Shaft of the Silver Queen. The location of this shaft is 200 feet south-west of the western end of the West Crossent at No 2 level. These workings are not mentioned by Montgomery, Waller, or Twelvetrees + Ward, the only information available being from plans found at the Mines Department. The work was done by the old 'Silver Queen Prospecting Association'. Three lodes were

worked and appreciable stoping was done. They are numbered in the old plans on the Silver Queen basis, but this has been adjusted in the accompanying plan to avoid confusion with the Montana No 2 terminology. No 4 lode was driven on for 100 feet and is most probably the southern continuation of the No 4 lode cut in the West Crosscut. Trotter's lode West was driven on for 150 feet. No 6 lode West was driven on for 290 feet. They have been stoped for lengths 90ft, 70ft and 100 feet respectively. W

No 1 Lode.

Nos 1 + 2 Levels.—The shoot was . . . . . The shoot was about 160 feet in length at No. 1 level, and shortened to 70 feet at No. 2 level. The whole of the shoot was stoped out about No. 2 level, and a winze was sunk on the ore below No. 2 level for a depth of 75 feet. At the bottom of the winze the ore is said to be only 13 feet long, and from 2 to 4 inches wide.

No 3 Level.—As seen at No. 3 level, it is nearly vertical or slightly heading west. Here where cut it is only from 1 to 5 inches wide, and not payable. In the end of the leading stope over the north drive it is reduced to a mere track in graphite slate. From here back the lode is blank for nearly 100 feet, and then there are 50 feet of profitable ore to be worked out beyond on this level. In the south drive the lode is faulted: only a track discernible, with a few specks of galena.

At No. 4 level in the north drive the width of the lode averages 6 inches, and finally it disappears. The lode dip from here down to No. 5 is easterly, but upwards it is westerly. The end is blank, showing merely a band or two of quartz and carbonate of iron. In the south drive the lode is cut off by a fault at the boundary of the section.

At No. 5 level in the end of the north drive only a small lode-track is apparent, in black slate, and not carrying any galena. Above this the lode was 6 inches to 1½ feet wide. The greatest width attained was 3 feet. It has really been a small lode all through, but the silver ratio was much higher than that of No. 2 lode. In the south drive, 15 feet behind the end, a bar of hard rock cuts the lode off, and the drive passes into a loose channel or fault-fissure filled with broken stuff mixed with carbonates. The lode seems to have deviated sharply to the west, and at the point of deviation there is a marked graphitisation of the slate, which extends south for a few feet on the line of the original lode-channel.

No 2 Lode

No. 1 Level.—

lode was worked successfully by Donnelly and party on tribute in the upper levels for some years, and yielded a large amount of ore. It has now been driven on 190 feet at both No. 1 and No. 2 levels. A rise has been put through from No. 2 to No. 1, and communication made to an old air shaft from No. 1, securing good ventilation. At No. 1 level the drive north on lode was driven for 32 feet, in barren lode matter, then pyrites began to make up to 12 inches wide for 30 feet; after this the lode has been an average of 2½ feet wide, carrying galena and pyrites, and is still showing well in the end of the drive. The galena is medium grade, assaying 50 ounces of silver per ton, with 60 per cent. lead. The last 41 feet produced 15 tons of first-class ore, worth £8 per ton, and 120 tons of seconds worth 23s. per ton.

No 2 Level.—

At No. 2 level the ore was struck in the crosscut, and continued in the drive for 140 feet, averaging 1½ foot wide of galena and pyrites, the last 50 feet being poor. This lode is a payable one, and when stoping is started will place the mine in a self-supporting condition.

At No 2 Level the south drive goes to the section boundary, showing in the end a little galena and pyrite. Over a foot of mixed low-grade ore continues into the next section. In the parallel south drive, which is a footwall one, the end is pyritic with a little galena. Thirty feet above this the hanging-wall and footwall approach to within 6 feet. Here they are 20 feet apart, and from here down seem to behave as two lodes.

In the north drive the length of the stopes is 300 feet.

(5)

No 3 Level.—

At No. 3 level the lode in the south drive degenerates into pyrite, with traces of galena. A band of pyrite sometimes 3 to 4 feet wide follows the east wall; this can be seen on three levels. A thin vein of galena is encased in pyrite. The stopes above the north drive on lode have a length of about 350 feet.

No 4 Level.—

At No. 4 level the lode over the south drive is patchy, and the ore splits as it goes north. To the south the ore makes under a slide, and is picked up again 50 feet in to the west. This is now being driven back upon. Beyond are other slides which have heaved the lode 9 feet a few times. The ore disappeared in driving north. The wall has been followed a few hundred feet showing a lode-track with occasional quartz and pyrite, but no ore.

No 5 Level.—

At No. 5 level the crosscut for No. 2 lode was being driven at the time of our visit. Its north-west continuation was in a wide band of pyrite following the strike of the country, but separated from the slate by a soft dig. This band was kept on the north side of the crosscut, and the latter turned west, crossing only small formations of pyrite 6 inches and 1 foot wide.

(c) Orientation.

No 1 lode has a curved strike swinging as it goes northwards from 30° to 60°. No 2 lode has practically a meridional strike. Both lodes dip eastwards and the same applies apparently to all the other lodes. The angle of dip of Nos 1 & 2 lodes is 65° – 75°

(6) The Ore

(a) Character of lode Material.

It would appear from the various descriptions that the lodes do not consist of solid lode material between definite walls, but rather a series of lenses of ore in shattered rock. This is Twelvetrees & Ward's description:-

> "This lode as a whole is a complex formation, marked by a divisional plane and some broken country on its east wall. The reefs found in irregular bunches or lenses in this broken country. Followed north it degenerates into unpayable stringers. Southwards it has been traced into Mt. Queen ground, and there worked on royalty." (3)

It is this characteristic which probably accounts for the relatively high ~~lead and silver~~ contents in N. mullock dump.

(b) Constituent Minerals.

The gangue is siderite and quartz. The latter at times dominates the ore, but siderite seems to be generally present.

Galena with some sphalerite, but with abundant pyrite are the sulphides. At times the ore is pyrite with varying amounts of galena disseminated through it.

The silver-lead ratio was at least 1:1 but the average was not much below this, being 0.6.

(c) The Concentrations.

Only a small proportion of the ore mined was solid galena. This statement is synonymous with that by Twelvetrees and Ward: "Working results cannot be regarded as satisfactory".

Nowhere in the records is there any reference to enrichments nearing the slides. Did the northern drives reach the Montana Tear Fault?

(3) Geol. Surv. Tas Bull 6 p136.

(7) Mine Workings

(a) Shafts.

The old No1 Queen Shaft, now Mt Montana No 2 Shaft, is 510 feet deep with levels at 111, 218, 318, 418 and 500 feet. Its dimensions are 14 ft by 6 ft. The collar is standing, but the shaft is blocked by an old cage.

A Rise from the 318 ft level east crosscut holes to the surface behind the State School. There is a continuous flow of water from this rise.

(b) Drives.

The drives on No1 Lode are about 200 feet in length except at the No1 or 100 ft level where the length is 400 feet.

On the No2 lode the drives are in the vicinity of 480 feet in length.

(c) Crosscuts.

Apart from the short crosscuts from the Shaft to the lodes, there are two exceptionally long crosscuts to both east and west. These are both at the No2 or 318 ft level.

The East Crosscut is 1380 feet in length. The length of the West Crosscut is less. It is not given by either Waller or Twelvetrees, the latter's plan showing it incomplete. George Clarke who worked in the mine at the time in its closing states that it goes for 800 feet west of the Shaft. This is confirmed by a cross-section recently unearthed which shows the West Crosscut to be 855 feet.

(8) Discussion of Possibilities.

Although there are no outstanding possibilities demanding early attention it cannot be said that exploration at Montana No 2 was anything approaching complete.

There is the unnamed pyritic formation between Nos 1 & 2 Lodes awaiting exploration. Nos 3, 3A, 4, 5, Trotter's, 6, 7 & 7A, lodes have had no work done on them except a few feet.

Although No1 lode was followed into Zeeton Queen ground to the southwards at Nos 1 & 3 levels, No 2 Lode

On No 2 lode an adit was driven for 300 feet.

In the plan accompanying this report short drives are shown on Nos 3, 3A, 4, 5, Trotter's, 6, 7, 7A lodes. These are symbolic only because their lengths are unknown. What is known, however, is firstly that the lodes were intersected in the long east & west crosscut, and secondly that they were driven on but only for a few feet in each case. The mine cross section ~~shows~~ drives at each intersection. They are sketched in by guess on the plan accompanying this report.

There are also the lodes worked at the 58 ft level of No 5 shaft of the old Silver Queen. These are on the south side of the Oonah Tear Fault. They produced a quantity of galena down to 58 feet, but are untouched below.

of driving on each. It would be outside the law of probabilities based on past experience at Zeehan if these lodes, as they approach the Montana Tear Fault on the north or the Oonah Tear Fault on the south, did not carry good values. Waller in 1904, before the east crosscut was completed, refers to one of these lodes as Trotter's Lode and says:—

"This lode was worked by tributors some years ago, and is known to be 3 feet wide, carrying galena assaying up to 130 ozs Ag per ton."

was not penetrated beyond the boundary. That lode formations continue in this direction is indicated by the occurrence known as Payne's lode about 1200 feet south of the Main Shaft. This lode, carrying good values but rather high in zinc, has never been worked, its outcrop having been on a building block owned by a woman with an anti-mining complex. It is stated by George Clarke that No 2 lode was continuing strongly at the boundary, but they were not allowed to penetrate beyond.

(About 350 feet east of Payne's lode is Margett's lode worked successfully at shallow depth.)

Apart from these possibilities, the existence of the East Crosscut at 218 feet below the surface presents an opportunity to approach the untested lode formations in the vicinity of Fowler's Circus where incidentally the first discoveries were made at Leeton, but which have never been worked. The distance from the end of East Crosscut is about 600 feet. W. Moyle's lode worked at shallow depth lies 400 ft east of the end of East Crosscut.

Consideration of possibilities would be incomplete without due regard to the existence of the Montana Tear Fault to the north of the Montana No 2 workings. It was under this 'slide' that the Montana No 1 lodes were most productive. Therefore, in spite of the fact that Twelvetrees & Ward report both Nos 1 & 2 lodes as thinning out northwards, there is here a field for exploration as yet untouched.

~~+xxx~~

(9) Recommendations

No immediate operations are visualised. The general geological investigations in progress must ultimately clarify the details of the structural environment. When a reasonably accurate location of the respective faults has been achieved, it will probably be opportune to consider unwatering the mine.

Until these conditions eventuate it would seem that activity at Montana No 2 will be confined to the treatment of the mullock dump.

Nevertheless it is advisable to keep in mind the fact that there exists at Montana No 2 an East-West Crosscut over 2200 feet in length at 218 ft below the surface. This must ultimately prove a valuable base for exploration and testing which the ~~Aer~~ known lodes, either untested or untested below the 8 ft level, are deserving.

In addition there are the possibilities on the south side of the Oonah Tear Fault to the south. This portion of the Zeehan Field is quite untested and the same applies to the area eastwards along the Oonah Tear Fault until the extreme western workings of the New Mount Zeehan ~~—~~ are reached a distance of 1500 feet in a general south-easterly direction. There is thus an untested area in this direction measuring 1500 ft by 1200 ft.