PRELIMINARY REPORT

on

THE NORTH ZEEHAN MINING AREA

Introduction:

Mining activity began in this area three years ago following the discovery of a rich vein of argentiferous galena in the bed of a creek by G. Clarke. Although this area lies contiguous to Zeehan field and may be regarded as the Northern extension thereof, it still remains in the earliest stage of development. The reason of its long neglect is not difficult of explanation. It is not because this strip of country has not received attention that discovery has been so late - prospectors in the early stages of Zeehan spread into the surrounding country and searched every hill and dale for outcrops of silver lead ore with a thoroughness that has never since been equalled it is because the cappings here are quartz and not limonite and the greater part of the containing rocks is deeply covered with peaty soil. The early prospectors, expecting to find the conditions here similar to those of Zeehan, failed in their search and the discoveries were left to a later generation.

This area had not been carefully investigated heretofore by the Geological Survey. Officers of the Department had passed through the country and had recorded the observations made en route, but no actual investigation had been performed.

This report embodies the result of a ten days examination only. Although the work is as yet incomplete, it is considered that the results obtained will prove of assistance to the interested parties.

Exploration:

Shortly after the discovery of lead and silver ores at Zeehan, this area and that north of it to Pieman River was pegged and leased from the Crown by speculators. Prospectors were sent to explore the country, but no important discovery was made by them, nor by those who came later, until H. Quigley and one Barnett in 1908 unearthed galena in the banks of Barnett Creek. Prospecting on the course of the lodes was not productive of very good results. In 1901 G. Clarke and others resumed the search and were rewarded by the discovery of Big Ben Lode. Since, many other lodes have been laid bare, some of which are likely to develop into important sources of galena and sphalerite. The development of the lodes of this area is due largely to the work of Clarke and his partner Blacklow.

A good deal of exploratory work remains to be performed between this area and Pieman River.

The rock formations of the area, hidden beneath a thick covering of peaty soil and button-rush have been revealed at few points. Creeks have laid bare the rocks in the bottoms of the valleys, and artificial openings expose them at widely separated points on the hills.

Over a considerable portion mudstone conglomerate of Permo-Carboniferous age effectively hides them from view. Under the conditions exploration is both difficult and costly.

Situation and Access:

The North Zeehan area, as its name implies, lies to the north of that field and is contiguous thereto. It is about four miles from Zeehan Post-Offices and is connected by a two foot gauge tramway with the Western Railway system.

Physiography:

The North Zeehan area is one of gently moulded hills and dales covered with button-rush and native grasses. On the banks of the many streams which have minutely dissected the country are occasional clumps of Eucalyptus and other trees suitable for mining purposes. The streams are replenished at frequent intervals by heavy rains and their normal supplies are assured by drainage from the peaty soils which have the power of arresting the flow of a large portion of the rain-water. The streams flow in a northerly direction and empty into major tributaries of Pieman River. Elevations vary from 600 to 950 feet above sea level.

Topography in Relation to Mining:

The topography is such that many of the ore bodies can be explored at shallow depth (50 to 100 feet) through adit openings. All work of a permanent character, however, is performed through shafts necessitating the use of pumping machinery to keep the mines unwatered during mining operations.

The Rock Formations:

Rocks of three systems are represented in the area, namely:-

1) Ordovician sandstones and slates.

2) Devonian quartz porphyry, and

3) Permo-Carboniferous mudstone conglomerate and sandstone.

1) The Sandstone and slates ascribed to the Ordovician belong to the Zeehan series which directly succeed the slates, tuffs and spilite lavas of the Dundas series so well represented in the adjoining area to the south and east. These consist of white sandstones, pale grey slates, and occasional bands of black slate. In some parts the slates are very closely laminated. Both sandstones and slates are thinly bedded (6 to 40 feet thick) but the formation as a whole is of great thickness.

2) A narrow dyke of granite porphyry projects through the slates and sandstones on the north side bank of Barnett Creek where it passes through section 9208/M. This is the only known outcrop in the area, but similar bodies project here and there in Zeehan district. They

are considered to have been derived from the same magma that produce the granite of Heemskirk Range, and doubtless are connected to that body. The unaltered rock is a grey coloured porphyry consisting of quartz phenocrysts in a very fine groundmass largely of altered felspars.

3) Mudstone conglomerate, presumably of Permo-Carboniferous age, and forming the base of that system here, rests on the upturned edges of the Zeehan series of slates and sandstones. A remnant of the next succeeding member (sandstone) of this formation may be seen on Section 9349/M. The materials of which the mudstone is composed are sub-angular to water worn pebbles of sandstone, slate and quartz with occasional pieces of granite, the whole set in a matrix of dark grey indurated mud of like materials. Rounded pebbles, two inches in diameter form the bulk of the rock, but boulders up to eight inches in diameter are found. The greatest observed thickness of this formation is 40 feet. It occupies old valley in the ordovician rocks conforming closely to those existent today, and extends northward to Pieman River. This formation has protected from erosion the ore bodies exposed in Permo-Carboniferous time.

Structural Geology:

The Ordovician Strata (slates and sandstones) trend in a general north-westerly direction and dip at high angles to the north-east. There are exceptions to the rule but these are of minor significance. In some parts in section 8896/M and 8945/M for instance, the slate member is compressed into very sharp horizontal folds caused by thrust from a westerly direction.

The known ore-bodies, it will be noticed, are disposed in three groups along major lines of fracture. They trend east of north almost at right angles to the strike of the strata and dip in a south easterly direction. One, on section 9349/M however, is contrary to this, coursing a little west of north. These lines of fracture, which are more pronounced crossing sandstones than slates, may be traced through the area from the south to the north end. Sandstones withstand shock and fracture irregularly; slates are plastic and incompetent rocks. In consequence the veinlets of galena are more irregular but more abundant in sandstone than in slate. They cement the fractured sandstone. North-west faults give an easterly flow to the vein fissures.

The Ore-Bodies:

Unlike the ore-bodies of Zeehan field, which are in almost all cases capped with limonite or gossan the cappings of the ore veins here are generally of quartz, pyrite, or siderite. In the flat country the only indication at surface is iron-stained quartz rubble; in the higher ground quartz veinlets in sandstone and iron oxide stains on the joint faces of the rock mark the cappings of veins. At a few places blebs of galena sphalerite and chalcopyrite appear at surface; at others their oxidation products maybe detected by careful scrutiny. Gossan cappings are not unknown. Several unopened "blows" have been located in the northern part of the area.

The ore-bodies are of two types distinguishable by their gangue, pyrite in one case, siderite in the other.

Pyrite-sphalerite-galena veins in which pyrite

predominates and galena is subordinate to sphalerite are closely associated with intrusions of quartz porphyry. It is remarkable that the silver content of the ore of this class is not high. A little chalcopyrite and antimonial lead ore, with occasional veinlets and blebs of siderite, with also a little quartz, are found as accessory components.

Siderite-galena-sphalerite veins in which the minerals occur in that order of abundance, are the more important. The galena component is characterised by its high content of silver in this type of ore vein. Argentiferous antimonial ore and chalcopyrite are very common associates. The gangue minerals are quartz and siderite in varying proportions in the several veins and at many points of the one vein. Sphalerite and pyrite are both present and likewise vary in bulk from point to point. The silver content of the several minerals constituting the ore of Big Ben vein is reported by the operators as follows:-

Galena contains	80 to 180	ounces per ton.
Tetrahedrite contains	292 to 487	ounces per ton.
Chalcopyrite "	72	" " "
Siderite "	17	" " "

Erosion of the Ore-Bodies

It may be affirmed that the depostion of the ores of these veins synchronised with the intrusion of the granitic magma from which they were derived. That erosion commenced during the Devonian period is proved by the discovery of granite pebbles in the succeeding Permo-Carboniferous mudstone conglomerates which yet occupy a large portion of the area. However, prior to the Permo-Carboniferous sedimentation erosion had been continuous a long time to cause the removal of the granite cover. Doubtless the formation containing the ore-bodies was reduced in level in equal proportion but probably the upper part was comparatively poor. Since that time the effects of the agents of erosions have not been great as the Permo-Carboniferous rocks formed a protective cover to the older rocks. Although greatly reduced they occupy a large area.

It is a striking fact that the cappings of all these veins is largely quartz, which probably formed the bulk of the upper part of the Zeehan veins also, a rock most resistent to erosion. All the hills are covered with a mantle of quartz detritus shed from the veins.

From the foregoing it will be seen that the metal-bearing parts have not suffered intense and continuous erosion, but are as much as they were at the time of their formation.

The Mining Properties

Lease 9208/M, 20 acres, Barnett Vein:-

Pieces of galena were found when washing the creek gravel many years ago and their source was discovered in the bed of the creek by one Barnett. He cut an adit in a south westerly direction 60 feet, from which £120 worth of ore was taken. After his death the Zeehan-Montana continued the work of exploration but with disappointing results. The adit which opens at a dyke of quartz porphyry was continued to 200 feet where the vein is marked by a

narrow band of pyrite. The ore exposed here is found in very short lenses (4 to 10 feet in length) and is very irregular.

From this level a shaft was sunk 37 feet, where the lode consists of solid pyrite.

An upper adit (30 feet above the lower) did not reveal ore in profitable proportion, and in the end showed irregular veinlets of pyrite, sphalerite, and a little galena.

First grade ore from these workings contained lead 60 per cent, and silver in the proportion of 45 ounces per ton.

This vein has been opened, at a point known as the Big Blow 700 feet south westward and 100 feet higher. In a trench 5 feet deep is exposed a body of ore three feet wide consisting largely of quartz, a little galena, sphalerite, tetrahedrite and pyrite. The sandstone wallrock is also flecked with these minerals. Some large boulders of galena have been taken from this hole. The vein fracture is marked near the south west corner of the section by an outcrop of ironstained quartz.

The section of this vein explored at adit level has not proved of considerable value. The ore is patchy, varies greatly in its metal content, and is not wider than three feet at any point. Other sections on this long new fracture may prove of greater value, especially in the southward extension thereof.

Four other veins marked in the accompanying plan are worthy of attention. One only has been explored. All are capped with quartz.

Section 8896/M. 40 acres (Lessees T. Brown and G. Clarke) Barnett Vein:-

Galena was discovered on the side of a track passing through the property by H. Quigley in 1908, and the lode was subsequently opened by him in two short adits and a long trench. Quigley drove alongside the richest shoot of ore which was discovered by T. Brown and G. Clarke.

Three distinct veins are exposed on this property of which Barnett's is the most important. It is cut in the bed of a tributary creek at the Southern boundary and again at many points near the centre of the section. At the northern end of the workings ore has been stoped to 120 feet in length by 25 feet in depth. That shoot courses 5 degrees but the next southward courses 21 degrees. A shaft 40 feet deep is at the end of north shoot. A shaft 20 feet deep, holes and trenches expose the southern shoot 100 feet in length. This is dominantly pyritic, but contains slugs, blebs and veinlets of galena, and sphalerite and cellular quartz. It is 2 to 3 feet wide between its extremities.

This vein has been explored at greater depth through an adit driven from a point on the north side of the track a few feet above creek level. A south-easterly crosscut intersected the vein at 112 feet where a little ore was taken from stopes 30 feet in length.

A drive 25 feet north and 150 feet south did not disclose another rich shoot. At the end of the south drive the lode is 18 inches wide, and consists almost wholly of quartz. Here a branch vein of quartz coursing S 77 degrees E. and dipping east of north, junctions with the main body. The footwall of the lode is sharply defined and slickenslided. It emits a hollow sound when struck with a hammer. A crosscut into the footwall may reveal a parallel body.

Fifty feet west of Barnett Vein is another body exposed in a hollow shaft and a long (40 feet) open stope. In the south end of the stope a 2 inch vein of galena is shown.

It is reported that from these several workings over 100 tons of high grade argentiferous galena has been produced. The ore shoots on this section are much longer and more regular than those developed in Section 9208/M.

Production - T. Brown and Party:

Lot	Tons Net %	Lead %	Silver ozs. per ton	Value net
1	10.0	71.3	87.0	£227. 0. 0
2	6.23	73.6	82.35	169 2 10
3	8.56	69.6	77.5	215 12 6
4	9.61	68.1	93.5	282 1 8
5	7.18	68.3	86.3	199 17 3
6	6.4	35.35	29.25	66 9 5
7	1.93	46.45	42.2	31 18 3

Section 8209/M. 20 acres:

A low level adit was driven by one Wells many years ago to intersect the northward continuation of Barnett Vein, but not with any good result. This adit was driven through 100 feet of mudstone conglomerate and 20 feet into slate. In the end are small veins of quartz and iron carbonate (siderite) with occasional blebs of galena and sphalerite and pyrite. No defined ore channel is noticeable.

About 5 chains south of this opening is an unopened quartz outcrop which apparently marks a point on the line of the lode.

Section 8911/M. 40 acres. (Lessee G. Clarke):

This section is almost wholly occupied by mudstone conglomerate, which completely obscures the metal-bearing rocks. Ore bodies are not known on this property.

Section 8948/M. 5 acres:

On the bank of a small stream passing close to the south west corner an open cut has exposed pyrite bearing sandstones. A few blebs of galena and sphalerite were noticed. Five chains northward a long trench failed to reveal the vein, but towards the north west corner of the section two shallow pits expose the lode, which there contains a little galena, sphalerite (blende) and chalcopyrite. Two chains westward is a large outcrop of limonite on mudstone conglomerate. Probably the limonite emanated from an ore body underneath the mudstone which here is a few feet thick only.

Section 8947/M, 40 acres:

The lode is again exposed at the point of junction between the slates and mudstone conglomerate towards the eastern boundary of this section. It is marked at surface by a large body of limonite. The removal of that cover exposed a quartz lode containing galena and sphalerite. Many years ago the May Queen Syndicate under the leadership of one J. O'Neil commenced the sinking of a large shaft to explore the vein at depth. Work ceased at 10 feet.

As this section is wholly occupied by mudstone conglomerate surface exploration is not possible.

P. Jones - Prospect;

Near the north east corner of lease 8947/M on the left bank of a small creek P. Jones and party sank a shaft 35 feet on a 3 foot lode consisting of galena, chalcopyrite quartz, siderite and sphalerite. The sandstone in which these minerals are contained is minutely fractured as marked by the numerous veinlets of the metallic minerals. The valuable minerals are in comparatively small proportion.

Two more veins are exposed in a trench five chains north eastward. They have not been explored.

The foregoing constitute the eastern group of fissure veins of which that known as Barnett's is the main one and typical of its class. They are of the pyrite-galena type in which siderite is subordinate to pyrite.

Section 8912/M, 20 acres - Big Ben Lode

This is the most important ore body thus far developed in the area. It is not only the longest and widest, but it is the richest. The discovery of galena, near the Southern boundary was made by Clarke and Blacklow four years ago. At that point a shaft has been sunk to 50 feet on the dip (50 degrees) of the vein and a drive bearing 29 degrees has been cut to 66 feet. At the end of the drive the vein material consists of galena and quartz 10 inches wide, with clean quartz on the hanging wall and numbrous veinlets of quartz at right angles to the dip dissecting the foot wall-rock. Siderite and galena veinlets also penetrate the footwall rock. The vein has been stoped to surface 43 feet in length south of the shaft the drive has been cut to 18 feet where the vein is interrupted by one of the numerous faults that intersect the country here. These faults have a north westerly course and throw the strata and veins about 100 feet eastward.

At the end of the south drive the vein is marked by a narrow streak of galena. About 150 feet north eastward the ore body is exposed again in Hanlon Adit. It is here not confined to one narrow vein but is made up of many veinlets cementing the broken sandstone and permeating it over a width of 16 feet. Two trenches, 60 and 70 feet, north of Hanlon adit expose the ore body again. Beyond that point it is hidden under cover of mudstone conglomerate.

The metallic minerals of this vein are galena, sphalerite, tetrahedrite, pyrite, and chalcopyrite in that order of quantative importance, the whole set in a matrix of quartz and siderite. All of the metallic minerals are richly argentiferous, expecially tetrahedrite and galena. It is remarkable that the metallic minerals are not intimately associated but are dissociated in blebs and bunches allowing of easy separation by mechanical means.

The following table of production conveys an idea of the content and value of the selected ore:-

Lot	Tons Net	Lead %	Silver ozs. per ton	Value Net		
1	6.42	39.95	68.0			
2	10.48	66.8	129.1			
3	11.18	68.95	102.2			
4	6.85	52.2	73.15	£674	10	8
5	5.83	68.57	118.97	153	0	1
6	6.71	45.5	65.47	88	2	8
7	10.95	69.87	120.5	324	2	1
8	10.03	47.0	74.17	164	12	5
9	4.77	72.6	112.45	152	19	2
10	4.85	50.95	67.0	90	4	0
11	5.30	43.2	46.0	66	9	6
12	7.68	61.9	81.5	213	13	8
13	2.05	69.85	89.05	58	18	2
14	9.18	47.75	57.95	158	16	11
15	6.68	73.1	11.05	216	15	10
16	6.05	67.15	111.0	173	5	3
17	6.51	52.8	71.6	141	1	0
18	4.65	74.47	116.85	164	5	5
19	5.26	75.8	148.6	210	12	10
20	8.23	56.65	83.95	202	7	9
21	5.80	60.0	71.85			
22	7.35	44.95	64.0			
23	2.32	72.65	127.8			

The dumps at the mine are estimated to hold over 300 tons of second grade ore containing 10 to 12 per cent. lead, 15 per cent zinc, and 20 ozs. silver per ton. Ore of this class is marketable at the Electrolytic Zinc Company's Works at Zeehan.

No other vein has been opened on this property. About 7 chains north west of main shaft is a trench cut in black slate where a little galena and sphalerite are showing. This, however, appears to be on the line of another fault.

Lease 8909/M. 40 acres

Two outcrops of quartz in sandstone, one the displaced portion of Big Ben vein, stand out prominently on the hill ridge at the northern boundary of this section. They have been traced 10 chains southward and have been opened at points to a depth of 3 feet. These veins at surface consist almost wholly of quartz with which is associated limonite and a little siderite and splashes of galena, chalcopyrite, pyrite and sphalerite.

Between them and the eastern lode the sandstone rock has been cut into at many points exposing limonite and chalcopyrite on the joint faces. It is probable that this mineralisation indicates the near presence of another ore body not outcropping.

Eastern vein is exposed in a trench on the south bank of Big Ben Creek near its point of confluence with Barnett Creek. The sandstone rock in which it is contained is veined with quartz, limonite and a little

chalcopyrite. It has been traced southward ten chains where it is marked by limonite and quartz. This body has not been explored. Not one of the ore-bodies on this property has been explored at depth. This can be performed by sinking only either by shaft or by hole.

Section 8949/M. 20 acres - Lessee C. R. Bowling

This property occupies the high ridge west and adjoining Section 8912/M. Two quartz outcrops are known, but neither has been opened. The continuation of the north west vein in the flat country beyond the northern boundary is marked by limonite. At two points splashes of galena have been noticed in the mineralised sandstone underneath the limonite. Both veins are worthy of attention.

Section 8944/M. 20 acres - Lessee G. V. Williams

This lies south of 8949/M. The first work performed on this property was near the south west corner. A short adit and long trenches were cut across the strata in the hope of disclosing any hidden bodies of ore. There is no indication at surface that veins underlie this part of the property. Towards the centre of the section at the foot of the hill a small outcrop of limonite was discovered by G. Clarke. This removed, brought to light a small body of mineralised sandstone in which galena and sphalerite are discernible.

Lease 8940/M. 40 acres

This section is occupied almost wholly by Permo-Carboniferous mudstone conglomerate.

In the bed of Big Ben Creek at the western boundary the joints in sandstone are much stained with limonite. Any other ore bodies are hidden beneath the covering of the younger Permo-Carboniferous rocks.

The foregoing comprise the middle group of the ore veins of which that known as Big Ben is the only one explored at depth. Surface outcrops are of quartz which lies above the sulphite zone.

Lease 9349/M. 20 acres - Lessees A. D. Sligh & M. Cronly

Surface exploration has revealed the presence of several ore-bodies on this property. Three are exposed on the bank of a creek near the northern boundary, the fourth near the centre of the property.

The outcrop of west lode is 5 feet in width and consists largely of pyrite with some galena and sphalerite in a matrix of quartz. These minerals fill fractures in sandstone. An attempt made to cut this body northward failed because of the cover of Permo-Carboniferous sandstone and mudstone conglomerate.

Middle lode is also prominent at the outcrop and is similar in every detail to west lode.

East lode is a large irregular body of quartz in sandstone, with sphalerite and pyrite as accessory minerals. This is exposed in one spot only.

There are indications of yet another body farther eastward. South lode is the only one known in the area having a north westerly trend where exposed on the bank of Clarke Creek its course is 9 degrees west of north. It there fissures sandstone and black slate at an angle of 60 degrees to their strike. The ore consists largely of galena, coarse and fine in grain in different parts. Quartz, pyrite, sphalerite, and chalcopyrite are also present. These ores are more prominent in the shattered sandstone than in the slate. Veinlets of galena one to two inches wide contain lead 85 per cent and silver in the proportion of 65 ozs. per ton. A long trench exposes the ore to advantage where the fissure is 6 to 18 inches wide. The southern continuation of this lode is marked by an outcrop of limonite at the southern boundary of the section. Farther westward is a large outcrop of limonite exposed in a trench. The work has not penetrated the base of the capping.

Lease 9348/M, 20 acres - Lessees A. D. Sligh & M. Cronley

No exploratory work has been performed on this property. Crossing the southern boundary is a body of quartz which may prove to be the capping of a sulphite lode.

Lease 9340/M, 20 acres - Lessees J. A. Duff & G. Clarke

Development on this section has revealed three ore-bodies and the indication of a fourth. "A" lode opened on the bank of a tributary of Clarke Creek in a shaft 15 feet deep is one of the most promising of the recent finds in the area. The little work that has been performed has been productive of encouraging results. At the time of visit, the shaft was full of water and the ore body at that point could not be examined. However, it is reported to be three feet in width, flat in underlay, and contained in argillaceous sandstone. The ore in the bin and on the dump clearly indicates the nature. Galena of bright lustre containing a high proportion of lead and silver, is the dominant metallic mineral. Amber coloured sphalerite and chalcopyrite are also prominent components of the mixed ores. Quartz is abundant, but siderite is conspicuous by its absence. The galena occurs in bands of up to two inches thick filling fractures in the sandstone. Sphalerite is dissociated and more prominent on the hanging-wall. The several mineral components are contemporaneous, yet, except for occasional blebs of sphalerite and chalcopyrite in the galena, each is in separate bunches and bands. In places, later, quartz is deposited around the metallic minerals.

"B" lode is similar to "A" but quartz and pyrite predominate. Galena is a one inch vein in the middle of the lode. Coarse pyrite and black sphalerite in cellular quartz fill the interstices of brecciated sandstone. This ore body has not been opened.

"C" lode consisting of a large body of quartz and limonite with blebs, is exposed in the bed of a creek. It has not been explored.

Between "A" and "B" lodes a quartz vein

carrying chalcopyrite has been cut in a shallow trench. These ore bodies, like those already described, can be developed by shaft only.

Lease 9351/M, 20 acres - Lessees A. V. Duff & G. Clarke

Four lines of lode are known to outcrop at surface, one of which has received the attention of the prospectors. This last remark refers to a 5 foot formation opened in a long trench out in the bed of a small creek. Here quartz, pyrite, sphalerite, and galena vein the shattered sandstone and are in that order of abundance. Two other bodies south of this are in echelon arrangement and possibly represent the first lode in faulted positions. No other improvements have been made to these bodies. Two outcrops of limonite appear in the bed of another stream near the north east corner and probably indicate the presence of another body. Towards the north west corner are three outcrops of limonite still undisturbed.

Section 9342/M, 40 acres - Lessees V. A. Duff & G. Clarke

On this property a lode formation is marked in the bed of a creek by quartz and limonite veins in sandstone, with also occasional blebs of galena and sphalerite. An adit crosscut (50 feet) in sharply folded and contorted slates intersects the ore channel which is here poor and ill defined, consisting of veinlets of quartz, pyrite and a very little galena and sphalerite. As there is no defined fissure here, the prospects of improvements as development proceeds is not at all encouraging.

Summary:

In this area are several parallel ore bodies as yet in the earliest stage of development. The few to which improvements have been made are fairly productive and the results give credence to the idea that they will develop into profitable mines. However, in order to minimise the risk always attendant to mining in its early development, it is necessary to further explore them at depth before deciding upon a working plan.

The outstanding feature of the ores is their high content of silver and consequently their relatively high value. The ore shoots are short and irregular, but the vein fissures although not wide are very extensive. The fissures are interrupted at long intervals by north west faults which give an easterly throw of 60 to 100 feet; but these have no marked bearing upon the formation of the ore bodies. As herein-before remarked, the veins occur in three groups with one main fissure to each group. The other attendant fissures may prove to be branches of the main fissure in each case, in which event the veins at depth may prove of greater width and the ore footage of greater tonnage value. At surface their definiteness is not clearly marked as the fracturing of the containing rock is very irregular where it is sandstone and very narrow where it is slate.

The effects of oxidation is slight, because erosion has been rapid, although it has not been continuous over many periods. Here the outcrops are largely of quartz which lies above the sulphite zone.

The ore bodies then have not been reduced by agents of erosion to the extent of those of Zeehan. For that reason they are not as attractive to the eye, but they are nevertheless, worthy of careful investigation.

A. McIntosh Reid.
GOVERNMENT GEOLOGIST.

26th January, 1926.