

The Hon. the Minister for Mines,
HOBART.

Sir,

As directed, we have the honour to furnish the following report upon the No. 6 Argent Mine at Zeehan:-

HISTORICAL

Upon a resumption of operations in August, 1922, the mine was unwatered to the 120 feet level and Astle's appellated No. 3 and No. 4 lode channels were driven on southerly from the old workings. Simultaneously, preparatory work was undertaken and a commencement was made with the sinking of an auxilliary shaft from the surface level of and easterly from the Main shaft, to connect with and continue down on a winze previously sunk from the 120 to the 160 feet levels. When the auxilliary shaft had been completed to the 120 feet level the use of the Main shaft was discontinued except for pumping purposes.

Driving southerly on Nos. 3 and 4 lode channels revealed ore occurrences of marked value and which were to be classed as accessions to previously known ore. Continued driving disclosed that these ore occurrences persisted into ground outside that were brought under the Aid to Mining Act for the purpose of the No. 6 Argent company. The occurrences of ore, in the southern portion of the area brought under the Aid to Mining Act and in the adjoining ground, have yielded most of the ore recovered since the resumption of operations but the actual output and recoveries are not available owing to the absence of a proper system of mine accounting. With a gradual depletion of developed ore at the 120 feet level, known as No. 3 level, attention was directed to sinking the auxiliary shaft on the winze referred to and further developing the lode occurrences at the 160 feet where limited mining had been done and certain values revealed; vide a report furnished by Messrs. Levings and Vaudeau on the 30th April, 1921. The sink was accordingly completed to the 160 feet level, being No. 4 level.

At this level and from the main crosscut, the north drive on No. 3 lode channel was extended to 136 feet and the south drive on this channel was advanced to 165 feet.

From the point of intersection of a crosscut from the south drive on No. 3 channel, No. 4 lode channel was driven on 80 feet northerly and 53 feet southerly but this channel has not been penetrated from the northern workings on No. 3 lode channel.

Northern developments on No. 3 lode channel disclosed a well defined fissure varying up to 6 feet in width and carrying lesser widths of second class ore with an irregular dissemination of bands of first class ore. Southern developments revealed an irregular ore occurrence from approximately the 15 to the 102 feet measurements, the remainder of the drive showing no values. This southerly developed ore has been mined and depleted to the 120 foot level.

Limited stoping was done on the northern ore development, but, we are informed, results proved that overhead values are insufficient to enable the lode to be economically exploited under existing conditions.

No. 4 lode channel is reported to have varied up to 5 feet in width with an inclusive width of up to 2 feet of ore but developments are ascribed to have been disappointing and on the 19th October last, the Company notified employees of its financial inability to carry on and offered the mine on tribute to them. From that date, tributers operated on No. 4 lode at No. 4 level and to a limited extent on No. 3 lode between Nos. 3 and 4 levels in the northern workings. Results are ascribed to have again established that under existing conditions the grade of ore in No. 3 lode channel over the north drive is not payable, and faced with a gradual depletion of other developed ore it was apparent that unless extensive developmental work was undertaken and proved depth persistence or other makes of payable ore, a cessation of operations was inevitable. The position appears to have been aggravated by the tributers experiencing difficulties in obtaining adequate supplies of firewood, and these two factors culminated in a cessation of operations by the tributers on the 12th December, 1923.

PRODUCTION

Information received approximates that during the operating period from August, 1922, the No. 6 Argent Company produced 963.4 tons of ore and concentrates containing metallics of a total gross value of £20,329; from which a total nett value, of £14,197 was derived. After absorbing this nett value, less royalty, and in addition exhausting liberal financial assistance from the Department and invested Capital the Company ceased operations in a financially embarrassed position, but as we have not been required to reveal the financial transactions and position of the Company, no further mention is being made thereof in this report.

In addition to metallics produced by the Company, tributers produced 318 tons of ore and concentrates of an approximate gross value of £6,778 from which an approximate nett value of £4,383 was derived. Data available in respect to parcels of ore and concentrates produced at the close of the period are incomplete, consequently values are approximations only.

EXAMINATION

Exclusive of any prospective value, it will be realised that the immediate possibilities of the mine, on the area are dependent upon a persistence of payable ore below the 160 feet level - the depth attained by the auxiliary shaft - and that exploration of these possibilities necessitates further sinking. An examination of the lode occurrences at No. 4 level was, therefore, of importance.

When the tributers abandoned the mine stocks of firewood were exhausted and compelled a cessation of pumping operations with a result that the No. 4 level workings were flooded. No. 3 level workings had been collapsed and otherwise distressed by the flooding, and that the drive on No. 4 lode channel on No. 4 level had been "slurried", partly filled with runs of filling from the stopes and completely filled at the northern end with a run of sand and slate detritus from a hangingwall fissure. The distress of workings together with the prevalence of deficient air, which extinguished the artificial lights used, rendered impossible, without the incurrence of a large expenditure of money, an examination of the workings in the southern end of the mine on No. 3 level and of No. 4 lode channel on No. 4 level. The absence of a sump at the auxiliary shaft and a constant flow of water on the floor of the workings at No. 4 level added extreme difficulties to an examination of No. 3 lode channel at that level, but with the installation of a series of dams and pipe launders much valuable evidence was collected of the ore occurrences in this lode channel, and the taking of indicator samples was rendered possible. It is considered that the examination made and the data collected have rendered possible a preparation of the desired report.

FAST DEVELOPMENTAL METHODS

The developmental methods pursued at this mine since the resumption of operations in August, 1922, have been unusual and extremely costly for a comparatively small undertaking.

The policy pursued involved the driving of two adit levels distances aggregating 365 feet, the sinking of a new shaft 12'6" x 4'5" in the clear, rising this shaft to the surface, installation of a second winding plant, cutting of two additional bob pits, installation of two additional draw lift pumps with 240 feet of heavy flat rods and bobs working in balance with the two draw lift pumps at the Main shaft and equipment of the shaft generally. The preconceived plan of the management appears to have been directed to obviating the cost of alterations to the headgear of the Main shaft, enlarging this shaft to the 120 feet level, sinking it and then driving long crosscuts to the lodes at the opening-out levels.

On the 30th April, 1921, Messrs. Levings and Vaudeau, when reporting upon an application by the No. 6 Argent Syndicate for assistance to the extent of £5,000, stated:-

"After earnest consideration we subscribe to the opinion that it is a sound mining speculation to sink the main shaft and open the mine to a deeper level although necessity compels the use of steam power."

The report dwelt kindly upon the prospects of the mine and as a result financial assistance was granted. The recommendation contained in the report, however, was deliberately departed from, and the policy responsible for the existing arrangements was substituted therefore.

The cost of effecting and maintaining these arrangements is not available, but we are satisfied that it would greatly exceed that likely to be involved in giving effect to the recommendation of Messrs. Levings and Vaudeau. The policy of the management enabled ore production to be commenced at an earlier period than would otherwise have been the case, but in seeking that advantage costly errors were committed in practices and economics and resulted in the infliction of heavy and unnecessary overhead expenses on the mine. The principle of sinking to avert costly crosscutting to lode channels finds a useful application under certain conditions but not to the conditions obtaining and produced at this comparatively small mine. Further, although some lateral exploration was undertaken no greater depth was attained than when Messrs. Levings and Vaudeau submitted their report.

However, we do not voluntarily seek to dwell upon errors committed in mining practices and economics, but we desire to emphasise that these errors fault the principle of the Department advancing monies to mining ventures without rigid control of expenditure, methods of absorbing advances and economics practised.

LODES AND VALUES

Information received asserts that a winze was sunk 17 feet from No. 3 level on make or ore in No. 4 lode channel some distance southerly from the boundary of the area brought under the Aid to Mining Act, but outside opinions differ in respect to the extent of this ore, upon which some stoping has been done, and as an examination could not be made of the development owing to distressed workings and deficient air, it must remain as of undetermined prospective value. Further, information presented to us attaches complexities to pursuance of mining operations in this ground conjointly with operations in the area brought under the Aid to Mining Act, consequently we have refrained from regarding the development as one to be coupled with any prospective value of the mine.

No. 4 Level

No. 4 Lode Channel: This lode channel was driven on 80 feet northerly and 53 feet southerly from the south crosscut and is reported to have varied up to 5 feet in width with an inclusive width of up to 2 feet of ore. The developed ore was exploited by the company and tributers. An examination of the floor of the drive was not reasonably practicable after the unwatering owing to unfavourable conditions and deficient air, previously, without an incurrence of considerable expense of time and money.

Records show that 3 samples of prill ore from this lode assayed:-

29.5	ozs.	silver	and	33.05%	lead
28.5	"	"	"	34.6 %	" and
26.05	"	"	"	35.35%	" and

Seven parcels of ore from this lode, together with a small quantity of ore from No. 3 lode, approximated 28 ozs. silver and 44.24% lead.

The south end of the drive and a short rise therefrom are recorded by Mining Engineer Scott to have been discontinued in channel filling carrying a seam of galena about 2 inches in width.

At 80 feet the north drive encountered spillite country and the lateral continuity of the lode channel was interrupted. A crosscut easterly therefrom penetrated a hanging wall fissure and this was accompanied by a run of sand and slate detritus. Mining Engineer Scott records that a seam of cubical galena about 3 inches in width was observed in the roof and on the south side of the crosscut end. A sample of galena supposed to have been taken from this seam assayed 73 ozs silver and 78.8% lead. When the mine was unwatered for examination purposes the crosscut end was inaccessible owing to an extended run of fissure filling, consequently it was not practicable without the incurrence of a large expenditure of money to further investigate this ore occurrence, but being of a different physical character from that obtaining in No.4 lode channel, the development might be regarded as of some prospective value.

No.3 Lode Channel North:

The north drive on this lode channel has been extended to 136 feet disclosing a well defined fissure varying up to 6 feet in width and carrying lesser widths of milling ore with an irregular dissemination of bands of first class ore. Indicator samples were taken of the lode at stated intervals, with the following results:-

At 25 feet from the main crosscut the lode channel is 4'6" wide and carries an irregular dissemination of small seams of galena. A bulk indicator sample taken across the channel width assayed 12.1 ozs. silver and 8.6% lead.

at 50 feet from the crosscut the lode channel is 5'5" wide with small bands of galena, one of which varied up to 3 ins. in width. A bulk sample from the channel width assayed 15.4 ozs. silver and 12.1% lead. Selected galena from this sample cut assayed 104 ozs. silver and 76.8% lead.

At 80 feet from the crosscut the lode channel is 6 feet wide and carries bands of galena aggregating 15 inches in width. A bulk indicator sample from the channel width assayed 12.4 ozs. silver and 19% lead. Selected galena from this sample cut assayed 120 ozs. silver and 77.3% lead.

At 115 feet from the crosscut the lode channel is 6 feet wide and carries occasional bands of galena, one of which approximated 5 inches in width. A bulk sample taken from 4'6" of the channel width assayed 26.8 ozs. silver and 21% lead. Selected galena from this sample cut assayed 76 ozs. silver and 57% lead.

The drive end shows a well defined lode channel 4 feet wide but of poor quality, the filling being banded siderite, gangue rock, and traces of galena.

As previously stated results are ascribed to have proved that values are insufficient to enable

the lode over the level to be profitably exploited under present conditions. In the leading stope, 19 feet from the drive end the channel width is 4 feet and a sample cut across this width assayed 13 ozs silver and 12% lead. With reasonable mining and milling practices this grade of ore should be payable. A few feet south from where the sample was taken the rising stopes show lode matter of poor quality but the grade of ore samples continues northerly and may be seen in the roof of the leading stope at the drive end.

Fifteen feet from the end of the drive an exploratory crosscut was commenced and driven easterly about 7 feet. It is very regrettable that this crosscut was not continued, as such would have been of intrinsic value in disclosing as to whether or not the No.4 lode channel persisted in this part of the mine.

No.3 Lode Channel South: The south drive was advanced to 165 feet from the main crosscut revealing an irregular ore occurrence from approximately the 15 to the 102 feet measurements the remainder of the drive showing no values and as far as could be seen no defined lode channel.

Samples were taken at stated intervals along the floor of the drive with the following results:-

At 15 feet south from the main crosscut a lode width of 6 inches of siderite, galena, and quartz was disclosed. A bulk sample of this ore assayed 38.4 ozs silver and 25.4% lead. This appears to be the northern extremity of the ore occurrence in the lode channel in the southern workings.

At 25 feet from the crosscut the lode channel is 4'6" wide. 14 inches of ore on the footwall side assayed 45 ozs silver and 27.5% lead. The actual ore width at this measurement was not determinable owing to a heavy flow of water but a lump sample from an additional width of ore on the hangingwall side of the previous sample assayed 62.2 ozs. silver and 24% lead.

At 37 feet from the crosscut the channel width is 2'9" and carries 15 inches of ore on the hangingwall side and a small seam of galena on the footwall side. A bulk sample of the 15" of ore assayed 78 ozs silver and 37.3% lead. Selected lump ore from this lode width assayed 80 ozs. silver and 51.3% lead. Clean galena from this ore assayed 80.8 ozs. silver and 70.2% lead.

At 52 feet from the corsscut the lode channel is 4'7" wide with 2'5" of ore on the footwall side and 3 inches of ore on the hangingwall side. A sample from the 2' 5" of ore assayed 61 ozs silver and 45.1% lead. The 3 inches of ore of mixed galena and siderite assayed 36.6 ozs. silver and 44.2% lead.

At 72 feet from the crosscut there are two seams of ore, one 6 inches wide on the footwall of the lode channel and one 5 to 8 inches wide on the hangingwall side 8'5" from the former. A sample of the 6 inches of ore assayed 60 ozs silver and 61.4% lead and a sample of the 5 to 8 inches of ore assayed 20 ozs silver and 19.1% lead.

At 87 feet from the crosscut searching revealed a seam of finely crystalline galena up to $1\frac{1}{2}$ inches in width which assayed 71.6 oz silver and 71.1% lead.

At 102 feet from the crosscut the channel width was not defined but 2 feet of milling ore on the hangingwall side assayed 48 oz silver and 21.8% lead.

At 117 feet from the crosscut no ore was encountered. At 182 feet the ore occurrence appears to have been interrupted and on the footwall side and deviating into the footwall country a make of "gossan" up to 9 inches in width was observed. A sample of this gossan, upon which no exploratory work has been done, assayed 168 oz silver and 5.8% lead.

Based upon reports received, previously, the result of the examination of the ore occurrence along the floor of the south drive on No. 3 lode channel has been disappointing, both as regards widths and values. Inspector Vaudeau emphasises that considering the amount of first class ore produced during driving, better results could reasonably have been expected.

The occurrence of "gossan" at the 102 feet measurement is of marked interest, and considering the assay results, it is remarkable and deplorable that this occurrence was not explored beyond the mere exposure in the drive.

The examination confirmed reports received of developments in No. 3 lode channel north; namely, an occurrence of milling ore with an irregular dissemination of bands of first class ore of widths and values stated.

MILLING

Samples were obtained from the jig rejects and concentrating table tails accumulated at the mine from the treatment of milling ore produced since the resumption of operations in August, 1922. Three samples taken from the jig dumps assayed:-

1. 8.6 oz silver and 5.3% lead
2. 7.3 oz silver and 5.4% lead
3. 7.9 oz silver and 4.9% lead

Two samples taken from the table tails assayed:

1. 30.0 oz silver and 10.4% lead
2. 15.4 oz silver and 9.6% lead

Results suggest that milling leases are unnecessarily high and as so much is dependent upon milling efficiency in the treatment of the lower grade ores there appears to have been ample scope for more attention to improving the efficiency of the milling practice. Given more time further researches could have been effected but from data collected it is not surprising that some of the good class ore could not be economically exploited under the prevailing conditions of mining and milling. Inspector Vaudeau made simple tests of the mill rejects and regards the ore amenable to jigging and table concentration without incurring losses as high as recorded. Alterations and additions to the mill would be necessary to produce increased milling efficiency.

Exclusive of a short length of milling ore in the leading stope over the north drive on No. 3 lode at No. 4 level, developed ore in the mine is inconsiderable.

Irregularities and inconsistencies of ore occurrences in the lode channels within the Zeehan metalliferous area add difficulties to presenting a definite opinion upon depth persistence of the irregular ore occurrences revealed in No. 3 lode channel at the 160 foot level but the length of the ore zone, widths and values obtained in No. 3 lode channel together with the unexplored make of gossan at the south end of this channel, the lower grade ore in No. 4 lode channel and the undetermined make of ore at the end of the east crosscut from No. 4 lode channel add a prospective value to the mine which is not to be ignored. Legal right to pursue mining operations in the southern area, previously mentioned, conjointly with the area brought under the Aid to Mining Act, together with an extension of the north drive on No. 3 lode channel and the east crosscut 15 feet from the drive end, adds to the prospective value.

ECONOMICS

The immediate possibilities of the mine being dependent upon a persistence of ore below the 160 foot level, necessity for further sinking is admitted and as the auxiliary shaft has been completed to the 160 foot level or 40 ft below the bottom of the main shaft and is in a more favourable position for the immediate exploration of Nos. 3 and 4 lodes channels - the question of sinking this shaft for a further lift of workings must be considered.

The Manager has informed us that the quantity of water lifted to the surface is 24,500 gallons per hour. Maintenance and cost of pumping are exorbitant but with the development methods pursued by the Company it is doubtful if costs can be materially reduced with a continuance of the existing pumping.

In sinking for a further lift of working of 65 feet allowance must be made for a 'sump' of at least 5 ft, making the sink 70 feet. At a sinking rate of 10 feet per week the minimum cost of effectually carrying out the work under prevailing conditions would be \$1,816, but it is doubtful if that sinking rate could be maintained with the existing arrangements and we are inclined to regard a sinking rate of 8 feet per week as more reasonable when the total minimum cost would be \$2,225.

It must be distinctly understood, however, that a completion of the sink would not place the mine in a production stage for any operations. At the opening-out level a plat chamber requires to be excavated and making provision for crosscutting to the lode channels and driving 1000 feet and 50 feet on No. 2 and 4 lode channels, respectively, a further cost of £1,071 would be involved making the cost of sinking and driving £2,887 or £3,296 according to the respective sinking rates.

To unwater the mine with the existing pumping arrangements, preparatory to a resumption of operations, would absorb approximately £350.

Inspector Williams emphasises that ventilating conditions have been deplorable in the past, and that similar conditions, reasonably, could not be permitted in the future. Conditionally that the ore persisted in depth and is developed to the exploitation stage immediate provision may be necessary for adequate ventilation and escape. Immediate necessity for adequate ventilation might make it advisable to couple the cost with the cost of placing the mine in the producing stage. If this is allowed, the cost of again placing the mine in a producing stage for operators would probably vary from £3,537 to £3,946.

The above cost allows for the present pumping arrangements being adequate, does not allow for the value of any ore produced during development and does not provide for exploration of any of the lesser prospective values mentioned.

In opening up the mine at deeper levels it would be reasonable to anticipate an increase in the quantity of mine water to be lifted to the surface. If such were the case it would place an added burden upon the pumping arrangements and pumping capacity and, under existing conditions, it is very doubtful if such would be adequate.

To unwater the mine and continue with existing arrangements and past methods of working would be economically fallacious. Present systems may be departed from in several ways but each would mean added initial cost against the prospective values mentioned. To open up and economically work the mine, operations should be concentrated at one shaft and to do this would be to incur a large initial expenditure.

Equipping, enlarging and sinking the main shaft and placing the mine in a producing stage was dealt with by Messrs. Levings and Vaudeau on the 30th April, 1921 when the cost was placed at £10,000. Since then metallics to the value states have been extracted and the prospective value of the mine appears to have lessened. With the present size and depth the auxiliary shaft is in a more favourable position for any future working of the mine. The question of sinking this shaft with present arrangements and continuing past methods of working has already been dealt with. An expression of doubt being recorded in respect to the adequacy of the existing pumping arrangements, should an increased quantity of water required to be lifted to the surface, it is necessary to emphasise that in any future scheme of working the question of coping with mine water is of considerable importance and ample provision should be made for contending with an increased quantity of water to that ordinarily making. The cost of equipping the shaft with a steam operative plant without the use of extensive lengths of flat sweep rods is of such moment that the question of electrical equipment may be taken into consideration. To convert the electrical pumping and winding and making provision for lifting up to 40,000 gallons of water per hour would probably absorb between £3000 and £4000. However actual quotations for electrical equipment have not been produced, consequently it is not possible to make this cost reasonably definite. The Electrical Engineer of the Zeehan Municipality has been conferred with and has finally furnished an approximation of the cost of an electrical pumping equipment. This is appended. The opinion was also expressed that to convert to electrical winding of a desired capacity would absorb £800 to £1000. To electrically equip the mine, systematically open up and explore the prospective

values it would be advisable to make available a capital of not less than £8,000.

PLANS AND ASSAYS

Complete surveys and plans of the workings were not made by the Company, consequently developmental references are necessarily vague but a compass survey has been made of No. 4 level workings and with data otherwise derived a plan and section of part of the workings have been prepared and accompany this report. The principal omission is the workings at the southern end of the mine on No. 3 level, which workings were not accessible for reasons contained in this report.

Assays of all samples were made by Mining Engineer Scott and these have been plotted on the plan accompanying this report.

We have the honour to be,
Sir,
Your obedient Servants,

(J.B. Scott)
GOVERNMENT MINING ENGINEER

(H.A. Vaudeau
W.H. Williams)
INSPECTORS OF MINES

MUNICIPALITY OF ZEEHAN.

Electric Light Department.

Zeehan, Tasmania, 31/12/23.

S. Kennedy,
Engineer.

Geo. E. Rees,
Council Clerk.

Messrs. Vaudeau & Williams - Inspectors of Mines

Approximate cost of Pumping Units

- 1. Electrically driven, Direct Coupled, Horizontal Centrifugal Pumping Unit, Capacity 40,000 gallons per hour against a total head of 300 feet including friction. Power absorbed by same - 85 B.H.P.

Approximate Price - £1,200.

- 2. Electrically Driven Direct Coupled Vertical Centrifugal Pumping Unit. Capacity 18,000 gallons per hour against a total head of 100 ft including friction. Power absorbed by same 16 B.H.P.

Approximate Price - £700.

- 3. Installation of the above Units complete including columns and all accessories.

Approximate Price £800.

Contingencies £300

Approximate Agg. Total - £3,000

Zeehan, 9th January, 1924

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The Honourable the Minister for Mines,
HOBART.

Sir,

Having now been required to present a recommendation upon the future of the No. 6 Argent Mine as an addendum to the report furnished on the 5th inst. we have the honour to state as follows:

RECOMMENDATIONS

The given assurance of the absence of legal obstructions to pursuance of mining operations on the area adjoining that brought under the Aid to Mining Act, referred to in the major report, dispels the uncertainty expressed and removes the barrier placed on the prospective value of that ground.

Having given the mine a prospective value of the extent and nature mentioned in the major report the question of the future of the mine arises for consideration.

The Government is not recommended to provide the amount of capital necessary to further explore the possibilities of the mine but if an approved syndicate is prepared to raise capital to further operate we would not be adverse to recommending financial assistance to an extent dependent upon the scheme of working to be applied and provided approved methods of working and economies are practised.

If an approved syndicate presents an equitable policy of working without involving financial assistance but with the use of the existing plant-adding to or altering it as may be deemed necessary and is prepared to carry out such exploratory and developmental work as will determine the possibilities of the mine we recommend that the syndicate be allowed to work the mine on a royalty basis of 10 per cent without any additional payment for use of the plant.

If the Department is not prepared to further financially assist in the development of the mine we recommend that the plant and mine be sold by tender to bona fide operators and that, for the purposes of working the mine with vested capital, the area be alienated from the Aid to Mining Act and allowed to be acquired under the Mining Act of 1917 with an assurance of no future interference under the provisions of the former Act.

POWER

It was omitted to mention in the major report that electrical power is available at one penny per unit to mining operators.

We have the honour to be,
Sir,

Your Obedient servants,
J.B. Scott
Government Mining Engineer.

R.A. Vaudeau
W.K. Williams.

Inspectors of Mines

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