

Q37 No 5

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SHEPHERD & MURPHY MINE

MOINA

by

M. R. McKeown

28/5/38

Shepherd & Murphy Mine, Moira
M. R. McKeown 28/5/38.

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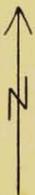
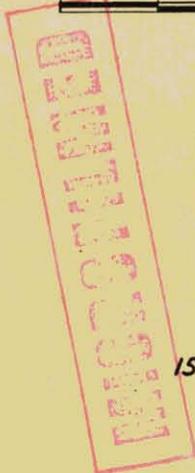
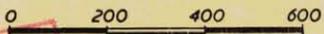
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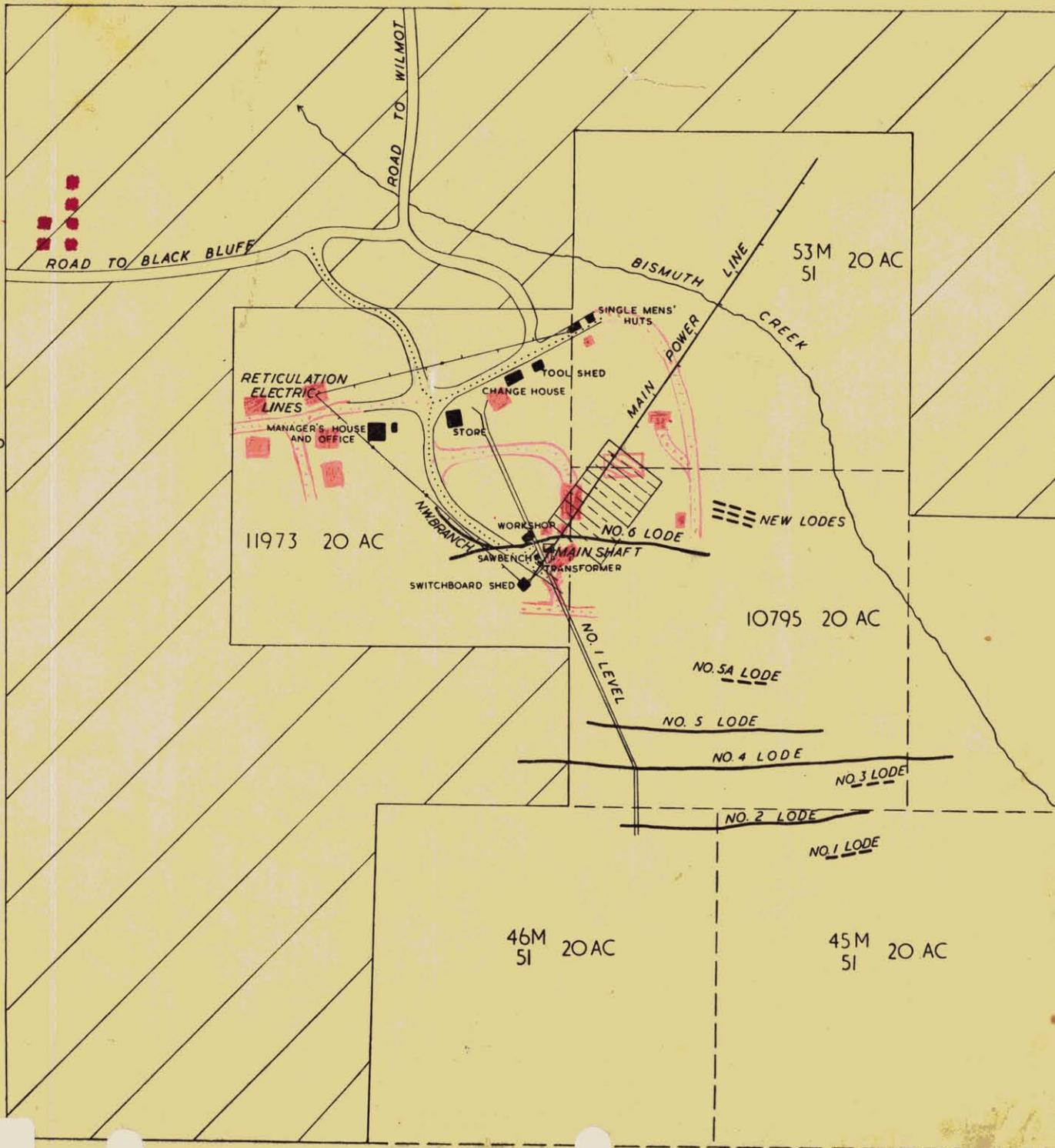
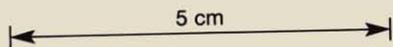
SKETCH PLAN MOINA MINE

-  LODES NOS. 2,4,5,6 AND NW BRANCH AS WORKED AT NO. 1. LEVEL
-  LODES NOS. 1,3,5A AT SURFACE
-  ADDITIONAL AREA BEING ACQUIRED
-  BUILDINGS RECENTLY ERECTED
-  POWER LINES RECENTLY ERECTED
-  NEW ACCESS ROAD
-  SITE BEING PREPARED FOR MILL

SCALE IN FEET



15.9.53



In 1919 the Mill was destroyed by fire. A new Mill including Rolls, Jigs, Tables and Vanners and a Magnetic Separator was completed in 1922, on a site adjacent to the position of the old plant. It is stated that the mine was not unwatered when the new Mill was put into operation, and that supplies of ore were drawn from the stopes above No. 3 Adit: in consequence, a considerable tonnage of ore broken in the idle period is said to be lying in the stopes below water level. The Mill was not run for long, as the heavy fall in the price of metals which then occurred, caused the Syndicate to cease operations in 1924, and to proceed to liquidation soon after. Following the discovery of the Aberfoyle Mine about 1927, the plant was purchased and removed to Aberfoyle. Since then, the only work done on the S. and M. Leases has been that carried on by J. P. Godwin, who during the past five years has been engaged sluicing alluvial, and in the production of concentrate from the treatment of ore by hand jiggling and dressing in the Streaming Box.

TOPOGRAPHY AND GEOLOGY :

The country is high and rugged. The altitude at No. 3 Adit is 1,900 feet, and the surrounding hills reach elevations up to 2,400 feet. Rainfall is 60 inches per annum. The surface is deeply dissected and drainage is carried northward by the Forth and Iris Rivers. Bismuth Creek flows westward down the gully on the south side of which the mine workings are situated, and is stated to be permanent, but the flow may be expected to diminish considerably in the summer months. The topography has assisted mining by exposing the lodes through the erosion of the covering basalt, and by permitting working by means of adits to a maximum depth of 330 feet below the highest point in the outcrop.

The country rock in the vicinity consists of Silurian sandstone, quartzite, a contact-metamorphic garnet rock and Tertiary basalt. The metamorphic rock is considered to be an altered limestone, the metamorphism having been caused by the intrusion of granite which outcrops at some distance to the south and east, and undoubtedly underlies the locality of the mine. It is by means of the solutions accompanying this granitic intrusion that the metallic contents have been introduced into the fissures in the overlying rocks resulting from the intrusion itself. When reviewed with Tin-Wolfram lodes elsewhere it is considered unlikely that values will cease below the contact of the intruded sedimentary and metamorphic rocks with the intrusive granite, and the lodes may be expected to persist in the underlying granite. This unbroken continuity is found to be the case in lodes adjacent to the S. and M. area, but the comparative elevations could not be ascertained.

The country rock strikes north and south and dips west; the strike of the lodes is east and west, and their dip is slightly to the south. The gangue is quartz, with topaz, fluorspar and mica; the economic minerals are Cassiterite, Wolfram and Bismuth Sulphide, with some Bismuth Carbonate in the upper parts of the lodes. A little Molybdenite is present in negligible amount and Pyrite also occurs in sufficient quantity to necessitate its removal from the concentrate. The lodes vary from 2 inches to 2 feet in width and are persistent along the strike for distances up to 1,400 feet. Other veins occur parallel to the main lodes, at a few feet on either side, and in places stringers of quartz leave the lodes and make into the country: such stringers might be worth investigation. Faulting has occurred to a limited extent, with slight displacement of the lodes, the greatest throw observed being 3 feet. The values in the lodes appear to be unaffected by the nature of the country rock. The economic minerals do not occur in shoots, but are more or less irregularly distributed throughout the lodes, bunches of high grade mineral being of fairly frequent occurrence. The ore bodies are, therefore, workable over long lengths. Tin appears to be fairly general in occurrence but Wolfram and Bismuth are present in patches, generally independent.....

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of one another. The alternations of values and blank sections are closely spaced, so that stoping can be carried through without a break.

Denudation of the Silurian rocks resulted in the liberation of Cassiterite and Wolfram from the lodes, and the concentration of the mineral in narrow gullies which were subsequently covered by the Tertiary Basalt flows. These factors of erosion and Basalt filling limit the extension, at a shallow level, of the lodes in a western direction, and the unusual feature is seen of drives following lodes into Basalt covered deep leads. This is the case with Nos. 4 and 5 Lodes at the Creek Drive level, and with the North-west Branch Drive at the No. 3 Adit level. Small leads exposed by the erosion of the Basalt, and which fall steeply to the west, have been sluiced for good returns, proportionate to their size.

According to statements, the Tin and Wolfram values in the lode show no marked diminution with depth, but some decrease has been noticed in the Bismuth content. It is also stated that the lodes are wider in the lower levels than in the shallower parts of the mine.

There is evidence that a fault of greater magnitude than usual intersects the country at the east end of the workings, its course being traversed by Bismuth Creek, and that extension of the lodes will be located on the Prospecting Area on the eastern side of the creek.

WATER, POWER, TIMBER :

The flow of water in Bismuth Creek is stated to be sufficient for milling purposes for about eight months of the year, and that, during the remainder, the supply should provide make-up water if the milling water were returned to circuit. Water is also available from the race from Weaning Paddock Creek, which would deliver sufficient for milling throughout the year. In addition, the mine is stated to make 2,500 gallons per hour.

There are four alternatives for the supply of power, all of which require detailed investigation. These are :-

- (1) Hydraulic Power: During the previous Company's operations, water was brought from Weaning Paddock Creek by a race six miles long, graded at 16 feet per mile, and delivered through 1,700 feet of 20-inch pipe to Pelton Wheels. The supply was sufficient for full operation during only eight months of the year, and with the object of providing enough water for continuous running, a race extension was surveyed to Iris River, but, owing to the porous nature of the country, it was considered that the proposed work would give no additional water in the dry part of the year. The Company's race delivered 10 sluice-heads of 24 cubic feet per minute. A 5 foot diameter Pelton Wheel, under a head of 360 feet, drove the Air Compressor of 500 cubic feet free air per minute capacity, and the Mill was driven by two Pelton Wheels, 2 feet 6 inches diameter, under a head of 375 feet. During the summer months, power for mining was provided by an auxiliary steam-driven Air Compressor, so that it is evident that the hydraulic power supply was not satisfactory. J. P. Godwin holds a Water Right covering the race as far as Bampton's Creek, a distance of 3 miles. The remaining 3 miles is held by a local resident for speculative purposes, and, as he has no lease for which the water would be legitimately required, his title might be disputed successfully.
- (2) Hydro-Electric Power, locally generated: J. P. Godwin holds a Water Right at Bull Creek, 3 miles east of the S. and M. mine. He states that the minimum flow of water in a very dry season was 4 sluice-heads, and that the creek falls 1,600 feet in a distance of 2 miles. An inspection showed that the creek is of importance, and that a considerable fall occurs in

a comparatively short distance, so that a detailed examination is warranted, Mr. Godwin states that Bull Creek has been examined recently by a Mr. Turner, Engineer to the Aberfoyle Tin N.L., who reported that some 250 H.P. might be obtained from that source, and that its transmission to the mine would call for some three miles of power line.

- (3) Electric Power purchased from the Tasmanian Government Hydro-Electric Commission : The Commission's mains have been extended as far as Wilmot, 11 miles from the mine, but the question of purchased power requires the same careful consideration as the alternative schemes. In the light of present information, the consumer would have to pay for the cost of the Power Line to the mine, and to contract for a definite block of power, which must be paid for whether used or not; and, in addition, a cash guarantee must be lodged, covering the estimated power consumption for a specified period. As these conditions can be very onerous to a small Company by locking up a, possibly, considerable amount of its capital in equipment in which it has no equity, power from this source may not be as advantageous as might appear at first sight.
- (4) Diesel-Electric Power: generated on the mine. In view of the distance from the Port of Devonport, 39 miles, the good road to the mine and the price quoted for transport of all materials and stores, of 15/- per ton, which would include fuel oil, the use of Diesel Engines coupled to Electric Generators must be considered. Diesel-electric power is to be preferred to direct Diesel Drives owing to the impossibility of using a Diesel Drive for a Winding Engine, and also to the greater flexibility possible in driving the Mill Units electrically, while an Electric Drive is again to be preferred for pumping.

The supply of timber for mining purposes in the near vicinity of the mine is limited, but satisfactory supplies of stringybark, myrtle and a lesser quantity of celery-top pine can be cut within a radius of three miles.

THE MINE WORKINGS :

The mine has been worked from four Adits and a three-compartment vertical shaft.

The vertical distances between the levels worked from these main openings are :-

Surface to No. 1 Adit	100 feet.	
No. 1 Adit to Creek Drive	90 "	
Creek Drive to No. 2 Adit	75 "	
No. 2 Adit to No. 3 Adit	75 "	No. 1 Level
No. 3 Adit to No. 2 Level, Main Shaft ..	75 "	No. 2
No. 2 Level to No. 3 Level, Main Shaft ..	75 "	No. 3
Total depth from highest point of lode outcrop to bottom level	490 feet.	

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No. 1 Adit is situated approximately 100 feet below the highest lode outcrop, and has been driven east for 600 feet. It intersects No. 5 Lode at 170 feet from the entrance, a split off the same lode at 190 feet, No. 4 Lode at 275 feet, and No. 2 Lode at 420 feet. Owing to falls of ground, Nos. 2 and 4 Lodes could not be inspected above this level, but both have been stoped to surface. No. 5 Lode has been driven 30 feet east and 20 feet west, and a small stope taken out at the west end on lode varying from 6 inches to 12 inches in width showing patches of Wolfram. In Nos. 2 and 4 Lodes, small patches of ore may remain unstoped, but they are not likely to contain any tonnage of commercial importance.

Creek Drive: This drive, 90 feet below No. 1 Adit, has been driven along No. 4 Lode for 850 feet, and has been stoped both above and underfoot for a distance of about 600 feet. A bridge of ore remains under the drive, but does not represent any material tonnage. Between the mouth of the Drive and 300 feet, a block of ground remains practically unworked overhead and underfoot, excepting a little stop-

ing off a rise at 200 feet in, and may contain payable ore. At 700 feet in a parallel vein 6 inches wide splits off the lode on the north side, and has been driven on and stoped to the east for 100 feet. The western end of the drive has been stoped in deep lead material. At 500 feet from the entrance a crosscut has been driven north-west for 130 feet to No. 5 Lode, and the Lode then driven on for 300 feet, the eastern end only being accessible. In the western end alluvial was reached at 54 feet from the crosscut, and beyond that distance the workings have collapsed. The lode has been stoped to 30 feet above rails; samples were taken from the floor of the drive where the lode has a width of 7.5 inches (see "Sampling"). At 800 feet from the mouth of the drive, a south crosscut intersects No. 2 Lode at 175 feet. The lode has been driven on for 180 feet west, and 530 feet east, and continues beyond both drive faces. Overhead the lode has been stoped for a length of 500 feet to an average height of 50 feet above rails, there being 40 feet of backs under No. 1 Level, with which connection is made by a rise at the east end. At 140 feet west of the crosscut a winze connects with an intermediate level at 75 feet down, and with No. 3 Adit at a depth of 150 feet. Below the Creek Drive level the lode is intact except for a relatively small amount of stoping in the vicinity of No. 3 Adit. No. 2 Lode was sampled in the back of the stope and in the floor of the drive, details being set out in "Sampling".

No. 2 Adit: This adit was not accessible and does not appear to have been driven beyond No. 6 Lode.

No. 3 Adit: has been driven south-south-east for 1,230 feet, meeting No. 6 Lode at 390 feet, No. 5 at 925 feet, No. 4 at 1,050 feet and No. 2 at 1,215 feet. No. 6 Lode is intact at its intersection by the Adit but the drive has collapsed at 20 feet west, where stoping westward commences; at 90 feet east the back laths have broken and caused the blockage of the drive by broken rock containing large pieces of Wolfram from the stope above.

Main Shaft: The shaft is of three compartments, 12 feet by 4 feet in the clear, and has been sunk to 171 feet below No. 3 Adit, close to No. 6 Lode, and has been risen to the surface, a distance of 96 feet. A Main Level has been opened out at 150 feet below the adit, and an intermediate level at a depth of 75 feet. At the bottom level a crosscut has been driven south for 700 feet, intersecting Nos. 6, 5, and 4 Lodes, most work having been done on No. 6.

DESCRIPTION OF LODES :

No. 2 Lode: The width of the lode, as proved by sampling, is 8.5 inches, and according to the Company's records, 10 inches. The workings extend for a length of 600 feet on No. 2, or the Creek Drive level, above which ore reserves are 1,140 tons of clean ore. From the Creek Drive to No. 3 Adit level, a depth of 150 feet, the lode is intact excepting a winze at the west end, and a stope 200 feet long and 75 feet high, in addition to which a drive has been extended for a total distance of 450 feet east and west from the Adit. While the evidence is not conclusive, it does not appear that the lode has been reached by the bottom level crosscut from the Main Shaft at 150 feet below the adit. The average metal values of this lode will be found under "Sampling".

No. 4 Lode, according to records, averaged 15 inches in width and was stoped at three levels for lengths up to 1,000 feet. It has been completely stoped above No. 3 Adit to surface, but, in the eastern end some unworked ore may exist. The lode has been cut at the bottom level where it is said to have been driven on for 400 feet and a leading stope taken off. There would, therefore, be an intact block of ground below No. 3 Adit, 150 feet in depth and of undetermined length. The lode has been one of the principal ore bodies in the mine, and its potentialities now lie below the No. 3 Adit level.

No. 5 Lode: has been explored to a limited extent only, and is intact except for stoping 300 feet long and 30 feet high at the Creek Drive level, where it is 7.5 inches wide. It has been driven on for 50 feet at No. 1 Level and has been intersected by No. 3 Adit, but as the

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latter point was not accessible, there is no information as to its values at that level. It may be regarded as having development possibilities throughout a minimum vertical range of 300 feet, but does not appear likely to develop into a lode comparable to the larger ore bodies.

No. 6 Lode has been regarded as the main ore body in the mine. Its average width was 20 inches, and it has been stoped continuously for a length of 700 feet. From No. 3 Adit it has been worked out to the surface; below the Adit, in a depth of 150 feet, two levels have been driven from the Main Shaft for similar distances. It is stated that limited backs remain above the upper level, but that 40 feet of ore is unbroken above the lower level stopes. It is further stated that these stopes were worked on the shrinkage system in which the ore broken is allowed to remain in the stope, sufficient only being withdrawn to give room for miners to work between the broken ore and the back of the stope: and that, following the destruction of the Mill, these levels were not unwatered, so that the stopes above them are full of broken ore. If this is found to be the case, a large reserve of ore, much of it already broken, may remain in No. 6 Lode between the bottom level and No. 3 Adit.

North-west Lode: Stopes are reported to be 400 feet long, and the width of the lode 15 ins. It is possible that, if worked similarly to No. 6 Lode, reserves of ore may remain in the stopes.

It is stated that all lodes go strongly underfoot from the lowest levels worked, and that the ends of these levels should be extended. Based on the records of the lengths of workable ore exposed at the greatest depth reached in each lode, the total length available for further exploitation is 3,000 feet, and the average width of ore is 14.57 inches. In addition, two new lodes have been discovered north of No. 2 Adit, which offer an attractive field for exploration, and there is evidence favouring the extension of the several lodes eastward into the unprospected country beyond Bismuth Creek.

SAMPLING.

As Nos. 2 and 5 Lodes at the Creek Drive level contained the only accessible ore, sampling was necessarily confined to this part of the mine. Channel samples were cut in the back of the stope at intervals of 20 feet, and in the drives, samples were cut underfoot at irregular intervals of 30 feet to 60 feet, according to the position of timber and ore passes.

In ore bodies in which values are irregularly distributed and high grade patches are common, a sampling interval of 20 feet is too wide. It was adopted because :-

- (a) The examination was of a purely preliminary nature and, as the length of the ore body was considerable, closer sampling would have involved more time and expense than were warranted.
- (b) Only two lodes out of the five worked were accessible for examination, and on one level only, and these two lodes were described as the least important on the property.
- (c) In view of these conditions, it was considered that the interval adopted would give satisfactory information as to mineral distribution and grade, particularly as it could be checked against the vendor's returns from portion of No. 2 Lode, and permit a decision as to whether a detailed examination of the mine was warranted.

If the predetermined position for the sample cut coincided with a patch of very high grade mineral, the cut was made adjacent to such patch where more normal values prevailed.

In calculating the average values, abnormally high assays have been reduced.

The assay results of all samples are tabulated below.

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TABULATION OF SAMPLING RESULTS.

Sample No.	Location.	Width Inches.	Assay Values.		
			Sn. %	WO ₃ %	Bi. %
<u>No. 2 Lode - Creek Drive Level:</u> <u>Underfoot in Drive:</u>					
1.	388' E. of Crosscut, N. side	12	0.16	0.03	Nil.
2.	388' " " " S. "	4	4.32	0.02	Trace.
3.	326' " " " "	12	0.19	0.25	"
4.	277' " " " "	13	3.84	0.58	"
5.	217' " " " "	9	0.21	4.98	"
6.	164' " " " "	7	0.11	0.02	"
7.	121' " " " "	6	0.27	0.03	0.18
8.	68' " " " "	4	0.80	0.02	0.27
9.	21' " " " "	5	0.13	0.03	5.40
10.	29' W " " "	6	0.80	0.06	0.05
11.	98' " " " N. vein	3	0.37	0.02	Trace.
12.	98' " " " S. "	3	6.83	2.58	"
Average Values of Drive for 486'		7	1.26	0.77	0.308
<u>No. 2 Lode - Back of Stope:</u> <u>Creek Drive Level:</u>					
13.	Over Crosscut	4	0.21	Trace	0.12
32.	20' E. of Crosscut	4	5.71	2.78	1.56
14.	40' " " " "	5	8.06	0.03	0.72
16.	60' " " " "	5	7.20	0.22	4.95
15.	80' " " " "	5.5	2.70	0.13	Trace.
33.	100' " " " 3 veins.	4.5	0.65	0.63	0.72
17.	120' " " " 2 "	6	0.91	6.66	Trace,
	140' inaccessible				
18.	160' E. of Crosscut	5	2.00	0.06	"
19.	10' W. of No. 9 Pass	6	0.37	1.04	0.61
20.	10' E. " " 9 "	13	0.86	2.91	0.38
21.	30' " " " 9 "	9	0.16	1.17	Nil.
22.	50' " " " 9 "	8.5	0.16	0.29	Nil.
23.	70' " " " 9 " 2 veins.	10	1.16	0.13	Trace.
24.	90' " " " 9 "	14	2.56	2.34	"
25.	110' " " " 9 "	13.5	19.22	0.92	"
26.	130' " " " 9 "	16	0.75	1.20	0.59
27.	150' " " " 9 "	14.5	0.16	5.69	Trace.
28.	170' " " " 9 "	14	9.13	0.21	"
29.	190' " " " 9 "	10	0.81	19.04	0.39
30.	210' " " " 9 "	9.5	0.38	0.17	0.50
31.	230' " " " 9 "	10.5	0.16	5.69	Trace.
East end of stope inaccessible					
Average of Stope for 410' ..		8.45	3.05	1.70	0.505
<u>No. 5 Lode - Creek Drive Level:</u> <u>Underfoot in Drive:</u>					
34.	47' W. of Crosscut	10	8.44	0.01	0.05
35.	17' " " " "	7	2.70	0.02	Trace
36.	30' E, " " 2 veins	6	0.32	0.25	"
Average for 97'		7.13	3.38	0.058	0.01

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TABULATION OF SAMPLING VALUES (continued):

Sample No.	Location.	Width Inches.	Assay Values.		
			Sn. %	WO ₃ %	Bi %
37	No. 4 Lode E. of Bismuth Creek.	8	0.65	0.51	Nil.
38	" 1 New Lode	10	0.10	0.96	"
39	" 2 " "	4	0.11	5.35	"
<u>The Average Assay Value of Nos. 2 and 5 Lodes calculated from the sampling results is</u>			2.17	1.163	0.306
<u>The Average Value of the ore in the back of the Stope worked by J. P. Godwin, is</u>			3.04	1.38	1.37
<u>The Average Value of the ore stoped by J. P. Godwin calculated from his Account Sales, being the recovered value only on an amount of ore estimated at 85 tons -</u>			1.5	0.55	1.20

It must be noted that Mr. Godwin has no crushing facilities, so that the fines only can be treated by concentration in a Hand Jig and Sluice-box. His loss in the coarse material could not be determined. The Bismuth in the part of the lode stoped by him is abnormally high. As stated above, the values calculated from this work are recovered mineral only.

MINING METHODS:

The old Company's method of mining was by flat-back stoping in some parts of the mine, and in others the system was modified into shrinkage stoping, or, as termed locally, "storage". No sorting was done in the stopes, and all broken material was sent to the Mill, thereby causing a high rate of dilution of the ore by mullock. In the ordinary flat-back workings the ore was drawn off as broken and stulls and lagging were used to keep the back accessible, a practice which considerably increased the cost of stoping.

The practice proposed for future operations would involve sorting in the stopes. The ground, to the necessary stoping width, would be fired down on to sollars and bagging, thus preventing loss of mineral in the fines. The rough mullock would be sorted out and thrown back in the stope for filling, and should provide sufficient without drawing on outside sources. Horizontal holes would be drilled instead of uppers, as in the past, thereby causing less shattering of the ground and simplifying sorting. This method of mining is followed elsewhere in working similar narrow lodes, and by careful supervision, dilution by mullock, which would be largely fines, should be kept under an ore to mullock ratio of 1 to 1.

The proposed system would -

- (a) Eliminate timber in stoping other than that required for passes and travelling ways.
- (b) Keep the stopes filled and the backs always accessible.
- (c) Reduce the tonnage to be trucked and hoisted, and consequently the cost of transportation.
- (d) Reduce the size of the milling plant required, and also the cost of treatment.

The saving in cost in these directions would more than compensate the slightly increased stoping cost brought about by sorting underground.

ORE TREATMENT.

The description of the treatment practice followed by the old Company is from information given by J. P. Godwin, who was Mill Foreman to the Company. The method of treatment was successful and would, therefore, be of considerable value in planning a future milling plant. The nature of the ore is favourable to the easy separation of mineral from gangue and the collection of the valuable minerals in a mixed concentrate. The three economic minerals exist either in more or less independent segregations, or in individual particles. Pyrite is also a constituent of the ore and occasions some difficulty in the final re-dressing of the concentrate. The gangue is quartz, topaz and fluorspar; it is good crushing material and the minerals are readily liberated at a coarse size, without production of slime. The mineral particles being coarse, there is no necessity for fine grinding.

As the accompanying flow sheet will show, the milling method adopted was one of stage reduction followed by the immediate recovery of the mineral freed by each successive reduction, two essential factors in the milling of tin and wolfram ores. Efficient concentration was effected by careful screen sizing and classification, and it is stated that the tailings, including those from the coarsest jigs, were discarded without necessity for re-grinding or retreatment. That the production of slime in milling was unimportant is shown by the facts that :-

- (a) The Mill contained 6 jigs and only 2 Wilfley Tables and 2 vanners.
- (b) The production of first grade concentrate was
 - from jigs, 72 bags per week,
 - from tables and vanners, 4 bags per week.

Owing to the closeness of the specific gravities of cassiterite, wolfram and bismuth sulphide, a mixed concentrate of all three minerals was produced in the first stage of treatment. After drying, the concentrate was passed over a magnetic separator, producing a high-grade wolfram concentrate and a tin-bismuth product. The latter concentrate was sold in that state and the separation of the two minerals effected by the buyers, by a wet process in which the bismuth was brought into solution, leached from the cassiterite and precipitated.

Present day treatment of such an ore would involve :-

- (1) Gravity concentration on the lines previously followed.
- (2) Magnetic separation to produce a clean wolfram concentrate.
- (3) Flotation of the tin-bismuth product from the separator, by which the bismuth sulphide would be floated off, leaving a clean cassiterite residue.

The mine would then be in a position to market a clean concentrate of each of the economic minerals in the ore.

In the old Company's mill the ore was delivered from the mill bin to a rockbreaker, the product from which went to a conical trommel clothed with $\frac{1}{2}$ " screen. The conical trommel oversize was crushed in a set of coarse rolls, the product passing to a second trommel; the oversize was elevated to the fine rolls, running in closed circuit with their own $\frac{3}{8}$ " trommel from which the oversize was returned, via the previous elevator, for re-crushing. The undersize from this operation joined the undersize from the $\frac{3}{8}$ " trommel following the coarse rolls and the material was raised to a series of trommels feeding three jigs, each having three compartments. Each succeeding trommel received and screened the undersize from the preceding screen; thus in sequence, the $\frac{1}{4}$ " trommel fed the $\frac{3}{8}$ " jig, the $\frac{1}{8}$ " trommel a $\frac{3}{16}$ " jig, and the $\frac{1}{16}$ " trommel supplied a jig treating feed slightly larger in grain size than the screen opening. The $\frac{1}{2}$ " conical trommel undersize passed to a second line of three trommels running in series similar to the previous set. The screen openings were $\frac{1}{4}$ ", $\frac{1}{8}$ ", and $\frac{1}{16}$ ", the oversize

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products passing to $\frac{3}{8}$ " , $\frac{1}{4}$ " and $\frac{1}{16}$ " jigs respectively. The final undersize product from each set of trommels flowed to an hydraulic classifier making two products. The coarse material fed a Wilfley Table and the overflow was re-classified in a second classifier, the underflow going to a second table while the overflow after thickening, was further classified into two sizings for treatment on two vanners.

The No. 1 hutch product of each jig was first grade concentrate. The No. 2 hutch products of the $\frac{3}{8}$ " jigs were returned to the jigs for further treatment, but the No. 2 hutch products of the remaining jigs produced second grade concentrate which was marketable after roasting. Both tables and vanners produced first grade concentrate and clean tailings. The table and vanner concentrates were re-dressed on a Wilfley Table, but the jig concentrate required no further treatment. The concentrate was shovelled from the collecting pits and barrowed to the dryer, being then bagged and shipped; for though a magnetic separator had been installed in the new mill, it was not used before operations ceased.

An adverse feature in previous milling practice was the quantity of mullock milled with the ore. The proportion of ore to mullock broken in stoping was approximately 1:3, and the whole of this material was treated. By careful mining, a large proportion of rough mullock could have been rejected in the stopes so that the actual dilution would not have exceeded 100%. The effect of such selection upon ore-dressing would be :-

- (a) Increased plant capacity; or alternatively, a smaller mill to treat the output of which the mine was capable, involving a lesser capital cost.
- (b) Reduced wear and tear on crushing and screening units.
- (c) Reduced water consumption.
- (d) Decreased power required.

In designing a new mill, the flow sheet could follow that of the old plant with some modifications, viz:-

- (1) Removal of a large proportion of mullock before the ore left the stopes.
- (2) Picking and bagging of lump ore in the stopes.
- (3) The provision of a picking belt between rockbreaker and rolls for further removal of mullock and lumps of clean ore.
- (4) An alteration in the routing of material through the rolls to effect simplification in layout.
- (5) Magnetic separation to produce clean wolfram concentrate and contingent upon test work.
- (6) The provision of a flotation unit to remove the bismuth sulphide from the tin-bismuth product of the magnetic separator.
- (7) Elimination by flotation of the pyrite in the second grade concentrate, thus obviating roasting.

The site of the previous mill is satisfactory, being well situated for :-

- (a) Delivery of ore from either the shaft or No. 3 Adit.
- (b) The supply by gravity of milling water from Bismuth Creek or the Weaning Yard Creek race.
- (c) The disposal of tailings.
- (d) The receipt of stores and despatch of concentrates, being within 50 yards of the main road.

It is considered that with a well-designed mill embodying the essential features enumerated, ore treatment would present no difficulties and a high recovery could be made. It is a reasonable assumption for the purposes of this report that a recovery of 80% of the mineral could be effected in a new mill, for it is stated that the recovery in the final years of the Company's operations was 85% and it is understood that the recovery at the Aberfoyle Mine, on very similar ore, exceeds 80%.

COSTS AND ECONOMICS.

Probable Grade of Ore. This question is difficult owing to the small proportion of the Mine open for examination, but can be approached from three directions.

- (1) By calculating back from the Company's concentrate production, allowing a recovery of 85% and an ore: mullock ratio of 1:2.7. As the result is based on total production, no indication can be obtained as to values at the lowest level.
- (2) From J. P. Godwin's account sales, discussed under "Sampling".
- (3) From the results of sampling Nos. 2 and 5 Lodes, which latter methods apply to a small, and high level part of the Mine only.

The average values are set out comparatively below with equivalent monetary values calculated at the metal prices shown. The London price of tin given has been raised to the Australian equivalent and the Australian price for wolfram and bismuth is shown in the table.

Base of Estimate	Assay Values			Commercial value per ton ore			Total.
	Sn.%	WO ₃ %	Bi.%	Sn. @/ton £160.	WO ₃ @/unit 46/-	Bi. @/lb. 3/-	
1	1.52	1.495	0.232	54.7/-	68.5/-	15.6/-	138.8/-
2	1.5	0.55	1.2	54/-	25.5/-	80.4/-	159.9/-
3	2.17	1.163	0.306	73/-	53.5/-	20.5/-	147/-

No. 2 base is excluded owing to its limited application and the abnormally high bismuth content.

Adopting a recovery in milling of 80% of each metal, the recoverable value of the clean ore is :-

1. Calculated from the Company's records: all lodes, 111/- per ton.
2. " " Sampling Lodes Nos. 2 and 5 117.7/- per ton.

Being the lower figure and covering the widest range, Base No. 1 has been adopted.

Estimated Working Cost. On the basic wage of £3:19:0 per week for districts outside Hobart, it is estimated that the working cost for development, mining, milling, general expenses and management will be 86/- per ton of clean ore.

On the probable grade, and at the metal prices set out above, the estimated profit on working account would be 25/- per ton of clean ore.

Ore Reserves and Development Possibilities. The only Proved Ore disclosed by the examination is 1,150 tons in No. 2 Lode at the Creek Level having the assay value shown above. The re-opening of the workings may show further ore which can be considered Proved, particularly in and above the stopes on No. 6 Lode at the lowest levels.

If the aggregate length of the five lodes, 3,000 feet, and the average width of 14.5 inches, together with the probable grade, are maintained with depth, it is possible that renewed development above the bottom

level may open up some 30,000 tons of ore, exclusive of any tonnage that may be proved in the two new lodes. On these assumptions, each 100 feet of sinking might develop an additional tonnage of 26,000 tons. These figures are based on data yet to be confirmed and, together with the inferences depending thereon, must be regarded as indicating only the possibilities of the mine, subject to establishing the correctness of the data, much of which are largely not the result of direct observation.

Mine Capacity. The work of opening up the estimated 26,000 tons per lift would involve approximately 4,500 feet of development work requiring not less than 18 months to make the new ore available. The development factor, therefore, limits the annual output of the Mine, which for the purpose of the estimate, has been taken at 8,500 tons of clean ore per annum, or allowing for dilution in the ratio of 1 : 1, 17,000 tons of milling ore.

Estimated Capital Required. The capital required to provide equipment for power generation, mining and milling, is estimated at £28,000; allowing for the further examination of the property, its purchase, and making provision for working capital to the productive stage, the preliminary estimate of capital required is £40,000. This figure may be liable to some modification when the property has been thoroughly examined, an important factor being the time interval which could elapse before it became necessary to commence the opening up of a new level. The probable total capitalisation of the enterprise might, therefore, be taken as £50,000.

Estimated Return on Capital. Based on the premises set out herein, an estimated return on Capital of £10,000, or 20% per annum might be expected, irrespective of taxation, amortisation of capital and Head Office charges.

FURTHER EXAMINATION OF MINE. A further examination would involve the unwatering of the bottom levels of the Mine, their repairs and sampling. A quotation has been obtained for a suitable pump on hire purchase; the minimum payment is £300 and the ultimate cost £1,090. The pump, which is quoted with a small temporary power plant, would form part of the permanent Mine equipment if the property were acquired.

The estimated cost for this examination would be £1,650 and the time required, four months, provided no undue difficulties were met in unwatering.

SUMMARY AND CONCLUSIONS.

Locality, History and Geology. The property is situated at Moina, 39 miles by good road south-west from Devonport, Tasmania. The Mine is at an altitude of 2,000 feet above sea level and the annual rainfall is 60 inches. Timber for mining purposes is adequate and sufficient water for all mining purposes is available. Diesel-electric or hydro-electric power could be generated by the Company, or electric power purchased from the Tasmanian Hydro-Electric Commission.

The Mine was actively worked for tin, wolfram, and bismuth from 1896 to 1919 when operations were stopped through the burning of the mill. Following the erection of a new plant, work was resumed in 1922, but the low prices ruling for metals caused the Mine to be closed down in that year and the Company was shortly after liquidated. In the past five years work has been carried on by the vendor, in a small way, using hand methods of mining and treatment.

Five lodes have been worked. Their strike is east and west and the dip is approximately vertical. The lode material is quartz, topaz, and fluor spar, containing cassiterite, wolfram and bismuth sulphide. The country rock is sandstone, quartzite and metamorphic garnet rock, overlaid to a considerable extent by Tertiary basalt. Granite exists at probably no great depth below the

sedimentary series but is not expected to affect the continuity or values of the lodes. No serious faulting has occurred and the country offers no difficulties to mining.

Mine Workings: A limited extent of the workings are accessible and particulars have been obtained largely from descriptions and the Company's plans. The aggregate length of the lodes worked is 3,000 feet and the average width is 14.57". The total depth reached from the highest lode outcrop is 490 feet, but all lodes have not been worked to this depth. To approximately 340 feet exploitation was carried out by adits and the lowest 150 feet from a vertical shaft. It is expected that the shaft and main drives can be reconditioned with little expense.

Ore Reserves: Inspection disclosed 1,150 tons Proved Ore, which tonnage might be increased when the workings are opened up for examination. From observation and the plans, there is reasonable possibility that renewed development above the bottom level may open up approximately 30,000 tons of ore in the five lodes, the potentialities of the two newly discovered lodes not being here considered. It is also estimated, on the assumption of continuity of length and width to greater depth, that each vertical lift of 100 feet may develop 26,000 tons of ore, again exclusive of the new discoveries.

Ore Values : The value of the clean ore, as distinct from milling ore which must be unavoidably diluted by mullock, has been assessed on three separate bases.

- (1) The old Company's production.
- (2) The vendor's production from a defined block in No. 2 Lode, calculated from his account sales.
- (3) The sampling and assay results on Nos. 2 and 5 Lodes at the Creek Drive level.

These valuations are :-

Base of Estimate	Assay Values			Commercial Value per ton Ore.			
	Sn.%	WO ₃ %	Bi.%	Sn. @/ton £160.	WO ₃ @/unit 46/-	Bi. @/lb. 3/-	Total Value.
1	1.52	1.495	0.232	54.7/-	68.5/-	15.6/-	138.8/-
2	1.5	0.55	1.2	54/-	25.5/-	80.4/-	159.9/-
3	2.17	1.63	0.306	73/-	53.5/-	20.5/-	147/-

In assessing the probable value of the ore, Base No. 2 has been rejected on account of its limited application and the abnormally high bismuth; No. 3 is limited to one level on Nos. 2 and 5 lodes; No. 1 has, therefore, been adopted for though certain assumptions are made in its calculation, it covers all lodes at all levels, and is also the lowest of the three.

Adopting a milling recovery of 80% of each metal, based on the old Company's work and one the results of milling a very similar ore at the Aberfoyle Mine, the estimated recoverable value of the clean ore, on the premises stated is : 111/- per ton.

Working Costs. The estimated cost of development, mining, treatment, management and general expenses, per ton of clean ore is 86/-. If the indicated grade of ore, Sn. 1.52%, WO₃ 1.495%, Bi. 0.232%, is established, the recoverable value of 111/- per ton at the metal prices assumed, would show a profit on working account of 25/- per ton of clean ore.

Capitalisation. The preliminary estimate of capital required for the further examination of the property, purchase, equipment and development, is £50,000.

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Mine Output. The annual output of the Mine is restricted by the time required to develop each new level, the work involving approximately 4,500 feet of shaft sinking, crosscutting and driving, which would occupy not less than 18 months. Working two shifts per diem, a treatment plant as estimated, would have an annual capacity of 8,500 tons of clean ore, or a total capacity of diluted ore of 17,000 tons.

On the grade indicated and at the metal prices assumed, the estimates show a profit of £10,000 per annum, equivalent to a return of 20% on capital, no allowance being made for the amortisation of capital or Head Office charges.

On the data available at this stage, the estimates given must be regarded purely as a measure of the possibilities of the proposition to indicate whether more detailed examination is warranted.

RECOMMENDATIONS :

It is recommended that :-

- (1) The lower levels of the Mine be unwatered, examined and sampled, involving :-
 - (a) Obtaining and installing on hire-purchase, a Diesel-electric driven Pomona Pump.
 - (b) An expenditure on the examination, for pump hire, pumping; labour on pumping, repairing workings and sampling; assaying, and the inspecting Engineer, of £1,650, over a period of four months.

If the results of the first stage of the work be satisfactory,

- (2) The extension of the option to permit :-
 - (c) Installation of power, hoisting and mining equipment for a certain amount of development.
 - (d) The carrying out of sufficient development on Nos. 2 and 4 lodes at the bottom level to confirm the value of the property and to show a tonnage of profitable ore sufficient to justify further capital expenditure on an ore-dressing plant and the necessary additional power, and warrant the purchase of the Mine.
- (3) Provided the results of the second stage prove satisfactory,
 - (f) Raise the remainder of the capital to
 - (g) Purchase and install the additional power plant, the Mill and all supplementary equipment, and
 - (h) To continue Mine development.

(Signed) M. R. McKEOWN.

Consulting Engineer.

28th May, 1938.

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LOG OF No. 1 DIAMOND DRILL HOLE

Distance	Type of Material Bored	Core Recovery %	Bit Recovery	Diamond Recovery
0.5	Hard Quartzite 1" of Quartz	100%)		
10	Hard Quartzite 2" of Quartz	100%)		
15	Hard Quartzite 1" of Quartz	100%)		
20	" " Quartz	90%)	Bit No. 1725 with 8.55 carats.	63.5
25	" " Quartz	100%)		
30	" " Quartz	100%)		
35	" " Quartz	95%)		
40	" " Quartz	95%)		
45	" " Quartz	30%)		
50	" " Quartz	30%)		
55	" " Quartz	30%)		
60	" " Quartz	100%)	Bit No. 1724 with 8.25 carats	12.0
65	" " Quartz	100%)		
70	" " Quartz	120%)		
75	" " Quartz	40%)		
80	" " Quartz	60%)		
85	18" Quartz Mica with Mo Fe Sulphide	60%)	Bit No. 1721 with 8.40 carats	50.08
90		50%)		
95		30%)		
100		80%)		
105		100%)		
110		40%)		
115		100%)		
120	9" Quartz	50%)		
125		30%		
130				
135				
140				
145				
150				
155				
160				
165				
170				
175				
180				
185				
190				

443 wed. 45 ton
 Thurs. 66 ton
 }
 was 68.7 1.7
 Sun 68.0 4.2
 (45g) = 4 ton
 1 ton

2748
 66.0
 5 3408 / 68.1
 68
 4.2
 5 11.0 / 2.2

was Sun
 68.1 2.2

68.7
 2748
 66.0
 5 3408 / 68.1
 2.12
 4.24
 5 11.36 / 2.2
 10.3
 10.6

DEVELOPMENT RECORD.

<u>No.1. Party.</u>	2 Level. Driving,	6 Lode. East, West & N. West.
<u>No.2. Party.</u>	3 Level. Driving	4 Lode East. 5 Lode West Main Xcut South.
<u>No.3. Party</u>	Stope development	No. 4 Lode 3 Level.
<u>No.4 Party.</u>	3 Level. Driving	6 Lode East & West.

3 Level No. 4 Lode East Drive.							3 Level No. 5 Lode West Drive							3 Level Main Xcut South.									
Week Ending	Draught Mark	D M	D.F	LM	Adv.	Coordinates	Remarks	Draught Mark	D M	D.F	LM	Adv	Coordinates	Remarks	Draught Mark	D M	D.F	LM	Adv	Co-ordinates	Pay	Total Pay	
2-11-54	Pin hole in 5th wall.	0	7	0	7	Period prior to commencement of contract.	10" Good vein	Centre pin of turntable	-7	24 $\frac{1}{2}$	7	17 $\frac{1}{2}$	Period prior to contract.	6" Quartz + pyrite	Centre pin Turntable	-24	27 $\frac{1}{2}$	24	3 $\frac{1}{2}$				
9-11-54	"	0	10	7	3		3	"	-7	27 $\frac{1}{2}$	24 $\frac{1}{2}$	3		3	"	-24	33	27 $\frac{1}{2}$	5 $\frac{1}{2}$		6		
23-11-54	"	0	16	10	6.		6.	"	-7	41.	27 $\frac{1}{2}$	13 $\frac{1}{2}$.		13.	"	-24	42.	33	9.		9.	28	
27-12-54	"	0	30	16	14		14.	"	-7	51	41	10.		10.	"	-24	55	42	13		13	37.	
17-12-54	"	0	42 $\frac{1}{2}$	30	12 $\frac{1}{2}$		12 $\frac{1}{2}$.	"	-7	60 $\frac{1}{2}$	51	9 $\frac{1}{2}$		9 $\frac{1}{2}$.	"	-24	60	55	5		5	27	

3 LEVEL			No. 6 Lode.				East Drive.			3 LEVEL			No. 6 Lode				West Drive.		
Week Ending	Measuring Point	M P	Dist to face	Last Meas	Adv	Total	Coordinates		Remarks	Week Ending	Measuring Point	M P	Dist to face	Last Meas	Advance	Total	Coordinates		Remarks
11-11-54	Plug in pin hole Nth wall.	-23	25 1/2	23 3/8	2 1/2				Period before contract start of	11-11-54	Last bullock horn	-34	34	34	0				Face faulted.
16-11-54	"	-23	34	25 1/2	8 1/2	11.			7" vein good values.	16-11-54	"	-34	38	34	4.	4.			Pay 15 Total pay 30ft
23-11-54	"	-23	40 1/2	34	6 1/2	17 1/2			Pay 15	23-11-54	"	-34	49	38	11.	15			
7-12-54	"	-23	50 1/2	40 1/2	10	27 1/2			10 4" Good values	7-12-54	"	-34	63	49	14	29			14
17-12-54	"	-23	61	50 1/2	10 1/2	38			10 1/2	17-12-54	"	-34	72	63	9	38			9.

= Shepherd and Murphy Mine =

= Moina =

Note

Hand Quartzité = about 2.239 tons per Lin ft
Mild do = 2.49 tons per ft in machine drives

Poor denolés under 1% concentratés

Fair " 1 to 2% "

Good " over 2% "

Drive footáges are shewn in feet

Vein widths " " inches

= Index =

Measurements and Details of Lodes

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West Drive Main La. 91 No 3 level No 6 Lode

Date	Inches	Width	Value	Remarks
2 June 17	332	12	Fair	Hard Garnet
8 " 17	339	10	Good	much faulted in hard rock
16 " 17	343	10	"	"
23 " 17	350 1/2	8-10	Fairly Good	much faulted
30 " 17	358	10-11	"	"
21 July 17	362	10	Fair	Hard Garnet
28 " 17	370	7	"	"
4 Aug "	373	8	"	"
11 Aug 17	378	8	Poor	much faulted

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Main Shaft No 2 Level, N.W. Branch cut at 120ft from plat @

Date	Feet	Width	Value	Remarks
30 Sept 16	11	vein		
7 Oct 16	15	"		
14 " 16	19	4 10 5'	Poor	
23 Feb 17	29	5'	Fair	
2 Mar 17	37	3	Poor	
10 " 17	45	3" + 4"		4" vein came in from S.W
17 " 17	53	4" + 4"	Fair	S.W. vein pyritic + Bi
24 " 17	58	12-14	"	
31 " 17	67	12" back 6" bottom	Poor	
7 Apr 17	7 1/2	12	"	Fairly hard Garnet
13 " 17	78	12-14	"	" " "
21 " 17	82 1/2	14-15	"	" " "
28 " 17	90	18-20	Little metal	
4 May 17	98	Split 20" agg	Poor	Fairly hard Garnet
12 " 17	106	15-16	"	" " "
19 " 17	113	17-18	"	5/16c Bi won
26 " 17	120	12	"	
2 June 17	124	14-18	"	
8 " 17	128	17	"	Hard Garnet Rocks much faulted
16 " 17	136	15'	Little Pyritic + Bi	" "
23 " 17	140	15-18	improved	

Main Shaft No 2 Level, N.W. Branch

Date	Feet	Width	Value	Remarks
30 June 17	144	10+8	Fairly Good	18" apart
21 July 17	148	12	Fair	more lods on left hand side
28 " 17	152	10+8	Little metal	3ft apart Hard Garnet
4 Aug 17	156	10+7	"	6ft "
11 " 17	160	8+9	Poor	6ft apart
25 " 17	170	7+8	"	9'6" apart
31 " 17	176	12	"	Following S.W. vein
8 Sept 17	178	10	Fair	
15 " 17	182 1/2	12	Poor	Fairly hard Garnet
22 " 17	190 1/2	10	Little metal	" " "
29 " 17	196	7-8	Fair	
5 Oct 17	203 1/2	10	Little metal	Fairly hard Garnet
13 " 17	208	6-8	Poor	
19 " 17	212 1/2	6-8	"	Sendng rocks for filling

021

This Lode gave good Bi values at No3 Adit Level and Slopes
 Main Shaft No3 Level, N.W. Branch Lode 76ft from shaft

Date	Inches	Width	Value	Remarks
26.5.17	8 12	3-6 4	Poor	Rock fairly hard Garnet
2.6.17	22	3.4	"	"
8.6.17	28½	4	"	"
16.6.17	37½	5-6	"	"
23.6.17	44½	6	"	"
30.6.17	48½	8-9	"	"
21.7.17	56½	6	"	"
28.7.17	68	6	"	"
11.8.17	75½	6	"	"
18.8.17	84	6	Fair	"
25.8.17	97	8-9	Poor	"
8.9.17	106	12	Fair	"
15.9.17	113	15-16	"	Good driving ground
22.9.17	122	15' back 7 bottom	Poor	"
29.9.17	129	15'	"	"
5.10.17	142	14	Little metal	"
13.10.17	149	12-18	"	"
19.10.17	161	24	¾ 181% 181%	"
26.10.17	171½	18	Fair	Grey Garnet
2.11.17	184	14-15'	Little metal	"
10.11.17	192½	21-24	"	Fairly hard Garnet

Main Shaft No3 Level, N.W. Branch Lode

25
022

Date	Inches	Width	Value	Remarks
17.11.17	204	10	Fair	Fairly hard Garnet
23.11.17	210½	12	Poor	Disturbed
30.11.17	226	Haullia	"	"
7.12.17	232	10+6+6	"	"
15.12.17	239	6+6	"	Vein gone out S.W at 230 ft
24.12.17	247	8+4	"	3½ ft apart
25.5.18	250½	6+3	"	Good driving rock
1.6.18	254	7	"	Other vein dying out
7.6.18	257	7-8	"	Fairly easy rock
15.6.18	262	7-8	"	small in bottom
21.6.18	268	10	Little metal	"
5.7.18	274	8-9	Poor	Good driving rock
13.7.18	277½	"	"	"
19.7.18	281½	10-12	"	Good driving rock
26.7.18	285½	8+4	"	"
5.8.18	290½	8	"	vein came in from E.S.
10.8.18	297½	7	"	"
17.8.18	301½	10	Fair	Good driving rock
6.9.18	316	8-12	Poor	" " "
14.9.18	319½	8-12	"	" " "
21.9.18	322½	10-12	"	" " "

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Intersection shaft w. of ...
 West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Feet	Width	Value	Remarks
	6 1/2	4 veins	Fair	Hard Quartzite
	12	"	little metal	"
25.5.18	17 1/2	3-12"	Fair	Very Hard Quartzite
	22 1/2	12"-18"	Fairly Good	
	28	7-8	Poor	
	32 1/2	12-13	"	
29.6.18	35 1/2	12	Fair	Very Hard Quartzite
	39	12	"	"
	47	12	Poor	"
	50 1/2	12	Fair	"
	57 1/2	12	"	"
2.8.18	62	12	"	Very hard Quartzite
	68 1/2	12	"	"
17.8.18	72 1/2	10-12	Poor	very hard Quartzite
	81	12	Good	"
	70	8	Fair	"
6 Sept 18	94 1/2	Split	"	Hard Quartzite
14. 18	100	8	Little metal	"
21. 18	103 1/2	veins	"	very " "
28. 18	107	3+1+2	little metal	"
4 Oct 18	110 1/2	4-5'	"	"

14
02

West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Feet	Width	Value	Remarks
12 Oct 18	114	4	Poor	Very hard Quartzite
19. 18	125	4	"	vein came in from both
1 Nov 18	129	10-12	Fairly Good	Hard Quartzite
9 " 18	137	9	Little metal	Fairly Hard
16 " 18	140 1/2	10-12	Fair	" "
23 " 18	144 1/2	8-12	Poor	" "
30. 18	149	11	"	Rock hard
6 Dec 18	152 1/2	12	"	Fairly hard
14 " 18	161	10-12	Fair	"
20. 18	168	12	"	Fairly Hard
22 Feb 19	176 1/2	9	"	Mild Quartzite
8 Mar 19	180 1/2	10	"	Fairly hard Quartzite 1/2 ft = 18 1/2 tons = 246 tons per ft
15 " 19	184 1/2	9	Good WO ₃	Mild Quartzite
22 " 19	188 1/2	8	Fairly Good	" "
29 " 19	192	7 to 8	1 Bag WO ₃ Good	" "
12 Apr 19	197 1/2	7	Fair	" "
19 " 19	201 1/2	6+2	"	" "
18 Oct 19	211 1/2	4+5'	Little metal	28 1/2 ft from 125 to 201 1/2 = 1600s = 249 tons per ft
25 " 19	218 1/2	9+2	Fair	Quartzite
15 Nov 19	235	"	"	Hauled

West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Inch	Width	Value	Remarks
22 Nov 19	237	7 1/8		Lode picked up S.
29 " "	241	veins	Fair	Mild Garnet
5 Dec 19	245	9	"	"
12 " 19	250	9	"	"
20 " 19	256	8	"	"
9 Jan 20	264	7-8	"	"
17 " 20	271	7	"	"
23 " 20	275	7	"	"

Main Shaft, No 3 Level, No 4 Lode Rise from West Drive

Date	Inch	Width	Value	Remarks
4 July 19	33	10	Poor	
18 " 19	41	10	"	
26 " 19	45	12	"	Fairly hard Quartzite
1 Aug 19	50	10-12	"	
16 " 19	57 1/2	12	"	
23 " 19	62 1/2	11	little metal	
30 " 19	67	10	Poor	
3 Oct 19	95	9	Fair	
20 Sept 19	83 1/2			near contact
13 " 19	75	10	Fair	
10 Oct 19	105			contact about 100ft
	109			Height 146 1/2 ft Holed through to wing

024

East Drive Main Shaft - No 3 Level, No 4 Lode 636 ft
Main shaft

Date	Feet	Width	Value	Remarks
7 June 18	9	Sp. S.	Fairly Good	Hard Quartzite
15 Nov 19	31	2 veins collected 10"	Fair	" "
22 " 19	36	7"	"	" "
29 " 19	43½	7"	"	" "
5 Dec 19	47	7"	"	" "
12 Dec 19	50½	7"	"	" "
9 Jan 20	58	8 + 2"	"	3 ft apart
23 " 20	63	6 + 3	"	5½ ft apart in very hard rock

East Drive, Main Shaft No 2 Level No 6 Lode

Date	Area	Width	Value	Remarks
25 June 15	10 1/2	split	Fairly Good	Hard Garnet
21 Aug 15	26	15 ^S + 6 ^N	Good	"
	32 1/2	18 ^S + 2 ^N	"	"
	40	24	"	Mild
	43	24	Fair	"
	47	22	"	"
	50	22	"	Hard
	54	23	"	"
16.10.15	58	22	"	"
	62	24	"	"
	66	22	"	"
20.11.15	70	22	"	Mild
27.11.15	82 1/2	22 ^S + 3 ^N	"	"
4.12.15	88 1/2	22 + 3	"	"
11.12.15	94 1/2	13 + 7 ^N	Good	"
23.12.15	99	17 5' vein	Fair	"
11.3.16	107 1/2	12 ^S + 7 ^N	Little metal	"
17.3.16	112	6ft apart 12	Fair	"
24.3.16	116	12 5	"	"
	121	12	"	"
	129	12	Poor	"

East Drive, Main Shaft, No 2 Level, No 6 Lode

026

Date	Area	Width	Value	Remarks
	132	13	Fair	Hard Garnet
	137	14	"	contact
27 May 16	140	13-14	"	Quartzite
	147	14	"	"
17 June 16	152	15 + 6	"	6" vein coming in from both sides
23 " 16	158 1/2	18	Fair	Fairly hard Quartzite
30 " 16	169	21	"	"
8 July 16	182	18	"	"
14 " 16	194	17	Poor	"
22 " 16	205 1/2	18	Little metal	"
29 " 16	218	18	Fair	Very hard Quartzite
4 Aug 16	227	14	"	Fairly " "
12 " 16	232 1/2	30cm = 15"	"	Very " "
19 " 16	245	15	"	Fairly " "
26 " 16	257 1/2	16	"	" " "
2 Sept 16	269 1/2	15	"	" " "
9 " 16	280 1/2	15	"	" " "
16 " 16	286 1/2	15 + 16	Poor	" " "
23 " 16	296 1/2	14	Fair	" " "
30 " 16	308 1/2	13	"	Hard Quartzite
8.9.17	315	13-14	Little metal	" " "

025

East Drive Main Shaft No 2 Level No 6 Lode

Date	Mean	Width	Value	Remarks
15.9.17	323	15'	Fair	Hard Quartzite
22.9.17	326½	15'	"	" "
29.9.17	333	14-15'	"	" "
5.10.17	337	14-15'	"	Split in bottom
13.10.17	341	12½-15'	"	Sound in back Split in bottom
19.10.17	348½	split 7+11	"	4 ft apart
2.11.17	356½	split	"	

552028

West Drive Main Shaft - No 2 Level No 6 Lode				
Date	Inches	Width	Value	Remarks
	22	14		Hard Garnet
21.8.15	26	12+6	Fair	" "
28.8.15	32	11+4	"	" "
4.9.15	39	13	"	" "
11.9.15	42	12	Good	" "
18.9.15	46	14	Fair	" "
1.10.15	49.6	14	"	" "
	53	15	"	" "
16.10.15	57	13	"	" "
	61	12+3(5)	"	" "
	64.6	14+3	"	" "
20.11.15	69	15	"	" "
27.11.15	73.6	12	"	" "
4.12.15	82	12	"	" "
11.12.15	86½	12	Poor	" "
18.12.15	96	12+6	Good	" "
23.12.15	99	17	Fair	" "
11.3.16	105½	14	"	" "
17.3.16	110½	15	"	" "
24.3.16	114½	14	"	" "
	121½	17	Little metal	" "

West Drive Main Shaft - No 2 Level No 6 Lode				
Date	Inches	Width	Value	Remarks
29 Apr 16	125½	16-17	Little metal	Hard Garnet
12 May 16	130	19	Fair	" "
20 " 16	137	19	Poor	" "
27 " 16	141½	19	"	" "
3 June 16	144	15	Fair	" "
9 " 16	147	16	"	" "
17 " 16	152	20	"	" "
23 " 16	160½	18	"	Fairly Hard Garnet
30 " 16	171	8	Fairly Good	Hard Garnet
8 July 16	182½	2" + 12	" "	12" came in from South side of drive
14 " 16	194	12	Fair	Hard Garnet
22 " 16	206	15	Good	Fairly Hard Garnet
29 " 16	218	15	Fair	" " "
4 Aug 16	227	14	"	" " "
12 " 16	239	14	Good	Very Hard Garnet
19 " 16	250	12 1/2 14	Fair	Fairly Hard Garnet
26 " 16	262	14	"	" " "
2 Sept 16	278½	12	"	" " "
9 " 16	283½	12	"	" " "
16 " 16	295½	8	Fair	" " "
23 " 16	299	6-8	"	Much faulted

19
026

West Drive ¹²⁹ Main Shaft L^o 2 Level No 6 Lode

Date	Area	width	Value	Remarks
23 June 17	307	6-8	Fair	much faulted
30 " 17	305'	8-10	Good	" "
31 July 17	312	8	Little metal	Hard Garnet Rock
28 " 17	317	6	Fair	much faulted
4 Aug 17	320½	6	Poor	" "
11 " 17	325'	6	"	" "

East Drive, Main Shaft No 3 Level No 6 Lode

Date	Inches	Width	Value	Remarks
10 July 15	22	24	Good	Hard Garnet
17 " 15	29	26	Poor	
24 " 15	36	Split 24 + 2	Fair	8" apart Mild Garnet
31 " 15	40	Split 18 + 6	Little metal	2 ft apart Mild Garnet
7 Aug 15	44	18 + 6	Poor	5 ft apart Mild Garnet
14 " 15	48	22	Fair	vein gone off S. at 46 ft
21 " 15	52	22	"	Mild Garnet
28 " 15	56	22	"	"
4 Sept 15	60	22	"	"
11 " 15	64	21	"	"
18 " 15	68	18 + 6	"	"
	72	12 + 5	"	"
16 Oct 15	77	5 + 9	"	5:6 apart
	81	5"	"	

Followed 2" vein to 120 ft + cutted 32 ft N+S. S. vein agg
6" + N. 12" lode fair value. This cutting connected
back to lode at 77 ft. Contact met at 112 ft

27 Oct 16	Squaring up drive veins 12 + 5 Poor			
3 Nov 16	137	12 ^N + 5 ^S	Poor	9 1/2 ft apart in hard Quartzite Rock
11 " 16	141	10 ^N + 6 ^S	"	9 ft apart
18 " 16	147	9 ^N 6 ^S	"	9 ft apart Hard Quartzite

East Drive, Main Shaft No 3 Level No 6 Lode

Date	Inches	Width	Value	Remarks
25 Nov 16	152 1/2	9 ^N 6 ^S	Fair	5 ft apart, Hard Quartzite
2 Dec 16	158 1/2	6 + 6	Fair	4 ft apart with veins between
9 " 16	163	veins	"	face 9 ft wide Hard Quartzite
16 " 16	176	12	"	veins gone out hole drawing on South veins
22 " 16	185	14	Poor	Very Hard Quartzite
13 Jan 17	195	14 10 15	"	" " "
20 " 17	203	14	Little metal	" " "
31 Jan 17	209 1/2	14 in back 4 + 10 in face	Fair	" " "
7 Apr 17	220	12	Poor	" " "
14 " 17	223	12	"	" " "
20 " 17	230	10 - 12	"	" " "
27 " 17	237	8	"	" " "
4 May 17	241 1/2	6 - 8	Little metal	" " "
11 " 17	252	Split 6	Fair	" " "
19 " 17	256	4	Poor	" " "
26 " 17	259	5 - 6	"	" " "
12 July 19	287	6	"	" " "
15 " 19	290 1/2	7	"	" " "
26 " 19	296	7	"	" " "
1 Aug 19	299 1/2	7	"	" " "

West Drive Main Shaft No 3 Level No 6 Lode

Date	Area	Width	Value	Remarks
17 July 15	22	20	Fair	Hard Garnet
24 " 15	31	20	"	"
31 " 15	35	18	Little metal	"
7 Aug 15	39	18	Poor	"
14 " 15	43.6	15	Fair	"
21 " 15	46	17	"	"
28 " 15	49	11 + 2 + 1	"	"
4 Sept 15	52	12 + 3 + 1	"	"
11 " 15	55.6	18	"	"
18 " 15	59	24	"	6" vein came in from N.
	63	22	"	"
16 Oct 15	66.5	21	"	Hard Garnet
23 " 15	70.5	22	"	"
30 " 15	74	22	"	"
6 Nov 15	80	22	"	2 W vein gone out of drive
	84	20	"	"
27 " 15	88	20	"	Hard Garnet
4 Dec 15	93	15	"	much disturbed
11 " 15	101	12/6/14	"	Hard Garnet
18 " 15	110.6	17	"	Very " "
23 " 15	118.6	20	Good	"
17 Nov 16	126.6	18	Poor	"
24 " 16	134.6	22	Fair	"

West Drive Main Shaft No 3 Level No 6 Lode

22
031

Date	Area	Width	Value	Remarks
51 Nov 16	138.6	16-17	Good	Very Hard Garnet
2 Sept 16	142	16-18	Fair	"
9 " 16	145	21	"	Hard Garnet
16 " 16	148.5	20	Fairly Good	Very " "
23 " 16	152.5	19	Fair	"
30 " 16	160.5	18	"	Medium Garnet
6 Oct 16	168	18	"	"
14 " 16	178	18	"	Fairly Hard Garnet
21 " 16	192	20	"	"
28 " 16	204.5	18	"	"
3 Nov 16	216.5	15-16	"	"
11 " 16	228	14-16	Fairly Good	"
18 " 16	239.5	20	Fair	"
25 " 16	251	16	"	"
2 Dec 16	263	15	Poor	Very " "
9 " 16	270	15	Fair	"
16 " 16	281	14	"	"
23 " 16	292	15	"	"
13 Jan 17	304	10-12	"	much faulted, hard Garnet
20 " 17	316	13	"	Hard Garnet
26 May 17	324.5	12	"	"

- Shepherd and Murphy Mine -

- Moina -

Note

Hard Quartzite = about 2.239 tons per Lin ft

Mild do = 2.49 tons per ft in machine drives

Poor denolés under 1% concentratés

Fair " 1 to 2% "

Good " over 2% "

Drive footages are shown in feet

Vein widths inches

Measurements and Details of Lodes	Page
N ^o 4 Gk Drive, N ^o 5 Lode E+W.	1
N ^o 4 Gk Drive, N ^o 2 Lode E+W.	2
N ^o 3 Adit, N ^o 4 Lode, E+W.	5
N ^o 3 Adit, N ^o 2 Lode, E+W.	10
Main Shaft, N ^o 3 Level, N ^o 4 Lode E+W.	14
Main Shaft, N ^o 2 Level, N ^o 6 Lode, E+W	17
Main Shaft, N ^o 3 Level, N ^o 6 Lode, E+W	21
Main Shaft, N ^o 2 Level, N.W. Branch	24
Main Shaft, N ^o 3 Level, N.W. Branch	25
General	27
N ^o 3 Adit, N ^o 2 Lode Inter Level above N ^o 3 Adit	28
N ^o 2 Lode, Rise above Inter Level to Gk Drive	29
N ^o 4 Lode Gk Drive, 154 ft above N ^o 3 Adit	30
N ^o 2 Lode Prospecting Adit, over South Drive from N ^o 1 Adit	32

East Drive No 4 Gk Drive No 5 Lode. Cut Lode 8" av. 108 ft from Gk Drive Adit

Date	Area	Width	Value	Remarks
26.6.09	19	4+3+1	fair	13 1/2 ft = 18 tons
10.7.09	36	5+2	little Bi	17 ft = 32 1/2 "
17.7.09	45	split	poor	
24.7.09	53	2+2+3	"	
30.7.09	59	7"-8"	fair	
6.8.09	66 1/2	7"-8"	"	
14.8.09	75	---	"	

West Drive

4 Sept 09	20	8 to 10	very fair	rocks good
" " 09	27 1/2	8 to 10	poor	
18 " 09	35	8 to 10	"	in faulted country
25 " 09	41	8 to 10	fair in back otherwise poor	
1 Oct 09	51 1/2	8	poor	in soft rock
8 " 09	60	8	"	
15 " 09	79 1/2	9	fair	
22 " 09	86 1/2	6+3	3" fair	
6 Nov 09	109	6+3	little metal	
" 09	113	6 x 25	fair	
4 " 09	119 1/2	6+2+2	fair to good	
11 Dec 09	128 1/2	7"	fair	
18 " 09	135	6 to 7	"	

No 4 Gk Drive No 5 Lode

West Drive Date	Area	width	Value	Remarks
25 Dec 09	152 1/2	8	fair	
15 Jan 10	159 1/2	6	"	
22 " 10	165 1/2	6 to 8	"	
29 " 10	172 1/2	6	"	
5 Feb 10	178	4+2	Bi	1" vein coming in (Bi)
15 " 10	183 1/2	3+2+1	fair	abt 1/2 bag for week
22 " 10	188 1/2	4+2	"	Bi underfoot 182 to 188 ft
	202			met alluvial

Excepting alluvial met in slopes and worked therefrom, the workings on this lode have been barely payable

East Drive No 4 Gk Drive No 2 Lode E. 169 1/2 ft. S. from Creek Drive

Date	Area	Width	Value	Remarks
25 Jan 13	7 1/2	veins		Quartzite
1 Feb 13	12 1/2	6 to 7	fair	
8 " 13	19	6"	good	
15 " 13	22	6	very fair	
10 May 13	27 1/2	5'	fair	
17 " 13	33 1/2	split	"	
24 " 13	37 1/2	"	"	
31 " 13	42	6"	"	
7 June 13	49	6"		faulled
21 " 13	60	3+3	Bismuth	
12 July 13	75 1/2	8"	fair	
19 " 13	80	6"	"	
26 " 13	87	4 to 5'	some Bi	
2 Aug 13	90	7"	"	Hard Quartzite
9 " 13	95'	8	poor	
16 " 13	100	6"	"	
23 " 13	103	7"	"	
30 " 13	109	7"	fair	
6 Sept' 13	113 1/2	7"	"	
13 " 13	118 1/2	6"	"	
20 " 13	122	6 to 7"	"	

East Drive No 4 Gk Drive No 2 Lode

2

Date	Area	Width	Value	Remarks
27 Sept' 13	126	5 to 6"	fair	Very hard Quartzite
3 Oct' 13	129	split all 6"	"	" " "
11 " 13	132 1/2	3+2	"	
18 " 13	136 1/2	3+3	"	
25 " 13	141	2+2	"	
31 " 13	145'	2+3	3 1/2 ft apart	
7 Nov 13	150 1/2	split agg 6"	fair	
14 " 13	163'	5" to 6"	poor	
21 " 13	160	5" to 6"	fair	
28 " 13	166 1/2	4 to 5'	"	
5 th Nov 13	175'	4" split	"	
12 " 13	181 1/2	2 veins 5"	"	
19 " 13	187 1/2	4" split	poor	
3 Jan 14	193 1/2	4" + 3"	"	3" vein coming in from hill
17 " 14	202 1/2	3 + 2"	"	
24 " 14	207	3 veins 7"	fair	
31 " 14		3 - 8"	"	
6 Feb 14	211 1/2	6"	fair Bi	
" " "	218	7"	fair	
6 Mar 14	232	5' + 5'	"	
14 Mar 14	238	veins agg 11"	"	

East Drive No 4 Gk Drive No 2 Lode

Date	Meas	Width	Value	Remarks
21 Mar 14	244	vein 14"	fair	
3 Apr 14	256	" 13"	"	
10 " 14	262	12"	"	
17 " 14	280	12"	"	
1 May 14	286	12"	"	Fairly hard Quartzite
8 " 14	292	14"	poor	"
16 " 14	297	12"	little metal	"
23 " 14	301	15"	fair	"
8 June 14	309½	14"	poor	"
13 " 14	313	14"	"	"
20 " 14	317	12" 16" 14"	fair	"
27 " 14	322	12" 16" 14"	"	"
3 July 14	327	12" 16" 14"	"	"
17 " 14	335½	12" 16" 13"	"	"
25 " 14	340	12" 16" 13"	"	"
31 " 14	346½	12" 16" 13"	"	"
7th Aug 14	352½	12" 16" 13"	little metal	"
14 " 14		12"	poor	"
22 " 14	360	10"	"	"
28 " 14	364½	9" + 3"	"	"
5 Sept 14	369½	6" + 4"	fair	"

East Drive No 4 Gk Drive No 2 Lode

Date	Meas	Width	Value	Remarks
12 Apr 14	376	6 + 5	fair	Fairly hard Quartzite
30 Apr 16	381	2 vein 4 apart	"	"
27 May 16	385'	10 + 2	"	"
3 June 16	388½	5 + 3	poor	"
9 " 16	396½	split' agg 10"	fair	"
17 " 16	399½	2 + 5 + 2	"	"
23 " 16	407	12"	"	Hard Quartzite
30 " 16	411	10 - 12	"	"
8 July 16	418	9"	"	"
14 " 16	426	8" 10" 10"	poor	"
22 " 16	429½	8"	"	"
29 " 16	436½	12"	fair	"
4 Aug 16	440	12"	"	"
12 " 16	444	split' 12"	"	"
19 " 16	446½	12"	"	"
26 " 16	455'	7 + 1 + 1	"	"
2 Sept 16	465'	7 + 1	"	From 218 to 474 Lode
9 " 16	467	5 + 3 + 1	"	payable = 256 ft
16 " 16	474	5 + 4	poor	"

Rise at 470 to No 1 Adit

Date	Mean	width	value	Remarks
	37	8-10	fair	
	41	8-10	poor	
	48.6	8	"	
	55 1/2	8-10	fair	
	68	8-10	"	
	79	6+3	"	

West Drive No 4 Gk Drive No 2 Lode. W.

21 Dec 1912	5	7"	fair	picked 78 lbs Bi
11 Jan 13	12	6"	"	Quartzite
18 " 13	17 1/2	7"	"	
25 " 13	20 1/2	6"	"	
26 Apr 13	36	6"	"	
3 May 13	41 1/2	5"	"	
10 " 13	46 1/2	6" split	"	
17 " 13	52 1/2	split	"	Contact at abt 84 ft
24 " 13	55	split app 6"	"	
31 " 13	58 1/2	2+2	Bismuth	
7 June 13	62	2+2	"	Bismuth in back of drive
21 " 13	74	4+2	fair	
12 July 13	90 1/2	small vein	fair Bi	Garnet
19 " 13	96	3" + 3"		at 93 ft

552041

West Drive No 4 Gk Drive No 2 Lode. W.

4

Date	Mean	width	value	Remarks
26 July 13	97 1/2	3+3 7' apart	fair	
2 Aug 13	103	small vein		
9 " 13	110	" "	fair	
16 " 13	117	6"	good	vein comes in from both
23 " 13	123 1/2	6"	"	
30 " 13	129 1/2	5"	fair	
6 Sept 13	138	split	"	
13 " 13	142	"	"	
20 " 13	148 1/2	4" + 2"	"	
27 " 13	156 1/2	split app 6"	"	

Drive entered alluvial at 160 ft

552042

East Drive, No 3 Adit, No 4 Lode, at 1050 ft 16" to 18" Lode

Date	Heas	width	Value	Remarks
9 July 10	0	16"-18"	Fairly good	Quartzite
	14½	16"	" "	"
	19½	15"	fair	"
	23½	16"-18"	"	"
	29½	15"	very fair	"
	30	15"	" "	"
	43½	15"	good	Hard Quartzite
	48½	15"	"	"
2 Sept 10	53	15"	fair	"
9 " 10	57	15"	"	"
16 " 10	61	9+3	very fair	Very Hard Quartzite
23 " 10	65½	12+2	fair	"
30 " 10	69½	12+2	"	"
7 Oct 10	74	14+2	poor	"
14 " 10	79	14+2	"	"
21 " 10	84½	14+2	"	"
	89½	14+1	good	"
	95½	15'	fair	"
	101	15'	"	"
	106½	15'	"	"
	113	5+6	poor	"

552043

East Drive, No 3 Adit, No 4 Lode

5

Date	Heas	width	Value	Remarks
	119	14	poor	very Hard Quartzite
	125'	18	fair	"
17 Dec 10	137½	16-18	poor	Hard Quartzite
24 Feb 11	142½	15'	fair	"
3 Mar 11	148½	14	Good	"
10 " 11	154	18	"	"
17 " 11	159	16-17	fair	"
24 " 11	163½	18	"	"
31 " 11	168½	18	"	"
7. 4. 11	173	12+3	Poor	"
21. 4. 11	183	12+2	fair	"
28. 4. 11	187½	12+3	Poor	"
5. 5. 11	193½	14	fair	"
12. 5. 11	202	15'	Poor	"
19. 5. 11	207½	9+4	"	"
26. 5. 11	211½	9+4	"	"
2. 6. 11	216	10+3	"	"
9. 7. 11	219	10+5'	fair	"
16. 7. 11	224	14	Poor	"
23. 6. 11	227½	14+1	"	"
1. 7. 11	232	14+1	"	"

552044

East Drive, No 3 Adit, No 4 Lode

Date	Area	Width	Value	Remarks
8.7.11	236	14	Poor	Hard Quartzite
15.7.11	239	14	"	"
22.7.11	244½	14	"	"
29.7.11	248½	14	"	"
5 Aug 11	253½	14	Fair	Split Hard Quartzite
12 " 11	259	2 veins	"	"
19 " 11	264	split	lower	"
26 " 11	269	10+2	Fair	2½ ft apart
2 Sept 11	274	4 veins	"	Hard Quartzite
9 " 11	278	2 "	very fair	2 ft apart
12 " 11	282½	^N 6 + ^S 8	Fair	Rock very hard
23 " 11	287	split	"	veins over 3 ft
30 " 11	292½	10+2	poor	3 ft apart Hard Quartzite
7 Oct 11	297	6+3+3	"	3½ ft " "
14 " 11	301½	6+6	"	15" " "
21 " 11	306	veins	"	"
27 " 11	310	10+6	"	18" apart "
4 Nov 11	314½	10+5	Fair	"
11 " 11	319½	10 + ^S smaller veins	"	over 3 ft "
18 " 11	324	12 ^S + 9 ^N	low	3 ft apart "
25 " 11	327½	10 ^S + 4 ^N	"	5 ft " "

East Drive, No 3 Adit, No 4 Lode.

Date	Area	Width	Value	Remarks
20 Jan 12	337	12 ^S + 3 ^N	Little melak	5 ft apart Hard Quartzite
27 " 12	342	9 ^S + 3 ^N	"	" " "
3 Feb 12	345½	9 ^S + 3 ^N	low	5 ft " "
9 " 12	349½	^S 10 + 3 + ^N 5	Little melak	7 ft "
17 " 12	352	^S 10 + 3 + ^N 4	low	8 ft "
24 " 12	356	12"	"	Driving on S vein other veins gone out on N side
2 Mar 12	361	10	Fair	Very Hard Quartzite
9 " 12	366½	9	"	Small veins 4 ft N
16 " 12	372½	7" + veins	poor	Very Hard Quartzite
18 May 12	389	10" + veins	Fair	"
1 June 12	399½	10	poor	"
8 " 12	404	10-12	"	"
15 " 12	409	10	"	Hault in back H.P
22 " 12	414	10	"	Little Bi
9 Dec 12	421½	10	"	sent for waste
16 " 12	424½	8-10	"	" "
21 " 12	428	12	Little Bi	Very Hard Quartzite
4 Jan 13	431½	12-14	Poor	"
21 June 13	444½	12	Little melak	2nd vein coming from S side
28 " 13	448½	14	poor	Hard Quartzite
19 July 13	459½	12	"	"

West Drive No 3 Adit No 4 Lode Cut at 1050 ft

Date	Area	Width	Value	Remarks
2-9-10	9	15 1/2 18	Good	Hard Quartzite
9-9-10	14 1/2	14	"	"
16-9-10	20	12+1	Poor	"
23-9-10	24 1/2	13+1	"	"
30-9-10	29 1/2	14+1 ^S	Fair	3ft apart
7-10-10	35 1/2	12	Poor	Fairly Hard Quartzite
14-10-10	41	12-14	"	"
21-10-10	48	12-14	.	Pyritic
28-10-10	55	12+2 ^N	"	"
5-11-10	60 1/2	14"	Fair	"
12-11-10	66 1/2	12+13	"	at 65 ft a x vein showed w.o.s
19-11-10	74 1/2	14	"	Rock favourable
26-11-10	82 1/2	11-12	"	Bulge on S. side carrying values
3-12-10	88 1/2	11-12	"	"
10-12-10	95	12	"	Hard Quartzite
17-12-10	101 1/2	11	Poor	"
24-12-10	108	4 ^S 7 ^N	S Poor N Good	"
31-12-10	111	4 ^S 7 ^N	Poor	2ft apart Quartzite
7-1-11	115	5 ^S 7 ^N	"	" " "
14-1-11	121 1/2	5 ^S 7 ^N	Fair	2'3" " "
21-1-11	127 1/2	5 ^S 6 ^N	"	4ft apart

West Drive No 3 Adit No 4 Lode 8

Date	Area	Width	Value	Remarks
28-1-11	133 1/2	Split 999 ^{1/2} 10"	Low	"
4-2-11	138 1/2	7" N small veins S	Fair	"
18-2-11	151	6 ^N 4 ^S	Little metal	4'6" apart Garnet
25-2-11	157 1/2	6 ^N	Fair	5 vein gone out of drive
4-3-11	165 1/2	7"	Good	Hard Garnet
11-3-11	171	Split 999 7"	Fair	" Hard Garnet
3-6-11	174	3+4	Low	3ft apart 4" gone out at 173 ft
10-6-11	177 1/2	3+3	Fair	3ft apart Hard Garnet
17-6-11	182	3+4	Poor	Faint in face
24-6-11	185	3+4	Little metal	2ft apart
1-7-11	191	Split 999 7"	Poor	1ft apart
8-7-11	195	8 1/2 9	Little metal	veins here junctioned
29-7-11	200	7 1/2 8	Poor	Small veins N show fair metal Hard Garnet
5-8-11	204	9	Fair	Hard Garnet
11-8-11	206 1/2	8 1/2 9	Little metal	"
19-8-11	210	8 1/2 9	Fair	"
26-8-11	217	8 1/2 9	216 ft Good	Rock better for driving
2-9-11	222	7+2	Lower	18" apart
9-9-11	226	Split	Low	Hard Garnet
15-9-11	232	9	Fair	veins junctioned
23-9-11	239 1/2	8-9	"	" Hard Garnet

West Drive, No 3 Adit, No 4. Lode

Date	Meas	Width	Value	Remarks
30 th Sep '11	245'	10"	very fair	Kind Garnet
7 Oct '11	254	10" to 12"	"	"
14 " 11	263	10 to 12	Low	Vein further N. Pyritic
27 " 11	269	12"	very good	Grey Garnet
27 " 12	276	10"	Good	Very Hard Grey Garnet
4 Nov 12	281½	10"	Fair	"
11 " 12	287	10"	"	Little Bi Sulphides
18 " 12	291	10"	"	Grey Garnet. Rock shows Bi
25 " 12	298	7"	"	Blue Garnet
2 Dec "	302	7 to 8	"	Hard Blue Garnet
9 " "	309	7"	"	" " "
16 " "	315'	7"	very fair	" " "
23 " "	318½	10	Good	" " "
6 Dec "	321	7-8	Fair	" " "
13 " "	325'	Split	"	" " "
17 Feb 13	332	3 vein 6S+1+4N	Low	" " "
24 " 13	337	7S+3N	Little metal	" " "
2 Mar 13	340½	7S+4N	7" thin 4" Poor	" " "
9 " 13	345½	7S+3N	7" " 4"	Fair
16 " 13	348½	Split	Poor	Very hard rocks
23 " "	352½	2+2+2	"	2½ ft apart

552051

West Drive, No 3 Adit, No 4. Lode

9

Date	Meas	Width	Value	Remarks
	357	small vein		
21.6.13	368¾	4"		Small veins coming in from both
27.6.13	375½	split	Poor	
9.7.13	386	8	Fair	
23.7.13	397	8	"	
1.8.13	401½	8	"	
8.8.13	409	7-8	"	
16.8.13	413	4-5'	Poor	
29.8.13	425½	1"		
13.9.13	432	2		x cut N 16½ ft
23.9.13				x cut S. 12 ft 1" vein
				Dipped from 0 to 330 ft

552052

East Drive, No 3 Adit, No 2 Lode Alt 1215 ft 2' 63" vein 1218 ft 6" vein
1221 Thread

Date	Inches	Width	Value	Remarks
8 Apr 13	10 1/2	7'5" + 2"N	Poor	3 1/2 ft apart Quartzite
15 " 13	18	7" + 2"	"	Coming together
22 " 13	25'	8"	Fair Bi	Hard Quartzite
23 Aug 13	30	8'	Poor	" "
30 " 13	36 1/2	8'	"	" "
6. 9. 13	40	8	"	very " "
13 9. 13	44 1/2	7	Fair	" " "
20. 9. 13	49	8	"	" " "
26. 9. 13	54	9	"	" " "
4. 10. 13	61	8	"	" " "
11. 10. 13	65 1/2	8	"	" " "
18. 10. 13	70	7	"	fairly hard
25. 10. 13	73 1/2	split agg 7	"	Hard
8. 11. 13	89 1/2	7	"	"
15. 11. 13	94	8	Poor	Fairly Good Quartzite
22. 11. 13	98	7	"	" " "
29. 11. 13	103	7-8	Fair	" " "
5. 12. 13	109 1/2	split 6-7	"	"
12. 12. 13	117	split	"	"
19. 12. 13	120 1/2	agg 7"	"	"
26. 12. 13	124	2 + 3	"	vein gone N.

552053

East Drive, No 3 Adit, No 2 Lode 10

Date	Inches	Width	Value	Remarks
22. 8. 14	135 1/2	4 + 3	Fair	Hard Quartzite
12. 9. 14	139 1/2	8 1/2 10	"	Strong flow water
10. 10. 14	153	small	Poor	Hard Quartzite
17. 10. 14	157	6"	Little metal	" "
24. 10. 14	160	split agg 5" - 6"	" "	" "
31. 10. 14	163	Small + split	Poor	" "
4. 12. 15	171 1/2	4 veins 1" to 4"	Little metal	" "
11. 12. 15	179	6"	" "	" "
23. 12. 15	195	6"	Poor	" "
17. 3. 16	198 1/2	4" to 5"	Little metal	" "
24. 3. 16	201 1/2	Small threads 4" to 3"	" "	" "
3. 5. 16	209 1/2	6" + 4"	Fair	"
13. 5. 16	213 1/2	3" + 3"	Poor	3 ft apart fairly hard
20. 5. 16	217	Small veins	"	"
6 May 16	220	" "	"	Very hard Quartzite
13 May 16	224	agg 7"	Fair	"
20 " 16	227 1/2	2 veins = 7"	"	Very hard Quartzite
27 " 16	231 1/2	6" N 2" S	"	5 ft apart
3 June 16	235	5 + 3	Poor	" "
9 " 16	238 1/2	5 + 3	Fair	2 1/2 ft apart Hard Quartzite
17 " 16	246 1/2	6 + 1	Poor	Hard Quartzite

552054

East Drive, No 3 Adit No 2 Lode

Date	Inch	Width	Value	Remarks
23-6-16	250	6+1	Poor	Hard Quartzite
3-5-18	269 1/2	5"-6"	"	"
11-5-18	272 1/2	5-6	"	Rocks improved
18 May 18	276 1/2	5"-6"	"	Rock Hard Quartzite
25 " 18	280	6"	"	"
2 " 18	283	6"	"	"
7 June 18	286 1/2	8"	Little more	Fairly hard Quartzite
16 " 18	292 1/2	4"+2"	" "	About 1/2 to 3/4 very hard
29 " 18	300 1/2	8"	Fair	Very hard
3 July 18	304	8"	Poor	"
13 " 18	307	8"	"	"
19 " 18	311	8"-9"	Fair	"
26 " 18	315	8"	Poor	" Quartzite
2 Aug 18	318 1/2	9"	Fair	"
10 " 18	322	Split aggr 8"	"	"
17 " 18	325	4"+3"	"	"
6 Sept 18	340	8"	"	Very hard Quartzite
14 " 18	343 1/2	8"	"	"
21 " 18	347 1/2	8"+3'S	"	"
28 " 18	351	9"	"	"
4 Oct 18	354	10" 10 12"	"	"

East Drive, No 3 Adit No 2 Lode

Date	Inch	Width	Value	Remarks
12 Oct 18	360 1/2	9"	Fair	Very hard Quartzite
19 " 18	364 1/2	11"	Poor	" " "
26 " 18	369	10"-12"	Fair	" " "
1 Nov 18	377	12"	Fairly Good	Rock easier
9 " 18	381	12"	Fair	Fairly hard Quartzite
16 " 18	384 1/2	12"	"	"
23 " 18	389	10"	"	"
30 " 18	396	10"	"	"
6-12-18	401 1/2	9" 10 10"	"	Hard Quartzite
14-12-18	405 1/2	9 10 10	"	"
20-12-18	413	11"	"	"
18-1-19	421	9"	very fair	Very " "
5-2-19	432 1/2	7"+2"	"	"
22-2-19	436	10"	Fair	Very Hard Quartzite
28-2-19	440	10"	"	"
P-3-19	444	10"	"	lost 12 ft 2-125 feet
15-3-19	452	Split 10"	Fairly Good	Hard Quartzite
22-3-19	456 1/2	3 veins 12"	very fair	Fracture displaced to 1 ft 10 in
29-3-19	461	8"+6"	Fair	3 ft apart
4-4-19	465 1/2	agg 11"	"	Very hard Quartzite
12-4-19	469	Split 11"	"	" " "

East Empire, No 3 Adit, No 2 Lode

Date	Meas	Width	Value	Remarks
19.4.19	472½	11"	Fair	Very Hard Quartzite
25.4.19	476½	10"	.	" " "
2.5.19	480	12"	Poor	" " "
10.5.19	484	12	Fair	" " "
16.5.19	488	7+5'	Low	6" rocks between
24.5.19	491½	3 veins 999 12"	Fair	Rock very hard
30.5.19	493½	3 veins 999 11"	Lower	" " "
6.6.19	495½	6" + 3"	Poor	3" vein gone out S. side
14.6.19	502	8" 15 9"	"	Very hard rock

$$432\frac{1}{2} \text{ to } 493\frac{1}{2} \text{ ft} = 61 \text{ ft} = 136\frac{1}{2} \text{ tons}$$

$$= 2.237 \text{ tons per lin foot}$$

West Drive, No 3 Adit, No 2 Lode

Date	feet	Width	Value	Remarks
9 Jan 12	10	6" + 2"	Fair	2 1/2 ft apart, Quartzite
16 " 12	15 1/2	5" + 2"	"	1 1/2 " "
23 " 12	19 1/2	8"	"	vein junction "
30 " 12	26 1/2	8"	"Pyritic	Hard Quartzite
6.4.12	31	9"	Fair	Mild "
2.4.12	35 1/2	9"	Poor	Hard "
	41	9"	Fair	" "
6.7.12	45 1/2	9"	Poor	" "
13.7.12	52 1/2	8" - 9"	"	" "
20.7.12	58 1/2	8"	"	" "
27.7.12	65 1/2	9"	Fair	" "
3.8.12	73	9"	"	" "
10.8.12	79 1/2	9"	"	" "
17.8.12	85 1/2	9"	"	" "
24.8.12	90 1/2	7"	Poor	2' vein gone South
31.8.12	95	6"	"	" "
7.9.12	100 1/2	6"	"	Hard Quartzite
14.9.12	105 1/2	7"	"	" "
21.9.12	111 1/2	7"	"	" "
28.9.12	119	6"	"	Mild "
5.10.12	127	3" + 3"	Fair	3 1/2 ft apart

552058

West Drive, No 3 Adit, No 2 Lode.

13

Date	feet	Width	Value	Remarks
12.10.12	133 1/2	3 + 3	Fair	vein gone South
19.10.12	139 1/2	3	"	"
26.10.12	148	3	Poor	about contact Stopped from 0 to 150 ft

552059

West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Feet	Width	Value	Remarks
	6 1/2	4 veins	Fair	Hard Quartzite
	12	" "	little metal	" "
25.5.18	17 1/2	3=12"	Fair	Very Hard Quartzite
	22 1/2	12"-13"	Fairly Good	
	28	7-8	Poor	
	32 1/2	12-13	"	
29.6.18	35 1/2	12	Fair	Very hard Quartzite
	39	12	"	" " "
	47	12	Poor	" " "
	50 1/2	12	Fair	" " "
	57 1/2	12	"	" " "
2.8.18	62	12	"	Very hard Quartzite
	68 1/2	12	"	" " "
17.8.18	72 1/2	10-12	Poor	very hard Quartzite
	81	12	Good	" " "
	90	8	Fair	" " "
6 Sept '18	94 1/2	Split	"	Hard Quartzite
14. 18	100	8	Little metal	" " "
21. 18	103 1/2	veins		very " "
28. 18	107	3+1+2	little metal	" " "
4 Oct 18	110 1/2	4-5'	"	" " "

West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Feet	Width	Value	Remarks
	12 Oct 18	114	4	Poor Very hard Quartzite
	19 " 18	125'	4	vein came in from north
	1 Nov 18	129	10-12	Fairly Good Hard Quartzite
	9 " 18	137	9	little metal Fairly Hard
	16 " 18	140 1/2	10-12	Fair " "
	23 " 18	144 1/2	8-12	Poor " "
	30 " 18	149	11	" Rock hard
	6 Dec 18	152 1/2	12	" Fairly hard
	14 " 18	161	10-12	Fair
	20 " 18	168	12	" Fairly Hard
	22 Feb 19	176 1/2	9	" Mild Quartzite
	8 Mar 19	180 1/2	10	" Fairly hard Quartzite 7 1/2 ft = 18 1/2 tons = 2.46 tons per ft
	15 " 19	184 1/2	9	Good W.D. ₃ Mild Quartzite
	22 " 19	188 1/2	8	Fairly Good " "
	29 " 19	192	7 1/2	1 Bag W.D. ₃ Good " "
	12 Apr 19	197 1/2	7	Fair " "
	19 " 19	201 1/2	6+2	" " "
	18 Oct 19	211 1/2	4+5	Little metal 28 1/2 ft from 173 to 201 1/2 = 7 1/2 tons = 2.49 tons per lin ft
	25 " 19	218 1/2	9+2	Fair Quartzite
	15 Nov 19	235'	"	Handled

West Drive, Main Shaft, No 3 Level, No 4 Lode

Date	Inches	Width	Value	Remarks
22 Nov 19	237	7 1/8		Lode picked up S.
29 " "	241	veins	Fair	Mild Garnet
5 Dec 19	245	9	"	" "
12 " 19	250	9	"	" "
20 " 19	256	8	"	" "
9 Jan 20	264	7-8	"	" "
17 " 20	271	7	"	" "
23 " 20	275	7	"	" "

Main Shaft, No 3 Level, No 4 Lode Rise from West Drive

Date	Inches	Width	Value	Remarks
4 July 19	33	10	Poor	
18 " 19	41	10	"	
26 " 19	45	12	"	Fairly hard Quartzite
1 Aug 19	50	10-12	"	
16 " 19	57 1/2	12	"	
23 " 19	62 1/2	11	little metal	
30 " 19	67	10	Poor	
3 Oct 19	95	9	Fair	
20 Sept 19	83 1/2			near contact
13 " 19	75	10	Fair	
10 Oct 19	105			contact about 100ft
	109		Height 146 1/2 ft	Holed through to wing

East Drive Main Shaft - No 3 Level, No 4 Lode ^{636 ft}
FROM shaft

Date	Feet	Width	Value	Remarks
7 June 18	9	Sp. l.	Fairly Good	Hard Quartzite
15 Nov 19	31	2 veins totaling 10"	Fair	" "
22 " 19	36	7"	"	" "
29 " 19	43½	7"	"	" "
5 Dec 19	47	7"	"	" "
12 Dec 19	50½	7"	"	" "
9 Jan 20	58	8 + 2"	"	3 ft apart
23 " 20	63	6 + 3	"	5½ ft apart in very hard rock

East Drive, Main Shaft No 2 Level No 6 Lode

Date	Area	Width	Value	Remarks
25 June 15	10 1/2	split	Fairly Good	Hard Garnet
21 Aug 15	26	15 ^S + 6 ^N	Good	" "
	32 1/2	18 ^S + 2 ^N	"	" "
	40	24 ^S	"	Mild "
	43	24 ^S	Fair	" "
	47	22	"	" "
	50	22	"	Hard "
	54	23	"	" "
16.10.15	58	22	"	" "
	62	24	"	" "
	66	22	"	" "
20.11.15	70	22	"	Mild "
27.11.15	82 1/2	22 ^S + 3 ^N	"	" "
4.12.15	88 1/2	22 + 3	"	" "
11.12.15	94 1/2	13 + 7 ^N	Good	" "
23.12.15	99	17 vein	Fair	" "
11.3.16	107 1/2	12 ^S + 7 ^N	Little metal	" "
17.3.16	112	split apart 12	Fair	" "
24.3.16	116	12 S	"	" "
	121	12	"	" "
	129	12	Poor	" "

552065

East Drive, Main Shaft, No 2 Level, No 6 Lode

17

Date	Area	Width	Value	Remarks
	132	13	Fair	Mild Garnet
	137	14	"	contact
27 May 16	140	13-14	"	Quartzite
	147	14	"	"
17 June 16	152	15 + 6	"	6" vein coming in from both sides
23 " 16	158 1/2	18	Fair	Fairly hard Quartzite
30 " 16	169	21	"	" " "
8 July 16	182	18	"	" " "
14 " 16	194	17	Poor	" " "
22 " 16	205 1/2	18	Little metal	" " "
29 " 16	218	18	Fair	Very hard Quartzite
4 Aug 16	227	14	"	Fairly " "
12 " 16	232 1/2	30 vein = 15"	"	Very " "
19 " 16	245	15	"	Fairly " "
26 " 16	257 1/2	16	"	" " "
2 Sept 16	269 1/2	15	"	" " "
9 " 16	280 1/2	15	"	" " "
16 " 16	286 1/2	15 + 16	Poor	" " "
23 " 16	296 1/2	14	Fair	" " "
30 " 16	308 1/2	13	"	Hard Quartzite
8.9.17	315	13-14	Little metal	" "

552066

East Pipe Main Shaft - No 2 Level No 6 Lode

Date	Feet	Width	Value	Remarks
15.9.17	323	15'	Fair	Hard Quartzite
22.9.17	326 1/2	15'	"	" "
29.9.17	333	14-15'	"	" "
5.10.17	337	14-15'	"	Split in bottom
13.10.17	341	12 1/2 15'	"	Sound in back Split in bottom
19.10.17	348 1/2	split 7+11	"	4 ft apart
2.11.17	356 1/2	split	"	

West Drive Main Shaft No 2 Level No 6 Lode

Date	Inch	Width	Value	Remarks
	22	14		Hard Garnet
21.8.15	26	12+6	Fair	" "
28.8.15	32	11+4	"	" "
4.9.15	39	13	"	" "
11.9.15	42	12	Good	" "
18.9.15	46	14	Fair	" "
1.10.15	49.6	14	"	" "
	53	15	"	" "
16.10.15	57	13	"	" "
	61	12+3(S)	"	" "
	64.6	14+3	"	" "
20.11.15	69	15	"	" "
27.11.15	73.6	12	"	" "
4.12.15	82	12	"	" "
11.12.15	86½	12	Poor	" "
18.12.15	96	12+6	Good	" "
23.12.15	99	17	Fair	" "
11.3.16	105½	14	"	" "
17.3.16	110½	15	"	" "
24.3.16	114½	14	"	" "
	121½	17	Little metal	" "

552068

West Drive Main Shaft No 2 Level No 6 Lode

19

Date	Inch	Width	Value	Remarks
29 Apr 16	125½	16-17	Little metal	Hard Garnet
12 May 16	130	19	Fair	" "
20 " 16	137	19	Poor	" "
27 " 16	141½	19	"	" "
3 June 16	144	15	Fair	" "
9 " 16	147	16	"	" "
17 " 16	152	20	"	" "
23 " 16	160½	18	"	Fairly Hard Garnet
30 " 16	171	8	Fairly Good	Hard Garnet
8 July 16	182½	2" + 12	" "	12" came in from South side of drive
14 " 16	194	12	Fair	Hard Garnet
22 " 16	206	15	Good	Fairly hard Garnet
29 " 16	218	15	Fair	" "
4 Aug 16	227	14	"	" "
12 " 16	239	14	Good	Very hard Garnet
19 " 16	250	12 1/2 14	Fair	Fairly hard Garnet
26 " 16	262	14	"	" "
2 Sept 16	278½	12	"	" "
9 " 16	283½	12	"	" "
16 " 16	295½	8	Fair	" "
23 " 16	299	6-8	"	Much faulted

552069

West Drive Main Shaft No 2 Level No 6 Lode

Date	Area	width	Value	Remarks
23 June 17	307	6-8	Fair	much faulted
30 " 17	305'	8-10	Good	" "
31 July 17	312	8	Little metal	Hard Garnet Rock
28 " 17	317	6	Fair	much faulted
4 Aug 17	320 1/2	6	Poor	" "
11 " 17	325'	6	"	" "

East Drive, Main Shaft No 3 Level No 6 Lode

Date	Inches	Width	Value	Remarks
10 July 15	22	24	Good	Hard Garnet
17 " 15	29	26	Poor	
24 " 15	36	Split 24 + 2	Fair	8" apart Mild Garnet
31 " 15	40	Split 18 + 6	Little metal	2 ft apart Mild Garnet
7 Aug 15	44	18 + 6	Poor	5 ft apart Mild Garnet
14 " 15	48	22	Fair	vein gone off S. at 46 ft
21 " 15	52	22	"	Mild Garnet
28 " 15	56	22	"	" "
4 Sept 15	60	22	"	" "
11 " 15	64	21	"	" "
18 " 15	68	18 + 6	"	" "
	72	12 + 5	"	" "
16 Oct 15	77	5 + 9	"	5:6 apart
	81	5"	"	

Followed 2" vein to 120 ft + x cutted 32 ft N+S. S. vein 999
6" + N. 12" lode fair value. This cutting connected
back to lode at 77 ft. Contact met at 112 ft

27 Oct 16	Squaring up drive veins 12 + 5 Poor			
3 Nov 16	137	12 ^N + 5 ^S	Poor	9 1/2 ft apart in hard Quartzite Rock
11 " 16	141	10 ^N + 6 ^S	"	9 ft apart
18 " 16	147	9 ^N 6 ^S	"	9 ft apart Hard Quartzite

552071

East Drive, Main Shaft No 3 Level No 6 Lode

21

Date	Inches	Width	Value	Remarks
25 Nov 16	152 1/2	9 ^N 6 ^S	Fair	5 ft apart, Hard Quartzite
2 Dec 16	158 1/2	6 + 6	Fair	4 ft apart with veins between
9 " 16	163	veins	"	face 9 ft wide Hard Quartzite
16 " 16	176	12	"	veins gone out both driving on South veins
22 " 16	185	14	Poor	Very Hard Quartzite
13 Jan 17	195	14 10 15	"	" " "
20 " 17	203	14	Little metal	" " "
31 Jan 17	209 1/2	14 in back 4 + 10 in face	Fair	" " "
7 Apr 17	220	12	Poor	" " "
14 " 17	223	12	"	" " "
20 " 17	230	10 - 12	"	" " "
27 " 17	237	8	"	" " "
4 May 17	241 1/2	6 - 8	Little metal	" " "
11 " 17	252	Split 6	Fair	" " "
19 " 17	256	4	Poor	" " "
26 " 17	259	5 - 6	"	" " "
12 July 19	287	6	"	" " "
15 " 19	290 1/2	7	"	" " "
26 " 19	296	7	"	" " "
1 Aug 19	299 1/2	7	"	" " "

552072

West Drive Main Shaft No 3 Level No 6 Lode

Date	Area	Width	Value	Remarks
17 July 15'	22	20	Fair	Hard Garnet
24 " 15'	31	20	"	" "
31 " 15'	35'	18	Little metal	" "
7 Aug 15'	39	18	Poor	" "
14 " 15'	43.6	15'	Fair	" "
21 " 15'	46	17	"	" "
28 " 15'	49	11 + 2 + 1	"	" "
4 Sept 15'	52	12 + Stringers	"	" "
11 " 15'	55.6	18	"	" "
18 " 15'	59	24	"	6" vein came in from h.
	63	22	"	
16 Oct 15'	66½	21	"	Hard Garnet
23 " 15'	70½	22	"	" "
30 " 15'	74	22	"	" "
6 Nov 15'	80	22	"	h.w. vein gone out of drive
	84	20	"	
27 " 15'	88	20	"	Hard Garnet
4 Dec 15'	93	15'	"	much disturbed
11 " 15'	101	12 1/2 14	"	Hard Garnet
18 " 15'	110.6	17	"	Very " "
23 " 15'	118.6	20	Good	" " "
17 Nov 16	126.6	18	Poor	" " "
24 " 16	134.6	22	Fair	" " "

552073

West Drive Main Shaft No 3 Level No 6 Lode

Date	Area	Width	Value	Remarks
31 Nov 16	138.6	16-17	Good	Very Hard Garnet
2 Sept 16	142	16-18	Fair	" " "
9 " 16	145'	21	"	Hard Garnet
16 " 16	148½	20	Fairly Good	Very " "
23 " 16	152½	19	Fair	" " "
30 " 16	160½	18	"	Medium Garnet
6 Oct 16	168	18	"	" "
14 " 16	178	18	"	Fairly Hard Garnet
21 " 16	192	20	"	" " "
28 " 16	204½	18	"	" " "
3 Nov 16	216½	15'-16	"	" " "
11 " 16	228	14-16	Fairly Good	" " "
18 " 16	239½	20	Fair	" " "
25 " 16	251	16	"	" " "
2 Dec 16	263	15'	Poor	Very " "
9 " 16	270	15'	Fair	" " "
16 " 16	281	14	"	" " "
23 " 16	292	15'	"	" " "
13 Jan 17	304	10-12	"	much faulted, hard Garnet
20 " 17	316	13	"	Hard Garnet
26 May 17	324½	12	"	" "

552074

West Drive Main Shaft No 3 level No 6 Lode

Date	Inches	Width	Value	Remarks
2 June 17	332	12	Fair	Hard Garnet
8 " 17	339	10	Good	much faulted in hard rock
16 " 17	343	10	"	"
23 " 17	350 1/2	8-10	Fairly Good	much faulted
30 " 17	358	10-11	"	"
21 July 17	362	10	Fair	Hard Garnet
28 " 17	370	7	"	"
4 Aug 17	373	8	"	"
11 Aug 17	378	8	Poor	much faulted

Main Shaft No 2 Level, N.W. Branch cut at 120ft from plot @

Date	Heas	Width	Value	Remarks
30 Sept 16	11	veins		
7 Oct 16	15	"		
14 " 16	19	4 10 5'	Poor	
23 Feb 17	29	5'	Fair	
2 Mar 17	37	3	Poor	
10 " 17	45	3" + 4"		4" vein came in from S.W
17 " 17	53	4" + 4"	Fair	S.W. vein pyritic + Bi
24 " 17	58	12-14	"	
31 " 17	67	12" back 6" bottom	Poor	
7 Apr 17	7 1/2	12	"	Fairly hard Garnet
13 " 17	78	12-14	"	" " "
21 " 17	82 1/2	14-15	"	" " "
28 " 17	90	18-20	Little metal	
4 May 17	98	Split 20" agg	Poor	Fairly hard Garnet
12 " 17	106	15-16	"	" " "
19 " 17	113	17-18	"	5 lbs Bi won
26 " 17	120	12	"	
2 June 17	124	14-18	"	
8 " 17	128	17	"	Hard Garnet Rocks much faulted
16 " 17	136	15'	Little Pyritic + Bi	" "
23 " 17	140	16-18	improved	

552076

Main Shaft No 2 Level, N.W. Branch

24

Date	Heas	Width	Value	Remarks
30 June 17	144	10+8	Fairly Good	18" apart
21 July 17	148	12	Fair	more lods on left hand side
28 " 17	152	10+8	Little metal	3ft apart Hard Garnet
4 Aug 17	156	10+7	"	6ft "
11 " 17	160	8+9	Poor	6ft apart
25 " 17	170	7+8	"	9'6" apart
31 " 17	176	12	"	Following h.W. vein
8 Sept 17	178	10	Fair	
15 " 17	182 1/2	12	Poor	Fairly hard Garnet
22 " 17	190 1/2	10	Little metal	" " "
29 " 17	196	7-8	Fair	
5 Oct 17	203 1/2	10	Little metal	Fairly hard Garnet
13 " 17	208	6-8	Poor	
19 " 17	212 1/2	6-8	"	Pending rock for filling

552077

This Lode gave good Bi values at No3 Adit Level and Slopes
 Main Shaft No3 Level, N.W. Branch Lode 76ft from shaft

Date	Inches	Width	Value	Remarks
26.5.17	8 12	3-6 4	Poor "	Rock fairly hard Garnet
2.6.17	22	3.4	"	" "
8.6.17	28½	4	"	" "
16.6.17	37½	5-6	"	" "
23.6.17	44½	6	"	" "
30.6.17	48½	8-9	"	" "
21.7.17	56½	6	"	" "
28.7.17	68	6	"	" "
11.8.17	75½	6	"	" "
18.8.17	84	6	Fair	" "
25.8.17	97	8-9	Poor	" "
8.9.17	106	12	Fair	" "
15.9.17	113	15-16	"	Good driving ground
22.9.17	122	15' back 7 bottom	Poor	" "
29.9.17	129	15'	"	" "
5.10.17	142	14	Little metal	" "
13.10.17	149	12-18	" "	" "
19.10.17	161	24	¾ 181% b	" "
26.10.17	171½	18	Fair	Grey Garnet
2.11.17	184	14-15'	Little metal	" "
10.11.17	192½	21-24	"	Fairly hard Garnet

552078

Main Shaft No3 Level, N.W. Branch Lode

25'

Date	Inches	Width	Value	Remarks
17.11.17	204	10	Fair	Fairly hard Garnet
23.11.17	210½	12	Poor	Disturbed
30.11.17	226	Fluctua	"	"
7.12.17	232	10+6+6	"	"
15.12.17	239	6+6	"	Vein gone out S.W. at 230ft
24.12.17	247	8+4	"	3½ft apart
25.5.18	250½	6+3	"	Good driving rock
1-6.18	254	7	"	Other vein dying out
7.6.18	257	7-8	"	Fairly easy rock
15.6.18	262	7-8	"	small in bottom
21.6.18	268	10	Little metal	"
5.7.18	274	8-9	Poor	Good driving rock
13.7.18	277½	"	"	"
19.7.18	281½	10-12	"	Good driving rock
26.7.18	285½	8+4	"	" " "
5.8.18	290½	8	"	vein came in from h. 8.
10.8.18	297½	7	"	"
17.8.18	301½	10	Fair	Good driving rock
6.9.18	316	8-12	Poor	" " "
14.9.18	319½	8-12	"	" " "
21.9.18	322½	10-12	"	" " "

552079

Main Shaft No 3 Level N.W. Branch Lode

Date	Feet	Width	Value	Remarks
28.9.18	327	12	Poor	
4. Oct 18	331	12	"	Dist prospects, Trace
12 " 18	334	12	"	
19 " 18	338	14	Trace	
26 " 18	345 1/2	14	Trace Bi	
1 Nov 18	349 1/2	12-14	"	
9 " 18	354	14+15	Very Poor	Good driving country
16 " 18	357 1/2	12+3	Traces	
23 " 18	366	14	Poor	
6.12.18	369	15-18	"	Fairly hard Garnet
	373 1/2	33	about 3/4% of con	
22.2.19	379	27	"	Fairly hard Garnet
28.2.19	382	8" back 6" bottom	Little Metal	" " "
15.3.19	386	14	about 3/4% con	
22.3.19	390 1/2	26	Fairly good	56lbs W.O. Picked
29.3.19	395 1/2	36 back 20 bottom	3/4 to 1%	Fairly W.O.
4.4.19	397	36 back 12 bottom	3/4%	Fairly hard rock
12.4.19	401	24 back 12 bottom	Poor	" " "
25.5.19	405 1/2	24	"	Little Bi
2.5.19	409	18	Little metal	hard Garnet

General

No 3 Level	Main Shaft - x cut . S. at	453	3"
"	"	466	8" Nos'
"	"	636	No 4
"	"	45 1/2	N.W
No 3 Adit		1215-1221	No 2 Lode
"		1050	No 4 "
"		391	No 6 "
"		927	No 5 "

East from Rie No 2 Lode Inter Lench above No 3 Adit

Date	Meas	width	Value	Remarks
18.11.13		6"	Fair	About contact
22.11.13	23	5' 10 6"	"	Mild garnet
29.11.13	29 1/2	4"	"	"
5.12.13	34	4"	"	Quartzite
12.12.13	40	5"	"	"
19.12.13	44	5"	"	"
3.1.14	51 1/2	4' 10 5"	Little metal	"
17.1.14	58	2+3	Fair	Hard Quartzite
24.1.14	63	5' agg	"	"
31.1.14	67	8"	"	"
6.2.14	72	3 veins	"	"
6.3.14	87	8" agg	"	"
14.3.14	92 1/2	8"	"	"
21.3.14	96 1/2	8"	"	line at 10' 10' Gk thin
5.4.14	115 1/2	5'+4'	"	3ft apart
12.4.14	122	5'+4'	"	2 1/2 ft "
8.5.14	128	10"	"	"
16.5.14	121	10"	"	Hard Quartzite
	136	9"	"	"
8.6.14	141 1/2	7"	Poor	"
13.6.14	146	8"	Fair	"
	148			
30.5.24	153.6	8' 10 9"	"	Hard Quartzite

552082

Meas from No 4 Pass West

Date	Meas	width	Value	Remarks
6.6.24	159	Split over 30"	Fair	Fairly Hard Quartzite
13.6.24	163 1/2	" "	Fairly Good	" " "
20.6.24	167	" "	Fair	" " "
27.6.24	171	" "	Fair	Hard Quartzite <i>Patch Bi in bottom</i>
Machine started				
7.5.25	174 1/2	2+7	Fair	Hard Quartzite
13.5.25	178 1/2	2+7	"	Good breaking
16.5.25	183	2+7	"	"
1.6.25	187 1/2	2+7	"	"
3.6.25	193	3ft apart 2"-7"	Coarse Tin in 7"	Good breaking vein fault in bottom
19.6.25	204	4' 6" apart 2'+7"	Poor	Hard Quartzite
26.6.25	209	2+6"	values in 2"	" "
3.7.25	216 1/2	2' 6" apart vein	"	very pitching
10.7.25	220	veins	values on New vein Poor	" " Quartzite
17.7.25	225	agg 9" vein	Fair	Rock improved, fair breaking
31.7.25	239	3+4	Poor	"
7.8.25	224	4S 3N	little metal	4 1/2 ft apart
14.8.25	253 1/2	3N+5S	Fair	Hard Quartzite
21.8.25	263 1/2	5"S+3"N	"	5 ft apart
11.9.25	275	6" S side	Fairly Good WO ₃	vein gone out N
18.9.25	280	6-7"	"	pitching

552083

Date	Locs	width	Value	Remarks
25.9.25	289	6" S.	Fairly Good	pitching
3.10.25	293			The head showed good Tin for 2 ft up evidently from 8" vein which is S. of drive
17.10.25	303	6-7	Fair	
30.10.25	308	7" S	Fairly Good in Tin	Soft in bottom of drive
14.11.25	313	7 S	Fair	

552084

No 2 Lode Rise above Inter Level to GR Drive

29

Date	Locs	width	Value	Remarks
		7" agg		Rising done for ventilation and for the pass
	14 1/2	Split	Fair	
	23 1/2	3 veins	"	
	31	Small vein		
	36 1/2	4"	Poor	
	47	Split up		
	55'	6"	Poor	
	61 1/2	4"	Fair	
	67	veins		other veins out south from Run

552085

N^o4 Lode Ck Drive 154 ft above N^o3 Adit at 102 ft East formation

Date	Area	Width	Value	Remarks
11.1.08	244	cut N at 7 1/2 ft	7" ^{good}	9 1/2 ft 8" little metal
8.2.08	251	12"	little Bi	Hard Quartzite
15.2.08	255 1/2	11	5/8 in mica vein along side	" "
22.2.08	260	6+ veins	little metal	very hard
29.2.08	266	3 veins 3" to 4"	at times Fair	2 shifts very hard
7.3.08	273	veins	" "	" "
14.3.08	281	"	" "	" "
11.7.08	29 1/2	999 about 10"	Poor (Bi)	" "
18.7.08	298	veins	" "	1 shift Hard
25.7.08	305 1/2	"	" "	Pyritic
1.8.08	313 1/2	8 to 10	" "	" "
8.8.08	319 1/2	7	" "	Driving on one vein
15.8.08	327	7 to 10	" "	3" vein in from S.
22.8.08	334	2 veins	" "	2 1/2 ft apart
19.9.08	349	8 + 2	Some Bi	" "
26.9.08	358	"	" "	4 1/2 ft apart
3.10.08	368 1/2	8" to 12" ^{and} vein	Fair	3 ft apart
10.10.08	378 1/2	"	" "	Very hard
17.10.08	386	3 veins	Fair	1 ft apart
31.10.08	401 1/2	20 vein N. 12" S. 5"	" "	1 ft apart
7.11.08	413 1/2	15" to 14"	" "	junction at 409 ft

Date	Area	Width	Value	Remarks
14.11.08	425 1/2	18"	Fair	Rock better
21.11.08	439 1/2	18" to 20"	Poor	" "
28.11.08	454	18	Fair	Rock Quartzite Fair
5.12.08	491 1/2	15" to 20"	"	" "
12.12.08	486 1/2	15" to 20"	"	" "
19.12.08	498 1/2	18	"	at 490 rise to No. 1.
6.2.09	508	veins	Good	" "
13.2.09	513	Split	Fair	" "
20.2.09	517	12" - 15"	"	at 528 cut to 5.
27.2.09	528	15	"	Very hard Quartzite
6.3.09	532 1/2	18" to 20"	very fair	" "
13.3.09	544	"	"	" "
20.3.09	554 1/2	3 veins	Fair	over 3 1/2 ft
27.3.09	568	18	little metal	" "
10.4.09	582	Split	Rather poor	2 1/2 ft apart
17.4.09	592	Split	"	" "
24.4.09	601	12" + 9"	Fairly good	" "
8.5.09	609 1/2	12" to 14"	Fair	" "
15.5.09	619 1/2	3 + 4 + 5 + 3	"	over 6 ft
22.5.09	629 1/2	4 veins	"	" 6 ft
29.5.09	638 1/2	Split	"	" "

Date	Area	Width	Value	Remarks
5.6.09	652	10"	Fair	vein gone to
12.6.09	662½	Spec 12"	"	
19.6.09	674	8" 16 10"	"	
26.6.09	688	8" 16 12"	"	
3.7.09	697	10" 16 12"	"	
17.7.09	703	Spec		5" vein gone N
24.7.09	712	6"	Fair	
21.8.09	718			
28.8.09	727	5" vein	Fair	
4.9.09	732½	At 10ft N cut 18"		
18.9.09	741	18" 16 20	Fair	
25.9.09	746	14+3+2	"	
2.10.09	757	14" 16 16"	"	
9.10.09	766½	18"	"	
16.10.09	774	14" 16 18"	Poor	
23.10.09	782	12"+3+1"	"	Hard Quartzite
30.10.09	792	12" 16 18"	"	
6.11.09	798			Alluvial shown in back
4.12.09	811	15" 16 18"	Poor	
11.12.09	820	12" 16 16"	Fair	
8.1.09	839			Alluvial 4ft from back

Date	Area	Width	Value	Remarks
15.1.09	847	9+3		Alluvial 2ft from rails
	855			" at floor

Alluvial carries fair prospects on bottom, for about 8" above thin 5' to 6ft of sand of very low value. From 738ft. branch drive driven back E. and sloped above. Good patch of B1 obtained in these slopes near surface

No 2 Lode Prospecting Adit over S. drive from No 1 Adit

Dali Area Width Value Remarks

From start of Adit to 40ft, Lode 5' to 6' fair

27.4.18	40	6	Fair	Some Bi carb
3.5.18	47	6	"	" " "
11.5.18	57	6	"	" " "
18.5.18	64	6	"	" " "
7.6.18	71 $\frac{1}{2}$	8	Little metal	
15.6.18	78 $\frac{1}{2}$	8	Fair	Some Bi Carb
22.6.18	86	8 to 9	"	" " "
29.6.18	95	8 to 9	"	" " "
3.7.18	104	8	Poor	
19.7.18	109	9		10 lbs Bi
26.7.18	114 $\frac{1}{2}$	8 to 9	Poor	

Some Carb Bi picked during the whole progress of driving