REPORT ON THE MT. FARRELL MINING DISTRICT.

Zeehan, 14th April, 1904.

SIR,

ACTING on your instructions, I left Zeehan on the 7th of March last, to examine and report upon the Mt. Farrell Mining District. Owing to my approaching retirement from the position of Geological Surveyor, I had to shorten my visit considerably, and, in consequence, this report will not be as full or as complete as the importance of the district warrants.

General Geology.

The Mt. Farrell District is situated within a remarkable belt of highly-altered igneous and sedimentary rocks, which appear to extend in an unbroken line from the south end of Mt. Darwin northwards along the main axis of the West Coast Range. The igneous rocks include syenites, syenite porphyries, keratophyres, felsites, quartz porphyries, and granites. These rocks appear to belong to one great family, and pass over into one another by gradual transitions. The porphyritic structure predominates in the rocks of the series, and is present in all members, except the holocrystalline granites and syenites, to a greater or less extent. Another strong characteristic is a certain schistose structure, which in many cases is so highly developed as to completely hide the true character of the rock. I have examined a great number of the so-called schists in the Mt. Read, Rosebery, Red Hills, and Middlesex districts, and in almost every instance I found that the igneous character of the rock was masked by the schistose structure. Still, some of the schists do certainly appear to be of sedimentary origin, and pass over into slates and argillites, and it is often impossible to tell without microscopic examination whether a given rock is of sedimentary or of igneous origin. I propose the term "porphyroid" as a provisional group name for the schistose rocks of this series. The name was originally applied to certain schistose porphyries in Europe, which were subsequently shown to be peculiarly rich

in soda, and were termed "keratophyres." Messrs. Twelvetrees and Petterd* have shown that some of our schistose porphyries at Mt. Read and Rosebery are true keratophyres; the series, therefore, would seem to bear some resemblance to the old "porphyroids," and until they have been exhaustively studied, I do not think we can do better than adopt the old name.

The origin of these "porphyroids" must remain an open question for the present. I, at least, have arrived at no conclusion as to their origin. They often appear to run in bands parallel to the schist planes, and may be interbedded with the sedimentary rocks. In some cases they are undoubtedly intrusive. Other bands are strongly suggestive of a tuffaceous origin.

The schistose character of these rocks points to their being of earlier date than the tourmaline and tin-bearing granites of the West Coast, which are known to be of late Upper Silurian or Devonian age. The porphyroids and associated granites and syenites are probably other than the Upper Silurian, because they have never been found in Upper Silurian rocks. They occur, however, in the form of quartz-felspar-porphyry dykes, often more or less schistose, in the Lower Silurian slates and grits at North Dundas and at the King River, near Queenstown. Their age, therefore, is probably Lower or Middle Silurian.

It is well known that the West Coast Range is capped by a massive layer of red conglomerates. These conglomerates have been the subject of considerable discussion as to what geological period they are to be referred. Up to the present they have usually been regarded as belonging to the Devonian period, *i.e.*, of later age than the Upper Silurian rocks of Zeehan and elsewhere, and younger than the tourmaline and tin-bearing granite, which is believed to be contemporaneous with, or perhaps somewhat later than, the great upheaval of the Upper Silurian sediments. Most of the ore-deposits on the West Coast are believed to be connected with, and of approximately the same age as the granite, and therefore it is of considerable economic importance to decide definitely whether any great series of strata, such as these conglomerates, is older or younger than the granite. If they are younger, then it is highly unlikely that they should be found to contain ore-deposits of value. If, on the other hand, they are older, they stand on an equal footing with any other rock (not specially known to be

* Felsites and Associated Rocks of Mt. Read and vicinity. Pro. Roy. Soc. Tas. 1898-9, pp. 33-46.

favourable to mineral deposition) which is older than the granite. On this question, therefore, depends whether these conglomerates should or should not be prospected for metalliferous deposits.

I have said that, up to the present, these red conglomerates have usually been taken for Devonian. The evidence on which this supposition is based is chiefly as follows:—

1. The red conglomerates are known to overlie the schists and porphyroids unconformably. (It has often been assumed that the schists were Upper Silurian. If this is granted, it follows that the conglomerates are Devonian, or younger.)
2. The red conglomerates are often nearly horizontally bedded, as is the case at Red Hills and elsewhere. They are, however, very much more disturbed than the Permo-Carboniferous rocks, and this would appear to lend force to the argument that they occupy an intermediate position between the highly-folded Upper Silurian rocks on the one hand, and the horizontally-bedded undisturbed Permo-Carboniferous beds on the other.
3. Up to the present, granite has not been discovered occurring intrusive in the conglomerates. This is negative evidence in favour of the theory that the conglomerates are younger than the granite. It has also been assumed (without sufficient grounds, as I think) that the quartz-veins, which occur abundantly in the rocks of Upper and Lower Silurian age, do not pass up into the conglomerates. These quartz-veins are believed to be connected with the granite eruption, and their absence from the conglomerates would be even stronger evidence of their later age than the absence of granitic dykes. The absence of ore-deposits from the rocks of this series would also constitute evidence of a similar character.

If we accept these arguments as determining the age of the conglomerate capping of the hills as Devonian, it is necessary to assume that there are also in the same districts similar conglomerates of an older date. At Mt. Lyell, for example, the principal ore-deposits are situated along a line of faulting which separates the schists from a hard, red conglomerate and sandstone formation; and since the latter has been mineralised to a considerable extent along the line of contact, it is evident that it, at any rate, must be older than the period of ore deposition (Devonian, or older).

I am, personally, strongly of opinion that the red conglomerates all belong to one formation, and that they are to be referred to the base of the Upper Silurian period. My recent examination of the Zeehan District has shown that the red conglomerates of Zeehan form a huge anticline, and that on these are resting conformably the fossiliferous strata of the Upper Silurian period. Here, at least, it appears certain that we have the base of the system represented by massive beds of conglomerate. Now, the conglomerates of the West Coast Range differ in no essential respect from these conglomerates of Mt. Zeehan. Of itself, this is, of course, not saying much, as conglomerates may be formed at very different periods, and yet have essentially the same characteristics. Still, the fact that we know that there are conglomerates at the base of the Upper Silurian, proving that there was a break, and probably upheaval of strata, between the Lower and Upper Silurian periods, prepares us to expect these same conglomerates to be found overlying the rocks of Lower Silurian age wherever conditions have been favourable for their preservation. It will therefore be worth while to criticise the evidence on which the theory of the Devonian age of the conglomerates is based, to see if they may not be referable to the same period as that of the Zeehan conglomerates.

1. The conglomerates of the West Coast Range are acknowledged to overlie the schists and porphyroids unconformably. If, then, the latter are Upper Silurian, it is plain the conglomerates cannot belong to the base of that system. They must be of younger age. I believe there is no evidence that the schist belt is of Upper Silurian age. On the contrary, the extraordinary amount of alteration they have undergone, so much greater than that of any rocks which form definite palæontological evidence we know to be Upper Silurian, would of itself suggest an earlier period. In the Mt. Read District, I believe, it can be shown that the schists lie conformably against the claystones and slates of the North Dundas District; the latter are probably Lower Silurian, and are certainly quite distinct, lithologically, from the Upper Silurian sediments. The Mt. Lyell Railway cuts through a thick section of these presumably Lower Silurian slates and claystones, and here also I think it will be shown that the schist belt lies conformably against these, though as to which overlies which, I

cannot venture on an opinion. It seems, then, highly probable that the schists and porphyroids are older than the Upper Silurian, and hence *may* be overlaid by Upper Silurian sediments.

2. "The red conglomerates are often nearly horizontally bedded." I believe there is a very slender basis of fact in support of this argument. After examining (somewhat superficially, I must admit) the conglomerate capping of all the hills from Mt. Darwin northwards to Mt. Farrell, I can only say that I can only recall one or two cases in which the bedding-planes of the conglomerates even approach horizontally. They usually form a series of anticlinal and synclinal folds, and are often very much faulted. I believe that where the conglomerates are horizontally bedded, they will be found to form the apex of large anticlinal or synclinal folds.

3. "Up to the present, granite, quartz-veins, and ore-deposits generally, have not been found in the conglomerates." It is true that granite has not been found intrusive in the conglomerates, but this is not a strong argument in favour of the Devonian age of the formation. In the Zeehan District it is only quite lately that it has become known that dykes of quartz-porphyry traverse the mineral field, notwithstanding the fact that it has been exhaustively prospected for many years. As to the quartz-veins and ore-deposits, these are known to occur in the conglomerates of certain localities, and this has been the principal reason for the assumption that there are two sets of conglomerates in this line of country; one being older, and the other younger, than the period of ore deposition. I can see no sufficient reason for this assumption. The conglomerates capping Mt. Farrell contain quartz-veins in abundance, and these are not the low-lying conglomerates which might be taken as belonging to the same period as the schists and slates underneath, but the coarse, red conglomerate from the top of the mountain. I have observed quartz-veins up to 6 and 8 inches in thickness, a great many from 3 to 4 inches, while whole masses of rock are traversed by innumerable strings and small veins of quartz.

The above will, I think, be sufficient to show that there is really very little evidence in favour of the Devonian age of the conglomerates. As positive evidence of the Upper Silurian age of at least some of them, I may mention that on the east slope of Mt. Jukes I found casts of rhynchonella, exactly similar to the fossils of the Zeehan District, occurring in coarse sandstone, interbedded with the red conglomerate, while Mr. R. B. Montgomery has brought me pieces of fine-grained conglomerate from the Red Hills District containing obscure casts of some sperifer. I do not think there is any reason to believe that these coarse conglomerates are to be regarded as belonging to two separate formations. I had an opportunity of observing how greatly the conglomerates can be altered in the Mt. Farrell District. The Murchison River passes through a deep gorge to the south of Mt. Farrell, and exposes a fine section of the conglomerate formation. About 200 feet above the level of the river the conglomerates are of ordinary appearance. They are hard and compact, but present no marked evidence of intense pressure. As we descend into the river, however, they begin to alter, and in the river itself are seen to have assumed a complete schistose structure, the ground mass of the conglomerates strongly resembling that of the harder schistose porphyries, and the rounded pebbles being flattened out to two or three times their original length. The conglomerate here is, in places, traversed by quartz-veins containing small grains of specular iron (hematite), and many of the pebbles of the conglomerate are completely transformed into hematite. This phenomenon may also be observed at Mount Lyell.

According to my conception of the geological position of this conglomerate formation, it is to be referred to the base of the Upper Silurian system. The conglomerates form a series of anticlinal and synclinal folds, overlying rocks of Lower Silurian, or possibly older, age. The conglomerates were, according to my conception, deposited prior to the period (probably Devonian) in which the schistose structure of the older rocks was developed, and the lower members of the conglomerates, especially where they form synclinal folds (as at Mt. Farrell), have undergone extreme pressure, and have developed the same schistose structure as the underlying rocks. According to this theory, there is no reason to believe that the conglomerates will be entirely barren of ore-deposits. They are a hard silicious rock, and on this account may, perhaps, prove to be unfavourable to ore-deposition, but he would be a reckless geologist who, hold-

ing the view expressed above, would deny the possibility of payable ore-deposits being found in the rocks of this formation.

Mt. Farrell is a long narrow ridge, 1500 to 1700 feet high, running approximately north and south, and separated from the northern spurs of Mt. Murchison by the Murchison River gorge. The whole mountain is composed of conglomerate. On the east side the dip is to the west, at from 45° to 55°, while on the west side the strata appear to be almost vertical, or inclined but slightly to the east or west. On the top of the mountain at the south end the strata are composed of sandstones and shales interbedded with conglomerates, and these are seen to form a distinct syncline. Passing from west to east, the strata first dip steeply to the east; they then gradually become flatter till, approaching the synclinal axis, the shales and sandstones are seen to be dipping about 30° east. A few chains beyond this, the same strata reappear dipping west, and beyond this again we find conglomerates also dipping west. There is, I think, no reason to believe that these shales and sandstones belong to any other than the conglomerate formation.

I regret that I was not able to examine the country to the east of Mt. Farrell. I did walk along Innis' Track, across the valley of the Sophia River, to the north-east of Mt. Farrell, and found on the eastern side of the valley hard sandstones containing small veins of green tourmaline; also large blocks of granite. I understand that the granite charted in Mr. R. M. Johnston's Geological Map of Tasmania as occurring at Granite Tor, extends southwards into this country. Viewed from the top of Mt. Farrell, the hills to the east of the Sophia Valley appear to be made up of white sandstones, which are likely to be of Upper Silurian age. The presence of tourmaline and granite among them is a good sign, and I am of opinion that this country is worth prospecting for metalliferous deposits, especially for tin and silver-lead.

The Mt. Farrell silver-lead lodes occur in a belt of hard slate country on the western slope of Mt. Farrell, and situated to the east of a very wide belt of porphyroid and schists. The lodes are well-defined fissure formations, belonging to the type which, in my Zeehan report, I have referred to as the "pyrito-sideritic" type, of which the lodes of the Spray Mine may be taken as good representatives. The lodes of the Mt. Farrell District differ from the Zeehan pyrito-sideritic lodes chiefly in that they contain more

quartz, and in this respect more closely resemble the lodes of the pyritic lead formation of Saxony and elsewhere. The known lodes form a parallel group, striking 20° east of north, and dipping east; some of them have been traced for distances of over a mile in length.

I have discussed the origin of these lodes at some length in my Report on the Zeehan Field, and this should be referred to for information on this point. I have also discussed the conditions necessary for the formation of rich shoots or bonanzas of galena in these lodes, and have shown that the two principal factors which would appear to be necessary for their formation are—(1) a large lode formation, along which surface-waters may circulate; (2) the presence of iron pyrites, which, by oxidising to sulphate, assists in the leaching away of the galena from the upper levels, and by its presence as sulphide is mainly instrumental in the redeposition of galena in an enriched zone at lower levels. In addition to these, we must, of course, also have the presence of primary galena in the lode-channel. All of these conditions are fulfilled in the Mt. Farrell District, and I shall be much surprised if many good shoots of ore are not discovered as soon as the lodes have been developed below the zone of leaching.

The North Mt. Farrell Mining Company, No Liability.

This company holds sections 4116-93M, 68 acres; 3262-93M, 76 acres; and 4927-93M, 20 acres. These sections are all situated to the west of Mt. Farrell, and take in the lower slopes of that mountain. The belt of slate country already alluded to passes through the eastern portion of the ground. The principal workings are situated on the south-eastern section, No. 3262-93M. The main lode runs approximately through the centre of this section, striking about 15° east of north, and dipping steeply to the west. It is a well-defined fissure formation, about 7 feet wide, with a good seam of "dig" on the hanging-wall. To the east of the lode the country is often much shaken up and disturbed, and sometimes contains a good deal of galena in the joints of the slate. The lode contains shoots of first-class ore (argentiferous galena), and also large quantities of second-class or milling ore. There are two branches from the main lode; one known as the south-west branch strikes 45° east of north, dipping to the west; the other, known as the south-east branch, strikes 20° west of north, and junctions with the main lode a little to the north of the south-west branch.

One hundred feet to the east of the main lode another formation, known as the east lode, has been cut. This strikes about north and south. Also, in the lowest (No. 4) adit, what may be called the west lode has been cut, about 200 feet to the west of the main lode. This strikes 10° east of north, and dips at an angle of 60° to the west. These lodes have been attacked at four levels, formerly known as No. 0, No. 1, No. 2, and No. 3, but are now known as No. 1, No. 2, No. 3, and No. 4.

At No. 1 level the main lode has been driven on in a southerly direction for a distance of 375 feet. The first 300 feet was productive, and is stoped out for a height of 50 feet above the level. There is still a nice block of ore to be stoped out here, between the back of the present stopes and the surface. This block is about 200 feet long, 50 feet high at the south end, thinning down to nothing in the north end. Two stopes were in operation at the time of my visit; one at the north end showed 2 feet of first-class ore and about 3 feet of seconds. In the south end there were only seconds showing.

At No. 2 level the main lode has been driven on for 520 feet. The lode is said to have been poorer at this level than in either of the levels above or below. There are two main blocks of stoped ground; one at the south end 100 feet in length, shortening to 40 feet at No. 1 level; the other, in the north end, 120 feet long, shortening to 80 feet 60 feet above No. 2 level. There is still a little second-class ore to be won above these stopes. Between these two main blocks of stoping, the leading stope has been taken out 200 feet in length; about half of this is said to be good milling-ore, with a fair proportion of firsts. The drive north at this level is being pushed ahead, to get under a quartz outcrop at the surface, which carries some nice galena. Ore had just begun to come in when I visited the face, there being a couple of seams of second-class ore about three inches wide at that time. Since then I understand an improvement has taken place. The south end is barren, but shows a fine big lode formation, which should be well worth driving on.

At No. 3 level the main lode has been driven on for 580 feet, and has been stoped continuously for 460 feet. There are said to be two very fine shoots of first-class metal cut in this level, both of which are untouched underfoot. The most northerly of these is said to be situated about 100 feet south of the No. 3 crosscut (adit). There is said to be up to 7 feet of first-class metal at this point. What the length

of the shoot is I could not ascertain. The other shoot is situated near the junction of the south-west branch lode with the main lode. There is said to be 5 feet of first-class ore at this point. At present, the stopes above No. 3 level are furnishing mostly second-class ore; they are now approaching No. 2 level, the last stope being taken out in one place.

At No. 4 level the main lode has not yet been cut. The adit is situated about 400 feet south of No. 3 adit, and cut the south-west branch lode 434 feet from the approach. This lode strikes about 45° east of north, and junctions with the main lode about 350 feet north-east of No. 4 adit. The lode has been driven on north for a distance of 75 feet, and carries good bunches of second-class ore. It is believed that this ground will just about pay to stope. This drive has been discontinued for the present, but will be re-started as soon as the rise, which is now being put up from this level to No. 3, is completed, and good ventilation provided. The drive has about 275 feet to go before it reaches the main lode, where the rich shoot of metal is to be expected; but, judging by the other levels, good ore should be cut in the branch lode before the actual junction is reached. The branch lode has been driven on at No. 3 level for a distance of 300 feet, and at No. 2 level for a distance of 120 feet. The lode is at its best near the junction with the main lode, and most of the stoping has so far been confined to this end of the lode. There is, however, some good second-class ore which will pay to take out further south.

South-East Branch.—This lode junctions with the main lode a little to the north of the junction of the south-west branch. It has been driven on at No. 1 level for a distance of 75 feet in second-class ore. A leading stope was just commencing at the time of my visit; the lode showed about 2 feet of fair seconds, the galena being distributed in the joints of the slate.

East Lode is 100 feet to the east of the main lode, and strikes north and south, dipping west. It has been driven along for 120 feet. A little ore was discovered, but I am of opinion that the drive has been made in the foot-wall country, and that the lode should be broken into by a couple of short crosscuts west from the present drive.

West Lode.—This lode has been cut in No. 4 adit, about 35 feet to the west of the south-west branch. At this point the lode is approximately at the junction of the schist or porphyroid country and the slate. It is a fissure-formation, with a foot of "dig" on the hanging-wall. To the east

of the "dig" the country is much disturbed, and contains iron pyrites and carbonate of iron. I think there is no doubt that this is a lode formation, and should be worth driving on, but preferably at a lower level than No. 4. It is situated to the west of all the other mine workings.

As regards the future policy of the company, it should, in my opinion, be directed towards the development of the main lode below No. 3 level. With this object in view, the drive from No. 4 adit should be continued up to the junction of the south-west branch lode with the main lode. There is every reason to hope for a good and highly payable shoot of ore being cut at this point. The main lode should then be driven on north and south. Below this level the lode must be opened up from a main shaft, and pumping machinery will have to be erected.

Although there was very little first-class ore to be seen in the stopes at the time of my visit, I have formed a very favourable opinion on the prospects of good shoots being found at and below the No. 4 adit level. A large lode formation, such as the main lode undoubtedly is, must act as a channel for circulating surface-waters, and these, in the presence of pyrites in the lode-channel, have the effect of leaching away the galena from the upper portions of the lode, and re-depositing it as an enrichment at a lower level. This probably accounts for the fact that, so far as the lode has been developed up to the present, it has improved in depth. There is, I think, a reasonable hope that some very fine shoots of ore may be mined below No. 4 level.

The North Mount Farrell Company owns a concentrator, which enables the large bodies of second-class ore to be successfully treated. The galena is about medium grade, assaying slightly over one ounce of silver to the unit of lead.

The ore produced up to the end of October, 1903, according to the last half-yearly report of the company, amounts to 2730 tons, of a net value at the mine of £21,367 5s. 2d. This gives an average net value per ton of £7 16s. 6d. From the 31st October, 1903, to the 21st of March, 1904, 274 tons have been produced, of a net value at the mine of approximately £1644, or £6 per ton. The falling off in the value of the ore is probably partly due to the fact that almost the whole of the ore produced lately has been second-class ore, and is of lower grade than the galena obtained from the more massive shoots mined previously. It is also partly due to loss of silver in concentration. That the loss of silver is greater than that of lead, is proved by the following list of assays of the several parcels of ore sold on the 4th of November last:—

Parcel.	Lead, %	Silver, ozs. per ton.
6 tons first-class ore.....	68	75
14 tons mill hand-picked ...	54	54
40 tons pigs	56	55
11 tons slimes	56	53

It is probable that, when the drive along the south-west branch cuts the shoot of first-class ore at No. 4 level, the value of the output will be augmented by an increase in the quality as well as the quantity of the ore produced.

The Mackintosh Copper and Gold Mining Company, No Liability.

Sections 3221-93M and 3223-93M; total area, 160 acres. There was no work going on at this mine at the time of my visit, but I was kindly shown over the workings by Mr. John Bissett. The sections are situated north-east and adjoining the North Mount Farrell Company's ground, and the main lode has been traced right through the two sections.

The main workings are situated in the south-western portion of Section 3221-93M. A main adit was driven 300 feet in length, and cut several other smaller lodes before the main lode was reached. At 55 feet from the approach a lode formation was cut, striking 28° west of north, and dipping 80° west. This lode has 8 or 9 inches of "dig" on the foot-wall, and carries fair second-class ore. It will certainly be worth driving on when cut at a lower level. At about 250 feet in, another lode was cut, striking 20° east of north. A vein running into this lode carries about 2 inches of metal where cut in the adit.

The main lode was cut at 300 feet, and was driven on south for 180 feet. Some good ore was cut in the southern portion of this drive, and a winze was sunk on ore for 34 feet, and is said to have carried metal from 18 inches to 2 feet in thickness the whole of the way down. From the winze alone 37 tons of ore were obtained, or a little over one ton of ore for each foot sunk. This is a most encouraging result, considering the fact that the workings are only at a shallow level.

About 10 chains north of these workings the lode has been cut again in a small creek, and driven on for 20 feet. The lode carries a little metal, but it is evident that more depth must be obtained before payable ore can be expected.

The next workings are situated close to the northern boundary of the southern section. The bed of a small creek was trenched along, and two lodes were cut, both carrying ore. The most easterly of these is probably the main lode,

and the other one may possibly be the lode which was cut at 250 feet in the south adit already mentioned. A party of tributors drove an adit to test these lodes, the west lode being cut at 144 feet and the main lode at 195 feet. Both lodes were poor where cut, though they carried a little metal.

To develop this property successfully, I am of opinion that a main shaft will have to be sunk, and the lodes driven on at a reasonable depth below the surface. The main lode is, in my opinion, a most promising formation, and well worth a fair trial in depth. This property should be amalgamated with the North Farrell, and the two mines worked from a central shaft.

The Mount Farrell Mining Company, No Liability.

Sections 2409-93M and 2410-93M; total area, 80 acres. These sections are south and adjoining the North Mt. Farrell Company's ground. There are two parallel lodes running through the sections, the most easterly of which is believed to be a continuation of the main lode of the North Mt. Farrell Company. In the northern section the lodes are extremely silicious, outcropping at the surface in the form of large blows of white quartz. An adit was driven close to the southern boundary of the North Farrell section for a distance of 700 feet, and cut both lodes. The western lode consists of a foot of pug, with a little carbonate of iron and quartz, and splashes of galena. The adit was continued, and eventually cut the east lode, which is believed to be the main lode of the North Farrell. A fall of earth prevented me from examining this formation properly, but I was able to see the western wall of the lode. I saw about 3 feet of "dig," carrying angular fragments of white quartz, and evidently a very large fissure formation. To the east of this seam of "dig," I understand that the adit passed through barren white quartz for 18 feet without reaching the other wall. It has occurred to me that this white quartz may possibly belong to an older period of mineral deposition than the galena. The large pug formation carrying angular fragments of white quartz may be the result of the re-opening of an older fissure, which had previously been filled with quartz. I have noticed these very wide quartz formations in several places in the Mt. Farrell District, and I am not at all satisfied that they are closely connected with the pyritic lead formation. However, I must leave this question open, as I have not sufficient evidence to enable me to form a definite opinion on the point.

In order to test these lodes at deeper levels in this part of the property, it would be necessary to sink a main shaft and erect pumping machinery. I hardly think the prospects are sufficiently encouraging to warrant this expenditure at the present time. The ground could be more advantageously prospected by driving south along the lode from the North Farrell Company's lower workings. This would test the formation thoroughly, and if enrichments have taken place, would be almost sure to cut them.

A large amount of prospecting work has been done on these two lodes further south. They have been cut by two adits, and have been driven on for long distances. I understand that nothing payable was cut—ore was found, and that of high grade; but it was very bunchy, and taken all through, quite unpayable. It is possible that these workings are still in the zone of leaching, and that good shoots may exist below; but until we know more about the behaviour of the lodes in depth, I hardly think the indications are sufficiently encouraging to warrant further expenditure.

The Murchison River Mining Association, No Liability.

Section 3263-93M; 60 acres. A large lode passes through this section, on a course of north 20° east. It is a parallel lode to the main lode of the North Farrell Company, but is more pyritic, and contains a good deal of zinc-blende. A good shoot of ore has been discovered, and the mine is now being developed under the management of Mr. H. Astle.

The lode was cut in the upper adit, at a distance of 92 feet from the approach. It proved to be a big lode, 17 feet wide, carrying a great body of mixed ore—galena, zinc-blende, and iron pyrites. Most of this ore is too poor to send away without being concentrated, but for 7 feet on the hanging-wall (west) side of the lode the ore is rich enough to send away after a rough hand-sorting. It has, however, become apparent that to work the mine effectively, a concentrator will be necessary. The lode was driven on for 200 feet at this level, and of this 94 feet carry good ore, which is now being stoped. There was a fine show of metal in the stopes at the time of my visit, but it is contaminated with much blende and pyrites, which decreases its value considerably.

No. 2 adit is 48 feet lower than No. 1, and cut the lode 146 feet north of No. 1. The lode was barren where cut, and was not recognised. A branch was driven on south, which eventually junctioned with the main lode, and this was then driven on below the upper workings. It appears

that this drive was taken along the western wall of the lode without breaking into the formation, and the lode was reported to be barren. It was afterwards discovered that the ore only needed to be broken down all along the side of the drive. This shoot has now been proved to be 134 feet long at this level. The full width of the formation has not been determined, only the better ore on the hanging-wall being mined at present. The good ore is up to 3 feet wide, and carries a large proportion of first-class metal. The drive in the lower level extends 50 feet south of the workings in the upper level. The shoot of ore appears, therefore, to be pitching south. A winze was being sunk from the lower level, and at the time of my visit was down 18 feet in good ore all the way. It is proposed to bring in a deep-level adit to cut this shoot of ore 117 feet below the present lower level. From the selected site for this adit, the distance to the lode is estimated to be 580 feet.

The Murchison River Mine is undoubtedly a very promising one. The ore is, however, somewhat complex, and will have to be concentrated to enable the mine to be profitably worked, as the freight charges to the smelters from the Farrell District are too high to enable low-grade ores to be sent to the smelting works. The following particulars of parcels sold from the mine are interesting, as giving a good idea of the class of ore to be treated:—

Parcel No.	Class of Ore.	Weight, tons.	Net Value.	Assay Contents.		
				Lead, per cent.	Silver, ozs. per ton	Zinc, per cent.
			£			
2	Jigs	6·25	82	70·5	95·0	—
3	Slimes	7·80	81	60·0	77·3	0·5
4	Firsts Galena ...	6·05	57	56·2	71·05	2·0
5	Seconds Galena	7·05	32	34·05	41·85	4·8
7	Galena	14·6	110	42·15	60·15	—
8	Bulk Ore	77·45	163	21·75	31·95	7·0
9	Bulk Ore	79·85	142	19·75	29·6	6·35

Parcels Nos. 2 and 3 are the product of hand-jigs. Parcel No. 7 contained, in addition to above, 2 dwts. of gold per ton.

Kittson's Section.—Section 3388-93M, 80 acres—H. E. Kittson. I was only able to pay a flying visit to this mine, and cannot claim to have sufficient knowledge of the general surroundings to be able to form a definite opinion on the value of the property. The mine is situated on the west

bank of the Murchison River, about 4 miles in a direct line south-east from the Farrell Township. The country-rock is hard felsite or porphyroid.

The lode has been exposed in several trenches, and open cuts along the west bank of the river, and has been traced for a long distance. It is a compound fissure-formation, about 18 feet wide, the lode-matter consisting of felsite heavily impregnated with iron and copper pyrites, and some zinc-blende. Rich silver and bismuth ores also occur in seams and bunches through the formation. No work had been done for some time previous to my visit, and the exposures were much discoloured, and I found it impossible to form any estimate as to the proportion of rich ore in the lode.

I have been shown a number of assays of ore from the lode, ranging from 100 to 350 ozs. silver to the ton. These assays were obtained from a number of different points along the course of the lode, so that it appears that the rich ore is not confined to one patch. I think the lode is worth testing by an adit from the Murchison River. The bank rises very steeply from the river, and from 150 to 200 feet of backs could be obtained with a very moderate outlay.

There are a number of other sections in the Mt. Farrell and surrounding districts which I should have liked to have seen, but unfortunately my time did not permit me to do so. From what I have seen, I have formed a favourable opinion on the prospects of the lodes. They appear to me to be fine, well-defined formations, continuous for long distances, and containing all the elements necessary for the formation of rich shoots of ore. I believe, however, that the best shoots will be found (especially in the hilly country) at some distance from the surface.

In conclusion, I desire to thank all those gentlemen who rendered me assistance during my visit to the Mt. Farrell District; especially would I like to acknowledge my indebtedness to Messrs W. R. Sale, H. Astle, J. Bissett, and W. H. Tole.

I have the honour to be,
Sir,
Your obedient Servant,

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