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SILVER - LEAD ORE  
QUIGLEY'S, BARNETT'S & BIG BEN  
WORKINGS  
ZEEHAN

23 - 02M

Silver-lead Ore, Quigley's & Barnett's &  
Big Ben Workings, Zeehan  
by  
W. H. Williams  
12/2/23.

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AMG REFERENCE POINTS ADDED


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 QUEENSTOWN, 12th: February, 1923.

*London Express 24.2.23*  
*J. M. Book case*  
*W.H.W.*

J. O. Hudson Esq.,  
 Chief Inspector of Mines,  
 H O B A R T.

Sir,

In accordance with your instruction I have the honor to furnish the following report upon the recent discovery of Silver-lead ore in the Zeehan district :---

--- Situation ---

The mineral area under observation is situate 2 miles N 50° W from the Zeehan township and westerly from the Granville tramway which affords the most convenient route of access, the distance thereby being approximately 3 miles from the township centre. 25 chains westerly from its intersection with the tramway the charted track to the Pieman Heads enters lease 8896 M of 40 acres whereon are located the Nos: 1 and 2 lode exposures and at 40 chains the track crosses the northern end of the lode exposure in the western wall of Quigley's workings. 45 chains N 8° W from these exposures and on lease 8912 M of 20 acres is located Blacklow's lode, locally appellated "Big Ben".

--- Historical ---

As reference will be made to what are known as Quigley's and Barnett's workings the sequence of this report would be interrupted without some mention of those workings. The former workings were partly explored but the latter workings were inaccessible consequently any reference thereto must be limited and as official data regarding the extent of workings, lode occurrences and values were not procured, these features must remain incomplete.

Quigley's Workings:-

Situate on the present holding 8896 M of 40 acres,

on the western slope of a low eroded hill and on the charted track to the Pieman Heads, several years ago, an opencutting was driven 60 feet S 7° W on a pyrite-galena lode in a well defined ore channel. A little above the bed of Barnett's Creek, which flows northerly through the present leases, and about 50 feet vertically below the opencut an adit was driven 110 feet S 65° E, through graphitic and gray slates and mineralised quartzites, and intersected the lode channel which was then driven on northerly 26 feet and southerly 40 feet. The lateral extremities of the lode were attained in the south drive which was idled in mineralised lode slates. The north drive disclosed no ore and was terminated in lode formation of poor tenor. A connection was made with the opencut, the proved ore was mined and the workings were then abandoned.

Records infer that a parcel of ore despatched to the smelters in 1909 assayed 62 per cent lead and 42 ozs silver per ton.

Barnett's Workings :-

Approximately 20 chains S 25° W from Quigley's workings and on the relatively steep western slope of a low hill line, adits were driven S 20° W on a lode system carrying a quartz-pyrite-galena ore in association with minerals siderite and sphalerite. Limited sinking, driving and stoping were done but little practical encouragement appeared to obtain for extended exploration of the zone of metallisation as the property was abandoned before merging into importance as a producer of silver-lead ore.

Records infer that the ore mined was graded to a marketable product assaying 60 per cent lead and 45 ozs silver per ton.

As far as could be seen, the wall rock is light sandstones and quartzites although slates occur in the locality.

About 10 chains further south, lode matter was exposed at the surface but nothing of consequence evolved.

Between Quigley's and Barnett's workings a limited amount of prospecting was done and at one place a shaft,

known as Kerslake's shaft, was sunk several feet on a nearly vertical pyrite-galena lode, the former mineral predominating. Apparently, results were not encouraging as the project was abandoned before merging into any importance. The shaft ends show highly pyritised lode matter and lode slate.

Superficial costeaning, surface probing and limited tunnelling were pursued at that period and subsequently, in the locality of the recent exposures, but results were not encouraging and the area was abandoned until the latter end of October, 1922, when two prospectors, named G. Clarke and T. Brown, directed attention thereto.

Indications of mineral oxidations influenced a penetration of the western wall of Quigley's opencut and resulted in the location of a branch pyrite-galena lode diverting westerly from a point of contact with the lode occurrence in the opencut. Surface silicifications influenced a southerly extension of prospecting, and following a series of short shallow trenches across the line of strike of the ore channel in Quigley's workings the capping of a pyrite-galena lode was exposed 125 feet S 8° W from the opencut and this has been appellated No: 1 lode. 43 feet W 5° N from a point 80 feet from the opencut, on the line of those exposures, an indicator of ferruginous cemented gravel was trenc<sup>h</sup>ed on and disclosed the capping of a galena-pyrite lode, known as No: 2 lode and striking somewhat parallel with No: 1 lode channel. The prospectors then co-operated with one named C. Blacklow and, pursuing superficial prospecting northerly, located extrusions of mineral oxidations from stratified quartzites which led to the exposure of a galena-pyrite lode 45 chains N 8° W from Quigley's workings. Thus, three lode systems were located; the branch lode at Quigley's workings and the No: 1 lode exposure being interrelated with the same ore channel.

On the crest of an eroded hill line and some distance S 60° W from Barnett's workings a quartz capping was cut down for about 4 feet and revealed galena somewhat sparsely disseminated in a siliceous gangue.

A little exploration southerly from the lode exposures on lease 8896 M encountered pyritised lode formation carrying occasional disseminations of galena.

--- Holdings ---

G. Clarke, T. Brown and C. Blacklow, the three prospectors, have acquired mineral leases covering some 120 acres on a north and south line and embracing Barnett's workings at the southern and Blacklow's lode exposure at the northern ends.

--- Geology ---

The locality is marked by sparsely timbered and open undulating country of an erosion hill system of low relief and flat alluvium mantled valleys traversed by a series of rivulets.

The area examined was necessarily limited but within that area igneous and a singular complexity of sedimentary rocks were encountered.

At the lower adit of Barnett's workings there is an intrusion of granitic porphyry, suggestive of the closing apophyses phase of consolidation of the plutonic magma. An absence of other exposures and conditions of inaccessibility at the workings restricted observations regarding the occurrence and influence of this intrusive, but such appeared to be striking west of north.

The sedimentaries embrace graphitic, blue and gray slates, silicified slates, quartzites, sandstones and an intermediate blue till.

The hillcrests are mantled with micaceous sandstones impregnated with quartz veins, and it is apparent that this aqueous rock once covered a greater area. An extensive shed of sand and quartz therefrom is indicative of intense operation of denuding agencies.

A few chains north easterly from Quigley's workings there is an occurrence of intermediate blue till which, from this point, extends north easterly to and beyond the granville tramway and north westerly to the low escarpment at Blacklow's

workings and thence to and beyond the No: 2 bridge of the same tramway.

The tills and micaceous sandstones and the weathered shed from these rocks and material repositied by other agencies, mantle the hill systems and valleys to such an extent, that, exclusive of exposures by mining and other operations, only sporadic croppings of the older sedimentaries are to be observed.

As far as the observations were extended, the micaceous sandstones appear to be a crustated aqueous rock more recent than the mineral bearing sedimentaries which, as is characteristic of Zeehan areas, comprise slates, crystalline sandstones and quartzites.

In the vicinity of Barnett's workings a fault zone appears to obtain. Interference with the sedimentaries is marked and, without inference of correlation, a lesser interference was observed at the northern locality of Quigley's workings.

Mineralised slates, quartzites and lode formation have been exposed northerly and southerly from the ore occurrences and establishes the persistence of the lode systems within a certain zone of mineralisation. A little sphalerite is associated with the galena-pyrite ore on lease 8912 M but siderite has not become conspicuous in association with the lode exposures on this lease or lease 8896 M. Pyrite is predominant and is suggestive of a northern extension of the zone of pyritisation within which occur the lode systems.

--- Lodes and Values ---

Certain facts leading up to the present ore exposures have been reviewed under "Historical", consequently a repetition thereof is being avoided.

Lease 8896 M :-

Interrelating the branch lode in the western wall of the opencut with the same lode system as that operated on in Quigley's workings and recently exposed 125 feet S 8° W from the opencut, present exposures indicate two ore channels, appellated for

the purpose of this report as Nos: 1 and 2 lode channels. Limited and irregular exposures render fixation of the true strike and dip a little difficult at present. There are indications of a slight northern convergence but for guidance, the lode channels may be cited as being roughly parallel at the locality of the exposures.

No: 1 lode channel:-

This lode channel strikes approximately N 9° E and dips easterly a few degrees from the vertical. The encasing country rock is graphitic and gray slates and stratified quartzites.

(a) Branch lode:-

Beyond penetrating and exposing this lode in the western wall of Quigley's opencut no material exploration of the lateral and depth persistence of the ore has been undertaken. 30 feet north from the point of contact with the opencut a little testing has disclosed pyritised lode matter and it is reasonable to assume that penetration will expose the lode here.

The lode at the exposure is 2 feet 7 inches wide and may be correctly termed a pyrite-galena-quartz lode. A zonal plane correlating with its strike and dip segregates the lode into 12 inches of highly pyritised ore on the western wall and 1 foot 7 inches of a siliceous galena-pyrite ore on the eastern wall. The galena ranges from finely crystalline to intermediate cubical and the pyrite passes through a like range of crystallisation with a light dissemination of chalcopryrite.

Assays:-

A sample cut across the face width (12") of the ore on the western wall assayed 24.4 per cent lead and 8.7 ozs silver per ton.

A sample cut across the face width of the remainder assayed 29.6 per cent lead and 17.4 ozs silver per ton.

Selected sulphides carrying pyrite and chalco-

pyrite assayed 55.6 per cent lead and 23.8 ozs silver per ton.

(b) Lode exposure 125 feet S 8° W from the opencut :-

At this place the lode capping has been exposed by trenching for a length of 12 feet. At the southern end the lode is contorted but there is ample evidence of some lateral extension of the lode beyond the trench ends. The lode width varies from 14 to 18 inches and the ore is somewhat banded in parallel with the strike of the lode. Three samples were taken at this exposure.

Assays :-

1. Southern end of trench: Lode width 18 inches. Ore banded from the eastern wall with 5 inches galena, 3 inches pyrite and 10 inches quartz carrying a light dissemination of mineral. Sample assayed 43.4 per cent lead and 28.5 ozs silver per ton.
2. Northern end of trench: Lode width 14 inches. Ore banded from the eastern wall with 6 inches galena, 3 inches pyrite, 2 inches galena and 3 inches quartz. Sample assayed 50.8 per cent lead and 71.2 ozs silver per ton.
3. Selected sulphides from this exposure assayed 70.8 per cent lead and 71.7 ozs silver per ton.

No: 2 lode channel :-

A costean for 33 feet along the ore channel has exposed a galena-pyrite lodē, with ample evidence of some lateral extension of the lode beyond the costean ends. The lode varies in width from 13 inches to 3 feet, strikes N 9 to 15° E and dips easterly at 3 degrees from the vertical. The exposed encasing rock is gray and graphitic slates and, although only exposed to a depth of 3 feet 9 inches, the ore channel appears to be well defined but it is a little premature to define the characteristics of this lode system.

The ore is irregularly banded, the planes being with the strike of the lode. The minerals comprise finely crystalline to intermediate cubical and laminated galena with light disseminations of pyrite and chalcopyrite in a siliceous channel filling.

Lode widths and assays :-

(a) At the northern end of the costean the lode channel is 2 feet 2 inches wide with 1 foot 4 inches of pyritised galena on the eastern wall and 10 inches of quartz on the western wall. A sample cut across the 1 foot 4 inches of pyritised galena assayed 59 per cent lead and 105 ozs silver per ton.

(b) 10 feet southerly from the first sample cut, a sample cut across the maximum lode width of 3 feet assayed 48.1 per cent lead and 80 ozs silver per ton.

(c) Selected sulphides of finely crystalline, cubical and laminated galena assayed 81.2 per cent lead and 107.9 ozs silver per ton.

Lease 8912 M :--

Blacklow's lode or "Big Ben" :

Situate at the foot of a modified micaceous sandstone escarpment and almost at the level of a valley flat, an opencutting has been driven for 9 feet on a lode channel approximating 4 feet in width and a little singular in its characteristics. Limited exploration made for limited observations but according to present exposures the ore channel is well defined, strikes N 33° E and dips 57.5 degrees from the S 57° E horizon. The upper portion of the exposure shows 6 to 9 inches of clean galena-pyrite sulphides resting on the footwall with galena seams interspersed through a quartzite channel filling. The lower portion of the exposure shows a singular stratification of the fissure filling, with bedding planes across the strike of the lode and dipping northerly at 44° degrees from the horizon. At the southern end of the

exposure the ore width was 1 foot 4 inches and this enlarged to about 3 feet within a length of 6 feet when the lode appeared to deviate to the footwall and converge to the width stated.

In consequence of the stratification, the sample cut was extended diagonally from wall to wall over the length of ore exposure and the sample assayed 62.8 per cent lead and 120.2 ozs silver per ton.

Selected sulphides of finely crystalline, cubical and laminated galena assayed 76.8 per cent lead and 127.8 ozs silver per ton.

A subsequent breaking of the ore exposure disclosed a partial replacement of the sulphides by dark slates a deviation of the lode to the footwall and an intercalation of seams of cubical galena along the planes of stratification of the slates.

The mineral sphalerite, as yet in small amount, is associated with this lode system.

The footwall country was not exposed sufficiently for extended observations but the lode is in contact with slates. The hangingwall encasing rock comprises gray and silicified slates and quartzites with graphitic slate on the planes of stratification adjacent to the ore channel and a seam of graphitic flucan on the fissure contact. The present exposure shows the casing rock to be roughly parallel with the strike of the lode.

Present indications are suggestive of a small footwall lode with intercalated seams of galena in the bedding planes of the remainder of the channel filling, but inconsistencies of ore deposition make for no certainty, and, characteristics remain to be disclosed by an extension of exploration beyond the present stage.

Evidence of mineralisation was encountered several chains S 33° W and about 150 feet N 33° E from this exposure and about 5 chains northerly pyritised lode slates have been exposed.

## --- Economics ---

Although contemporaneity of precipitation from magmatic solutions may be applicable to these lodes, the characteristics of the ore, channels, and encasing rocks make for a line of demarcation between the lode systems on leases 8896 M and 8912 M. Present reasoning inclines me to the opinion that the ore channel on the latter lease is not either of the channels on the former lease and that any lateral extension of the former channel southerly would be encountered westerly or north westerly from the latter channels. Conditionally that an uninterrupted continuity of the ore channels obtains, a north eastern convergence and a south western divergence would be expected.

Approaching from the south west along the line of lode systems operated on at Barnett's workings, the fault zone, already referred to as being at the locality of the plutonic magma apophyses, is attained and at this point the lode systems appear to be markedly interrupted. Although only limited exploration has been pursued on a 20 acre lease, adjoining the southern boundary of lease 8896 M on which is situate Quigley's workings and the eastern boundary of lease 8899 M on which is situate Barnett's workings, interruption planes have been encountered. One plane striking N 85° W and dipping northerly 82 degrees from the horizon contacts with but appears not to interrupt a well defined slate wall striking N 12° E and dipping E 12° S at 57 degrees from the horizon. In contact with the latter is a seam of pyrite and a small galena occurrence. Pyritised lode slates have been disclosed and the possibilities of systematic exploration revealing occurrences of silver-lead ore are not to be ignored.

Approaching from the south and extending northerly, it is reasonably apparent that the holdings and lode exposures are, with slight deviations, within a zone of pyritisation. Reasoning from this and from the extensive zones of mineralisation within the vale of the magmatic intrusions it would not be reasonable to limit possibilities of areas, from the west to the north east, to the present exposures.

Ore Persistence :-

Operations at Barnett's and Quigley's workings and at Kerlake's shaft would incite scepticism as to the persistence of ore but a careful examination of the two latter workings, coupled with a persistence of reasonably well defined ore channels in a zone of pyritisation, queries as to whether or not the zones of metallisation were systematically explored, and the recent discoveries respond in the negative. However, limited exploration and characteristics of ore occurrences make for reticence upon lateral and depth persistence of the lode exposures and such can only be determined with any degree of certainty by systematic lateral and depth exploration. Present horizons remaining constant, it is feared that the branch lode will not extend northerly beyond the tunnel nor persist below that level. Under like conditions of constancy it is possible that No: 2 lode will terminate at or southerly from the tunnel alignment. An expression of opinion beyond this would be purely unfounded conjecture and probabilities must pass to determination by lateral and depth exploration. The south drive in Quigley's workings has been extended to 54 feet and the end shows pyritised lode slates in a defined ore channel. An extension of this drive to No: 1 lode exposure with crosscutting to and driving on the No: 2 lode channel will determine possibilities. Except that Blacklow's lode occurs in a well defined channel favourable to a continuity of ore beyond the present exposure extended persistence can only be determined by depth and lateral exploration, the former being practically the initial desideratum.

Stage of operations :-

At present, operations have barely advanced beyond the discovery stage. As "Surface Shows" the prospects are sufficiently encouraging to warrant extended and systematic exploration. Until such exploration has been undertaken a reasonable and economic valuation of the discoveries cannot be made.

Mining :-

Low relief of the hill systems proffers limited opportunity for adit mining particularly in respect of Blacklow's lode. Given a depth persistence of ore, the most that could be expected of the Nos: 1 and 2 lodes by adit mining is approximately 50 feet of "backs". Even with a proved persistence of ore at Blacklow's workings, the possibilities for adit mining are limited to a small and already determinable margin, by a low and narrow projection of the modified escarpment. Proximity to the valley flats and stratification of the country rock are suggestive of necessity for a contention with water seepage.

## --- Transportation ---

Given a reasonable persistence of ore, transportation and accessibility offer no barriers, as, with short connecting links, the formation of which presents no complexities, the Granville tramway is conveniently situated to serve all requirements.

## --- Lode exposures and Prospecting ---

As already reviewed, the country is mantled with till, micaceous sandstones, gravel sheds and valley alluviums to an extent that the older mineralised sedimentaries are only sporadically exposed at the surface. This condition presents immediate barriers to the prospector and commands the application of systematic and often costly exploration.

Lode cappings are generally concealed or inconspicuous and systematic penetration through the mantle sediments and into the older sedimentaries is essential. A large amount of prospecting has been done over and beyond the present discoveries but an absence of system and failure to penetrate below the mantle sediments and into the older sedimentaries are unfortunately conspicuous. A contention is also held by many that the micaceous sandstones are correlated with the mineral bearing

sedimentaries and in consequence attention has been diverted from those areas. However, as far as my observations have been extended and in the absence of other data, I am unable to reason that this crustated aqueous rock has any influence upon or interrupts the possibilities of metallisation of lower and older sedimentaries.

Results show that with conditions as obtain at the locality under review, surface silicifications as "blows" or veins, -which are not to be confused with silicifications of the micaceous sandstones-, ferruginous cemented gravels, -locally appellated "bog iron"-, mineral oxidations, extrusive leachings from mineral oxidations and silica impregnated and mineralised slates and quartzites may indicate the proximity of lode systems or channels, although the ferruginous cementation may be of 'shift origin' and in consequence not an indicator.

Several matters could be dealt with to a greater extent but owing to the limited time at my disposal and to the fact that such are beyond the confines of this report observations were not extended to that extent.

Several mineral leases have been acquired in the locality of the holdings under review but nothing of consequence has been undertaken in connection therewith.

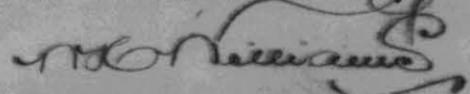
In conclusion I desire to record my appreciation of the assistance rendered me by the prospectors in sampling the varicus lode exposures and of the services of Mr:J.H.Levings in expediting the assays of the samples submitted him.

The sketch plant submitted is not intended to be accurately charted but is simply furnished as a guide to the sequence of matters reviewed.

I have the honor to be,

Sir,

Your obedient servant,

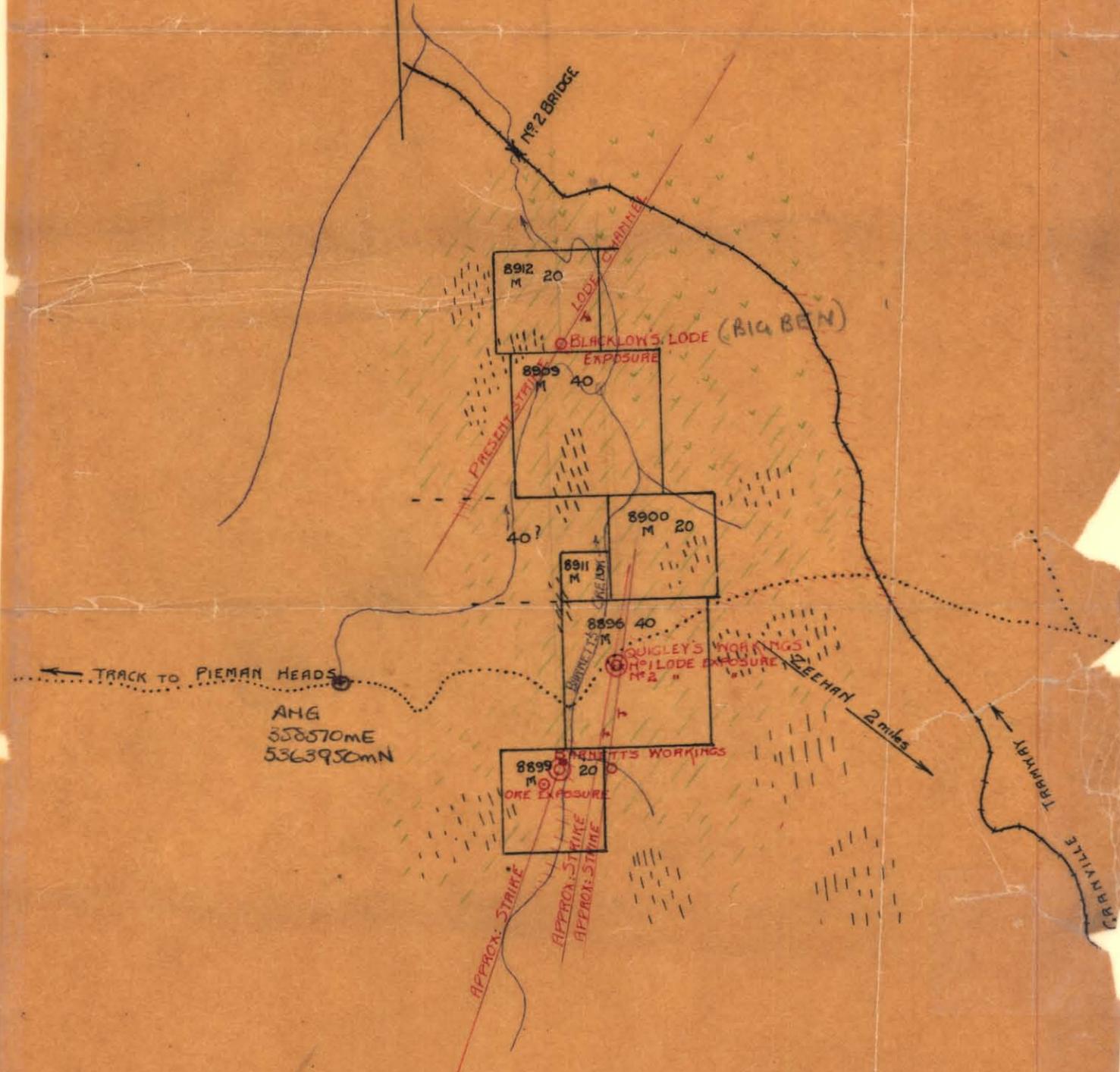


Inspector of Mines.

No:	Lode	Sample Description	Lead Per cent	Silver ozs.
0	Lease 8896 M :-- Branch lode Quigley's workings	Sample cut across 12 inches pyrite-galena ore on western wall	24.4	8.7
C	"	Sample cut across face of remaining 1' 7" of lode	29.6	17.4
6	"	Selected sulphides	55.6	23.8
1	Lode exposure 125' S 8 W from Quigley's opencut	Southern end of trench Lode width 18 inches	43.4	28.5
2	"	Northern end of trench. Lode width 14 inches.	50.8	71.2
7		Selected sulphides	70.8	71.7
A	No: 2 Lode exposure	Northern end of costean Lode width 2' 2". Ore width 1' 4" across which sample was cut	59.0	105.0
B	"	Southern end of and 10' from first sample cut. Lode width 3 feet.	48.1	80.0
8		Selected sulphides	81.2	107.9
3-4	Lease 8912 M :-- Blacklow's lode or "Big Ben"	Sample cut diagonally across banded ore, from wall to wall.	62.8	120.2
5		Selected sulphides	76.8	127.8

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