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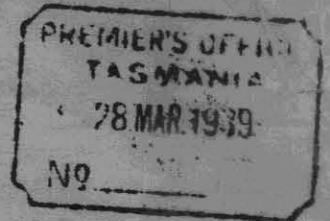
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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

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# REPORT OF EXPERTS

ON THE

BLYTHE RIVER IRON DEPOSIT,  
BURNIE, TASMANIA,

WITH

APPENDIX AND PLANS;

TOGETHER WITH

RECOMMENDATION FROM SIR J. M. HIGGINS,  
HONORARY METALLURGICAL ADVISER TO THE COMMONWEALTH GOVERNMENT.

*Presented by Command; ordered to be printed, 28th August, 1919.*

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Commonwealth of Australia.

Central Wool Committee,  
113 William-street,  
Melbourne, 28th July, 1919.

SIR,  
by—

I have the honour to forward herewith a Report on the Blythe River Iron Mines, Tasmania,

Messrs. A. A. BOYD,  
CHAS. G. GIBSON, and  
GERALD W. YOUNG.

In 1900 Mr. J. H. Darby, M.I.C.E., Iron and Steel Specialist, reported on the Blythe River Iron Deposit, and estimated the quantity of ore available at 24,500,000 tons of selected ore, with an average value of approximately 8 per cent. silica, 90 per cent oxides of iron, equivalent to 63 per cent. metallic iron.

In 1901 Mr. W. H. Twelvetrees, Geological Surveyor for Tasmania, estimated the deposit to contain from 17,000,000 to 23,000,000 tons.

During May, June, and July of this year Messrs. Boyd, Gibson, and Young made a thorough investigation of the deposit, and they compute that the deposit contains 9,000,000 tons—

“the bulk of the deposit is far too siliceous to be considered as an iron ore at the present day, and the quantity of good ore is too small to be considered of any economic importance.”

For many years the Blythe River iron ore deposit has been considered to be one of the largest bodies of high grade iron ore in Australia, and its accessibility gave it an additional value.

Assuming that the conclusions of Messrs. Boyd, Gibson, and Young are correct regarding the Blythe River Iron Mines, then the reduction in the quantity of iron ores available for treatment in Australia is a most serious national loss to the Commonwealth.

The reports of the experts differ so vitally as regards the quantity and value of the ore that there is only one course which I can recommend you to follow, viz., that the right of purchase over the Blythe River Iron Mines held by the Commonwealth Government be not exercised.

I remain,

Sir,

Respectfully and obediently yours,

(Signed) J. M. HIGGINS,

Honorary Metallurgical Adviser to the  
Commonwealth Government.

The Hon. W. A. Watt, M.P.,  
Acting Prime Minister,  
Commonwealth Offices, Melbourne.

Mount Morgan,  
Queensland, 14th July, 1919.

The Hon. W. A. Watt,  
Acting Prime Minister,  
Commonwealth of Australia, Melbourne, Victoria.

SIR,

In accordance with instructions received from Sir J. M. Higgins, K.C.M.G., we have inspected the Blythe River iron deposit near Burnie, Tasmania, and herewith beg to submit our Report.

Yours faithfully,

(Sgd.) A. A. BOYD.  
(Sgd.) CHAS. G. GIBSON.  
(Sgd.) GERALD W. YOUNG.

# REPORT ON THE BLYTHE RIVER IRON DEPOSIT, BURNIE, TASMANIA.

BY MESSRS A. A. BOYD, CHAS. G. GIBSON AND GERALD W. YOUNG.

Mount Morgan, Queensland,  
14th July, 1919.

## LOCATION.

The property is situated on the Blythe River, which intersects the deposit at about 6 miles above its mouth, the latter being approximately 5 miles to the east of Burnie (see locality plan).

The Main North Coast Railway from Launceston to Burnie crosses the river a few chains above its mouth, and a railway following the river could, if necessary, be built to connect with the mine. A survey and estimate of the cost of this has been prepared by A. Chaplin in 1901, and is in the possession of the Blyth River Iron Mines.

Good roads exist to the upper or north-east portion of the deposit, but the main workings could only be satisfactorily reached by following up the river, and no road exists here at present.

## EARLY WORK.

Although the property has been known for many years and a considerable amount of money expended by the present owners, very little work of a useful or developmental nature has been done.

The only works of any importance are the three tunnels shown on the plan herewith, and known respectively as the "Upper," "Middle," and "River." These were put in about eighteen years ago, and little or no work has been done since.

In addition, there are a number of prospecting trenches on the leases and two small open cuts, or "quarries," towards the north-east end of the outcrop.

At the time of our inspection the tunnels had fallen in and had to be re-opened and in parts timbered before the exposure of ore in them could be sampled. The important trenches, too, had to be cleaned out, and in most cases deepened and lengthened.

## PREVIOUS REPORTS.

The principal reports that have been made on the property from time to time are those by Messrs. Darby (1900), Twelvetees (1901), Paul (1912), and Jacquet (1912 and 1915), all these being more or less of a confidential nature.

## EXTENT OF THE PROPERTY.

The area held by the Blythe River Iron Mines comprises Crown Mineral Leases numbers 1061, 1009, 4066, 851, 4185, 7812, 7996, 7997, 7998, 7999, 8000, 8001, together with 12 acres of freehold, and mining rights in O'Keefe's 50 acres—in all 789 acres. The position of these is shown on the lease plan herewith.

## GEOLOGICAL FEATURES.

### TOPOGRAPHY.

The country immediately back from the Blythe River consists for the most part of undulating hills through which the river has cut for itself a steep rugged valley, which at the point where the iron deposit crosses it, has a maximum depth of some 750 feet, the sides rising at an average angle of about 1 in 2; both north and south of this point, however, the hills gradually become lower and the river valley consequently not so deep or rugged. The sides and bottom of the valley are invariably densely covered with sword grass, bracken, and undergrowth.

## GENERAL GEOLOGY OF THE DISTRICT.

The whole of the country in the immediate vicinity of the deposit has at one time been covered by an extensive flow of basalt. In the river valley and other low-lying localities this basalt covering has been denuded away and the older fundamental rocks of the district exposed. These consist of uptilted and highly altered sedimentaries (shales, sandstones, &c.) of probably Cambrian age. Their general strike is now about north-east and south-west, and their prevailing dip is steeply to the south-east. It is in those altered sedimentaries that the iron deposits occur.

## NATURE OF THE DEPOSIT AND ITS GENESIS.

The deposit is a bed interstratified with the original shales and sandstones. In its present form it consists of a mixture of hematite and quartz (chert or jasper); in some places the hematite predominates, and in others the deposit consists of practically nothing but ferruginous chert or jasper, whilst elsewhere is to be found every conceivable mixture of chert and iron ore.

As far as could be determined the average thickness of the bed is about 60 feet, and, being interstratified with them, it conforms to the strike and dip of the enclosing rocks.

In its original state this bed was probably laid down as an intimate mixture of chert and ferrous carbonate or ferrous silicate—probably carbonate; when subsequently exposed to weathering the ferrous compound became oxidized to hematite and limonite, the bulk of it *in situ* though probably some of it was simultaneously carried and redeposited; subsequent metamorphism at the time of uptilting further converted the limonite to hematite, and the bed became a hematite-bearing chert or jasper—its present form.

## GENERAL DESCRIPTION OF THE DEPOSIT AND ITS EXTENT.

The deposit crosses the Blythe River in a general north-east and south-west direction; it has been denuded away to the full depth of the river valley but outcrops on both sides of it in a series of rugged cliffs and crags; on the north-east slope the outcrop is practically continuous until it disappears under the basalt at a height of 500 feet above the river bed; on the south-west side of the valley, however, the outcrop is more irregular and the greater portion of it is hidden beneath extensive deposits of talus and *débris* from the slopes above; it can be followed in this direction in a series of large, irregular outcrops for a distance of 11 chains to a point some 350 feet above the river bed where it finally disappears beneath surface *débris*. North-easterly from the point where it disappears under the basalt, the deposit is covered for a distance of 28 chains, when it again outcrops on the opposite side of the hill; it can then be followed continuously over undulating ground for 14 chains north-easterly till it again disappears beneath surface soil and *débris*.

The north-eastern portion of the lode has an average surface width of 85 feet, and its general strike is 41 degrees east of north; the dip varies, but is generally steeply to the south-east. The whole deposit here is more regular than on any other portion of the leases. In general character it consists of a more or less intimate mixture of hematite and quartz (chert); at the south western end, just before it disappears under the basalt, there is a considerable development of hard, clean hematite, but this rapidly lessens going northward, and the bulk of the deposit in this direction approaches nearer to a ferruginous chert or jasper than to an iron ore.

At the south-western end of this outcrop are two small open cuts or quarries from which small parcels of picked ore have been sent away for treatment. Some clean hematite is showing in some of the faces of these quarries as well as a quantity of low-grade siliceous material. (This matter will be dealt with more in detail later on.) The "Upper" tunnel is also in this portion of the deposit, having been driven from the western slope of a low rise to intersect the lode at right angles at a point some 60 feet below the outcrop (*vide plan*). This tunnel has exposed 84 feet of "lode matter;" it has not been driven right through the lode, but judging from surface measurements, and from the appearance of the face, the end of it should be only a few feet from the eastern wall. The "ore" exposed in this tunnel is very hard and much jointed, and, on general appearances, is very cherty and siliceous throughout (see later).

The outcrop on the north-east side of the river valley is, as already stated, very strong and continuous, and for a considerable portion of its length very regular and well defined. Over the lower half of the slope it stands up cleanly above the ground level often to a height of from 30 feet to 40 feet in a series of rough vertical cliffs and crags; the upper portion, however, is more broken, and the ground is covered with a mass of boulders which render it impossible to accurately define the width of the body over this area. In one or two places large unbroken masses of the lode have fallen over and becoming partly embedded in surface soil and *débris* have the appearance of outcrops of similar parallel lodes. This portion of the deposit, however, consists almost entirely of ferruginous chert (jasper), and little or no clean ore is to be seen. The quality of the lode matter appears to improve somewhat lower down the slopes, though it is all very siliceous and "jaspery."

At a spot a few chains below the point at which the lode disappears under the basalt, and immediately to the east of the main outcrop, is a large irregular and isolated mass, or crag, of ferruginous jasper; the origin of this is not quite clear, it may represent portion of a parallel bed, or it may even be simply a large mass of the main lode which has fallen into its present

position when the original outcrop stood at a hundred feet or so above its present level. Whatever its origin may be, the only fact of interest to this report is that the outcrop consists almost entirely of ferruginous jasper, and contains no iron ore worth considering.

At the river level the main deposit on the north-east bank is seen to have a thickness of 30 feet. Lying immediately to the east of it, separated from it by 36 feet of soft slates, is a similar parallel lode 26 feet thick; this either dies out north-easterly or junctions in this direction with the main body, as no sign of it is to be seen in the middle tunnel (see plan). As much of it as is visible consists of ferruginous chert or jasper only (*vide* samples cut "J").

Two tunnels have been put into the main ore body; one, the "Middle" tunnel, as shown on the plan, being driven right across the deposit at a point 240 feet above the river, intersecting the lode about 55 feet vertically below the surface, where it shows 46 feet of hard-jointed cherty ore (see Appendix). The bottom or "River" tunnel has been driven along the western wall of the lode for a total distance of 221 feet, and cross-cuts have been put out easterly at 32 feet, 77 feet, 142 feet, 166 feet, and 221 feet, intersecting the ore body for distances of 5 feet, 17 feet, 5 feet, 23 feet, and 12 feet respectively; the ore in these cross-cuts is of variable grade, but the bulk of it is hard, siliceous, and cherty. The cross-cut at 221 feet is 150 feet vertically below the surface.

On the south-western side of the valley, the lode—as already stated—outcrops only in a series of large irregular crags, and its general thickness would appear to be somewhat greater than on the other side of the valley. All the main lode outcrops on this side show only ferruginous chert and jasper, with little or no clean ore.

Towards the top of the slope, and immediately to the east of the main lode, is a large rugged outcrop of iron ore, known locally as the "Purple Crag" (see plan). This deposit consists for the most part of clean high-grade iron ore, and appears to be entirely separate from the main lode. It will be referred to in more detail later on.

#### OBJECTS OF THE EXAMINATION.

The chief objects of the examination were (a) to determine by systematic sampling what the general iron content of the deposit was; (b) to determine what portion or portions of the deposit were sufficiently high grade to be classed as workable iron ore; and (c) to determine if there was sufficient of this high-grade material to economically justify the outlay necessary for the equipment and working, and transporting of the ore to the sea board.

#### SAMPLING.

After a brief preliminary examination it was clearly evident that by far the greater portion of the deposit could not be classed as a "workable" iron ore (*i.e.*, "workable" under present day conditions). Several series of samples were taken over areas that held out practically no chance of success, but the object of these was to prove definitely whether or not this ore was of commercial value. The surface cuts at various points across the outcrop were taken with the objects of (a) securing a general average of the less obviously useless portions of the lode, and (b) securing a series of general samples of the higher grade ore visible on the surface and the approximate extent of such ore. In addition to these surface cuts, all the underground tunnels and cross-cuts were systematically sampled with the object of ascertaining the general grade as the material exposed in them. The samples were, as far as possible, taken in sectional widths of 5 feet; the only exception to this rule was when sampling the apparently higher grade ore exposed in the two quarries on the north-east outcrop. Here the original samples were taken over 5 feet lengths, but in order to check the uniformity or otherwise of the impurities ( $\text{SiO}_2$ , &c.) in these, the sections were re-cut in the same place over lengths of 2 feet (see samples list).

The general method adopted in taking the samples was as follows:—

- (a) Surface cuts: The positions of these were chosen with the object already given; they were marked off at right angles to the strike of the lode, and whenever possible represented the full width of same, this being determined in most cases by trenching to locate the walls; all surface covering was carefully stripped from such portions of the lode as did not actually outcrop, and the whole was thoroughly cleaned down with a stiff broom; the various 5 feet sections were then marked off and the sample carefully cut on to a sheet with moils and hammers; about 7 lbs. of material were taken over each 5 feet; this was subsequently crushed to about  $\frac{1}{4}$ -in. mesh and quartered down to about 1 lb. weight, the whole of which was then fine crushed and the assay sample taken in the usual way.
- (b) Underground samples: These were cut along the walls of the cross-cuts in consecutive 5-ft. lengths; before cutting the samples the walls were, where necessary, freshly broken down so as to expose clean surface, and the samples cut as above. In taking these cuts, all soft seams and loose material were, as far as possible, carefully avoided, the sample thus representing the hard "ore" free from all soft mullock.

The locations and results of all these samples are shown on the plan herewith, and are also given, together with field remarks on the individual samples, in the Appendix attached to this report.

A careful examination of the results obtained from these samples shows that by far the greater part of the deposit may be at once cut out as of no value. The only ore of any possible present value is that occurring in the "Purple Crag," and at the southern end of the top or north-east outcrop of the main lode.

The results from the various underground workings are especially disappointing. The "Middle" tunnel results simply substantiate the poor opinion formed of this portion of the outcrop from surface inspection, and the same may even be said of the "River" tunnel. Some of the ore in the upper tunnel, however, looked fairly good, and some nice clean ore is showing in one or two places on the surface immediately over the tunnel; the results go a long way towards proving the irregularity and noncontinuity of the better grade of ore exposed on the surface to the south-west, and also that shown in sample trench "B" to the north-east.

Going into the question of this better grade ore in more detail, it will be noticed that cut "A" shows one length of 5 feet of good ore. This, however, is simply an isolated patch, and it is surrounded by siliceous jaspery material of no value. No appreciable quantity of decent-looking ore is to be seen anywhere to the northward of this point, and little or none to the southward until the vicinity of trench "B" is reached; at this point the samples show a consecutive width of 30 feet of ore containing approximately 61 per cent. of iron and 11 per cent. of silica; southward from this spot there are patches of good-looking ore showing and some is to be seen on the surface immediately over the tunnel; the results obtained here, however (*i.e.*, in the tunnel), are disappointing, and they indicate only one small patch (5 feet) of even moderately good ore. Trench "C" again shows 25 feet of ore of an average value of 63 per cent. iron and 9 to 10 per cent. silica, while "D" cut shows 60 feet of ore averaging 63 to 64 per cent. of iron and 7 per cent. to 8 per cent. of silica; in "E" cut this width has been reduced to 15 feet of 62 per cent. to 63 per cent. iron and 9 per cent. silica; while "F" shows only 5 feet of decent ore. Although these sections indicate that there is a continuous stretch of high-grade ore here the actual outcrop shows that there is *not*; the good ore does not occur regularly, but is found in bunches and in seams of all sizes and shapes running irregularly through the lower grade siliceous material. As example, the outcrop between samples trenches "C" and "D" shows much highly-siliceous ore lying between the areas of good ore exposed in these trenches, and a still larger development of siliceous, and in parts jaspery, material separates the good ore shown in "D" and "E," and similarly between "E" and "F." On the other hand, considerable areas of high-grade ore are to be seen corresponding to and replacing low-grade material exposed in other portions of the cuts. In other words, while any individual sample trench may shew 30 feet of good ore and 30 feet of siliceous material over any particular sections, another trench only a few feet away, while showing possibly the same total quantity of good ore, would have the relative values of corresponding sections entirely reversed, and *vice versa* in the next few feet.

With the object of checking the uniformity or otherwise of the silica content throughout the individual 5-ft. sections taken in the higher and medium-grade ore, samples 71/73 and 96/97 were re-cut in the same places over 2-ft. lengths. A comparison of the results shows that the silica occurs regularly throughout.

With the object of further arriving at the possible value of this better grade of ore a series of representative samples were chosen and the phosphorous contents determined. The full list of these samples is given at the end of the Appendix. It will be seen from these that the average phosphorous content of this ore is 0.050 per cent.

A general sample was also made up by taking proportional parts of a typical series of samples of the higher-grade ore, and a complete analysis of this was made with the object of ascertaining the full chemical composition of the ore. The result of this analysis is given in the Appendix.

By taking the general run of the samples, and calculating the total iron as hematite ( $\text{Fe}_2\text{O}_3$ ), it will be seen that the addition of the  $\text{Fe}_2\text{O}_3$  and  $\text{SiO}_2$  allows very little room for other impurities. The ore is, therefore, a varying mixture of hematite and quartz (chert).

With regard to the high-grade ore exposed in the "Purple Crag," this deposit may be considered as something separate from the main lode. It consists of a rugged mass of high-grade iron ore outcropping as shown on the plan. It appears to be formed of angular fragments of hard, dense hematite, cemented together by a more or less rubbly impure hematite. A tunnel, driven from the north side about 20 feet under the outcrop, shows that the deposit is not the outcrop of a permanent lode, but is merely a surface formation resting on upturned soft sandstones.

The origin of this deposit is not by any means clear; it appears to have been originally a surface collection of angular fragments and boulders of hematite, which have become more or less cemented together by a finely-divided limonitic earthy material; subsequently the whole was covered by a thick mass of molten basalt (the deposit is not far below the present basalt level), and the heat thus generated dehydrated the limonite and converted the whole formation into its present form. The apparent weak point in this theory is that there is no high-grade hematite now showing in the main lode—or anywhere else—which could have provided the supply for the deposit; however, it is quite possible that a local patch of high-grade ore may have occurred in the upper portion of the main lode prior to its denudation, and this may have yielded the original supply for the crag.

Near the south-east end of the big trench marked X" on the plan, there is exposed 16 feet of solid "Purple Crag" ore, which appears to be a continuation of the main "Crag" outcrop. A little work on this soon proved, however, that it was only a large tabular mass of "float" ore resting on soft sandstones—evidently a mass slipped down from the main crag.

A reference to the samples taken over the "Purple Crag" shows that the ore is of excellent quality as regards its iron and silica contents, these averaging 64.6 per cent. and 4.9 per cent. respectively. The phosphorus content as shown by samples 151/154 is 0.0089 per cent.

Unfortunately the quantity of ore in this body (12,000 tons) is not sufficient to render it of any economic importance.

#### QUANTITY AND QUALITY OF ORE AVAILABLE.

The gross tonnage of iron-bearing material in the whole deposit above the river level has been roughly estimated at 9,000,000 long tons.

This figure was arrived at as follows:—

The deposit was considered in five separate blocks as shown on the longitudinal section herewith, and the approximate tonnage in each of these calculated —

Block A. Length, 920 feet; depth, 600 feet; average thickness, 60 feet = 2,760,000 tons. Being low grade and siliceous, the material has been taken at 12 cubic feet to the long ton.

Block B. Length, 1,840 feet; depth, 570 feet; average thickness, 45 feet = 3,933,000 tons.

Block C. Length, 1,270 feet; average depth, 300 feet; average thickness, 45 feet = 1,429,000 tons.

Block D. Length, 700 feet; average depth, 200 feet, average thickness, 60 feet = 700,000 tons.

Block E. "Purple Crag," length, 200 feet; width, 30 feet, thickness, 20 feet = 12,000 tons. (Ore being high grade is taken 10 cubic feet to the ton.)

Total—8,834,000, or say, 9,000,000 tons.

*Note.*—In computing the average thicknesses of these blocks, notice has been taken of the fact that at the river level the main lode is only 30 feet wide, thus indicating that the bed is thinning out in depth; a general proportional reduction of the surface widths, has therefore, been made in all cases.

As already stated, however, the bulk of this must be discarded as being far too siliceous to be of any value at the present time. The only portions which can be regarded as iron ore are (a) the south-west portion of the upper or north-eastern block, and (b) the "Purple Crag."

As shown by the sampling and by careful field observations the good ore (*i.e.*, ore of the grade shown in the complete analysis at the end of the Appendix) in the north-eastern outcrop is confined to the portion lying between cuts "B" and "F" and even over this area it represents by far the lesser part of the deposit. Owing to its irregular occurrence, and to its more or less intimate mixture with low-grade siliceous material, it would be impossible to selectively mine any appreciable tonnage. For the same reason it is quite impossible to arrive at even an approximate estimate of the quantity available over this area.

Allowing for the unavoidable admixture of a certain amount of siliceous material, it might be possible to mine ore here of an average grade of, say, 12 per cent. silica. The gross quantity of even this that is available is, however, comparatively small, and the cost of mining and picking it would be prohibitive.

The ore in the "Purple Crag" is of excellent quality, but the small tonnage (12,000 tons) available and its inaccessibility render it of no value at the present time.

## CONCLUSION.

It is to be regretted that the result of our examination has been to force us to the opinion that the property is, at the present time, of no economic value; our investigations have shown that (a) the bulk of the deposit is far too siliceous to be considered as an iron ore at the present day, and (b) that the quantity of good ore is too small to be considered of any economic importance.

In view of these facts, the question of working methods, transport, &c., &c., did not warrant consideration.

A. A. BOYD,

(Sgd.)

CHAS. G. GIBSON,

GERALD W. YOUNG.

15th July, 1919.

*Note.*—Where the term "clean ore" is mentioned in this report, hematite ore containing not more than 12 per cent. silica is meant.

## APPENDIX.

## LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
* " A " CUT.—Across full width of outcrop; starting on west side and cut easterly in 5 feet section.			
1	52.89	23.53	Fairly good looking ore showing blebs of silica
2	18.35	69.80	Very siliceous and jaspery (nearly all jasper)
3	47.24	32.43	Very jaspery for first foot, then mixed hematite and jasper
4	41.97	39.02	First couple of feet jaspery then mottled and "bleby" ore
5	59.22	15.11	Mostly good ore but last foot or so jaspery
6	56.63	18.85	Much "bleby" silica showing throughout
7	57.68	16.60	Jaspery in part and with good deal of "bleby" silica in balance. (Much "bleby" silica showing just north-east of this section)
8	47.25	32.40	Jaspery and siliceous throughout (alternating jasper and hematite inch to inch)
9	51.40	26.00	Mottled and siliceous at first, then hard hematite (just to south-west of 8 and 9 is much jasper)
10	50.84	26.97	Hard mottled siliceous ore, jaspery in part
11	59.91	14.08	Hard mottled siliceous ore, jaspery in part
12	42.85	38.37	Jaspery and siliceous throughout
13	54.30	22.33	Siliceous and mottled type
14	58.45	16.77	Mostly dense fair looking hematite, but only local patch
15	49.49	28.45	Siliceous and coarse mottled, little clean ore
16	66.60	5.01	Mostly dense hematite with blebs of silica
17	51.47	26.19	Siliceous throughout
18	59.68	15.44	Fine mottled siliceous type
19	54.47	21.91	Fine mottled with coarser siliceous type
20	55.50	20.37	(6-ft. cut.) Nearly all coarse mottled siliceous type
* " B " CUT.—Across full width of outcrop; west to east, 5-ft. sections.			
21	45.07	34.80	(Not quite to edge of outcrop.) Very siliceous and jaspery
22	42.43	36.87	(Not quite to edge of outcrop.) Very siliceous and jaspery
23	48.55	28.90	(Not quite to edge of outcrop.) Very siliceous and jaspery. (Surrounding ore also very siliceous)
24	56.58	15.87	Some fair dense hematite, but more or less siliceous throughout
25	57.96	15.26	Some fair dense hematite, but more or less siliceous throughout
26	62.79	8.35	Mostly dense hematite, but siliceous in parts
27	61.24	9.67	Mostly dense hematite, but siliceous towards end of section
28	58.99	13.66	Mostly dense hematite with finely divided silica throughout
29	62.96	8.68	Mostly dense hematite with mottled siliceous type over centre foot
30	58.18	16.35	Mostly siliceous and mottled type throughout
31	63.48	8.20	Mostly fine dense hematite with finely divided silica
32	54.50	21.10	Siliceous and coarse mottled type with little clean hematite
33	...	...	Sample not cut, apparently soft mullocky seam (deeply eroded and not properly exposed)
34	58.09	16.48	(4½ feet only cut.) Mostly coarse mottled and siliceous; few inches clean ore
35	53.04	22.04	Coarse mottled siliceous type
36	55.63	19.74	Siliceous and jaspery, with small patch of clean hematite
37	48.81	29.52	Coarse mottled siliceous and jaspery
38	49.56	28.87	Coarse mottled siliceous and jaspery

\* See plan for positions of these cuts.

## LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

No.	Fe.	SiO <sub>2</sub>	Field Remarks.
* "C" CUT.—Across full width of outcrop; west to east in 5-ft. sections.			
39	57·61	13·46	✓ Little clean hematite, but on whole finely siliceous
40	54·08	20·78	✓ Little clean ore at first, then coarsely siliceous to jaspery
41	54·38	20·55	✓ Coarsely siliceous and slightly jaspery throughout
42	48·64	27·30	✓ Very siliceous throughout, coarse mottled and jaspery
43	56·21	17·80	✓ Hard dense and finely siliceous throughout
44	63·00	9·17	✓ Hard dense and finely siliceous (very siliceous just to south of this cut)
45	61·16	11·40	✓ Hard dense hematite, with siliceous patches throughout
46	66·06	4·44	✓ Dense hematite (good ore over whole section)
47	64·04	8·07	✓ Good hematite throughout except last foot which is finely siliceous. (44-47. There is good hematite all through these sections, but it is mixed with siliceous type, and is nowhere continuous in any direction, and could not be separated; couple of feet north from cut 46 whole outcrop is siliceous, but good ore to south; north from 47 is good, but to south is siliceous a yard or two away. Good deal of this mixed to good ore in this immediate neighbourhood)
48	59·42	13·76	✓ Hard dense and finely siliceous throughout
49	54·90	19·14	✓ Finely mottled and siliceous
50	61·68	9·05	✓ Hard dense reddish hematite (siliceous)
51	60·12	12·30	✓ Good deal of hard dense ore, but with siliceous patches throughout
52	55·25	20·14	✓ Good deal of hard dense ore, but with siliceous patches throughout
53	49·00	28·25	✓ Very siliceous and jaspery throughout
54	49·34	28·00	✓ Very siliceous and jaspery throughout
* "D" CUT.—Across full width of outcrop; west to east in 5-ft. sections.			
55	55·34	20·10	✓ Hard dense finely siliceous ore
56	63·73	8·02	✓ Hard dense ore, some siliceous patches
57	65·04	6·33	✓ Hard dense ore (good). (Very mottled and siliceous 2 to 3 feet north of this section)
58	65·16	5·50	✓ Hard dense ore (good)
59	63·91	8·05	✓ Hard dense ore. (All immediately about here is good, but becomes mottled and siliceous little to north.) (56-59. There is a lot of good ore about here, but $\frac{1}{2}$ to $\frac{3}{4}$ chain to north outcrop is mottled and siliceous, the occurrences of good ore are irregular, and no quantity can be estimated, as the whole it could not be worked apart from the siliceous)
60	58·95	14·75	✓ Mostly hard dense ore, but good deal siliceous matter in parts
61	67·65	2·55	✓ Most hard ore (good), with finer siliceous (?) patches
62	64·46	5·40	✓ Hard dense siliceous (?) ore. Some mottled ore in section
63	62·98	8·14	✓ Mottled and siliceous at first, then good ore. (Apparently no extent of good ore as outcrop shows siliceous just to north)
64	64·30	7·00	✓ Mostly good ore, last 18 inches mottled to siliceous
65	63·94	6·78	✓ Siliceous at first, but mostly good ore. (Much siliceous ore shown just south of good ore in these cuts; patches of good ore are irregular and mixed up with siliceous)
66	60·21	12·56	✓ Coarse mottled and siliceous throughout (patches of good ore)
67	64·29	5·96	✓ Mostly good ore, with occasional patches of siliceous
68	56·90	17·60	✓ Good deal of good ore, but siliceous bands and bunches throughout
69	58·55	15·60	✓ Siliceous throughout
70	53·51	23·10	✓ Very siliceous throughout (in part jaspery)
* "E" CUT.—"Small (N) quarry" samples (as shown); 7-ft. sections west to east on surface and along top of quarry face N.			
Note.—Samples 71-76 are cut diagonally, and do not represent true widths.			
71	63·71	8·04	✓ On surface 7 feet slightly diagonally to strike of lode. Mostly good ore, but siliceous at first
72	62·09	10·08	✓ 7 feet diagonally to strike edge of quarry N face. Mostly good looking ore, with siliceous patches
73	63·56	9·24	✓ 7 feet diagonally to strike edge of quarry N face. Mostly good looking ore, with siliceous patches
74	58·13	17·08	✓ 7 feet, face of quarry. Siliceous and mottled throughout
75	55·56	21·38	✓ 7 feet; very siliceous and mottled; jaspery towards end
76	35·39	48·85	✓ 7 feet (type sample only); jasper (no ore at all)
UPPER TUNNEL SAMPLES.—5-ft. sections; west to east along south wall of tunnel.			
77	51·33	25·29	✓ Hard dense ore; apparently siliceous throughout. (77-78 are best looking sections in tunnel)
78	55·73	17·42	✓ Hard dense ore; apparently siliceous throughout
79	45·67	32·69	✓ Coarse mottled siliceous; no clean ore (very jointy)
80	50·63	26·09	✓ Coarse mottled siliceous; no clean ore
81	49·06	28·55	✓ Coarse mottled siliceous; no clean ore
82	47·76	28·58	✓ Coarse mottled siliceous; no clean ore
83	49·59	27·35	✓ Coarse mottled siliceous. ("Soft" siliceous ore, friable in part)
84	49·40	28·58	✓ "Soft" friable siliceous ore
85	59·16	15·33	✓ More solid and denser, but still siliceous (other wall worse)

\* See plan for positions of these cuts.

## LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
UPPER TUNNEL SAMPLES—continued.			
86	58.80	14.70 ✓	Friable and siliceous; no clean ore
87	60.33	11.17 ✓	Apparently very siliceous; "scaly" and very jointed
88	59.42	13.72 ✓	Little clean ore showing, but bulk siliceous (roof)
89	58.91	13.62 ✓	Very broken and jointed, siliceous; soft and mullocky in parts
90	50.92	25.74 ✓	Very broken and jointed, siliceous; soft and mullocky in parts
91	53.20	24.00 ✓	Very broken and jointed, siliceous; soft and mullocky in parts
92	48.83	29.60 ✓	Hard broken siliceous and jaspery
93	25.47	62.40	Hard broken jasper, with occasional small veins of hematite
* "F" CUT.—Main quarry samples. Across face of quarry and over outcrop to west of quarry (continuous) taken west to east in 5 ft. sections.			
94	43.58	37.94 ✓	Surface 5 feet hard dense siliceous jaspery ore
95	43.13	38.73 ✓	Surface 5 feet; hard dense siliceous jaspery ore
96	52.15	26.20 ✓	Surface 5 feet; hard dense siliceous jaspery ore
97	48.04	31.73 ✓	Surface 7 feet; hard dense siliceous jaspery ore. (94-97. Intimate mixture of good ore and jasper could not be picked and bulk no good)
98	60.64	14.14 ✓	Face of quarry, 5 feet; hard clean looking ore (siliceous ore just behind)
99	63.98	7.42 ✓	Face of quarry, 8 feet (mostly along joint); good looking ore along cut, but surrounding ore poor and siliceous
* "G" CUT.—Taken across outcrop from west wall easterly in 5-ft. sections (not quite to east wall, which is here-irregular).			
100	51.37	21.46 ✓	Hard dense reddish ore, with bleby silica throughout
101	37.10	44.85 ✓	Siliceous and jaspery throughout
102	49.18	28.28 ✓	Hard dense reddish ore, with "bleby" silica (all siliceous?)
103	41.83	36.00 ✓	Jaspery, with small patches good ore (section no good)
104	47.69	31.81 ✓	Jaspery and siliceous
105	25.64	61.61 ✓	Very siliceous and very jaspery (jasper)
106-122			Cuts are at river (see later)
123	35.70	46.85 ✓	Jaspery and siliceous throughout
124	52.23	24.18 ✓	Jaspery, with small patches of clean ore
125	49.76	27.45 ✓	Jaspery, with small patches of clean ore
* "H" CUT.—Across exposed vertical face of main lode at entrance to (E of) bottom tunnel; 5 ft. sections; west to east.			
106	34.04	45.24 ✓	Hard dense reddish siliceous ore
107	46.81	30.69 ✓	Hard dense reddish siliceous ore
108	30.88	51.64 ✓	Very "mullocky" and jaspery (centre portion soft and mullocky)
109	63.00	9.21 ✓	Mostly good looking dense ore
110	48.30	30.19 ✓	Siliceous and jaspery
111	53.29	21.90 ✓	Dense reddish siliceous and jaspery, with small patches of decent ore (on general average all these sections siliceous and jaspery throughout)
* "J" CUT.—On E lode; across outcrop on bank of river; 5-ft. sections; west to east.			
112	48.76	29.09 ✓	Hard dense siliceous ore
113	51.94	24.59 ✓	Hard and dense, little good ore, but mostly siliceous
114	51.85	24.60 ✓	Hard and dense, with blebs of silica and some jasper
115	49.85	27.34 ✓	Hard and dense, with blebs of silica and some jasper
116	48.70	29.58 ✓	Hard and dense, with blebs of silica and some jasper. (Whole face of outcrop a few feet above section line is very hard and jaspery; is also still more jaspery further north and to south at water's edge)
* "K" CUT.—Across outcrop of main lode; west to east; in 5-ft. sections (not quite across full width of lode)			
117	55.57	20.18 ✓	5 feet (not quite to west wall); hard dense reddish "foliated" and siliceous
118	52.24	23.08 ✓	Hard dense siliceous ore
119	59.51	11.89 ✓	Very siliceous first half of cut, then fairly decent ore
120	57.24	17.25 ✓	Mostly dense reddish "foliated" and siliceous
121	54.95	17.48 ✓	6 feet; mostly dense reddish "foliated" and siliceous
122	46.37	31.00 ✓	6 feet to wall of cliff (about 4 feet further to wall of lode); very siliceous and jaspery throughout
* "M" CUT.—"Purple Crag"; across north-east end of main body; east to west; in 5-ft. sections.			
126	57.96	12.92 ✓	Mostly good hematite, but some silica showing
127	66.56	3.52 ✓	Mostly nice looking dense hematite, slightly rubbly in parts
128	64.15	3.70 ✓	Clean hard hematite
129	65.96	2.64 ✓	Clean hard hematite
130	66.56	2.26 ✓	6 feet; mostly clean hard hematite; few rubbly seams
131	64.50	6.36 ✓	Mostly clean hard hematite; some siliceous material near end of section. (All this ore is "agglomeratic")

\* See plan for positions of these cuts.

## LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
BOTTOM TUNNEL SAMPLES.—1st E cross-cut.			
132	63.81	6.54	North-east side of cross-cut (full width of ore exposed); very broken and jointed ore; mostly fairly good (some mullocky seams, not included in sample)
133	53.92	19.07	South-west side of cross-cut opposite (132); 5 feet. More mullocky than 132, and ore harder and more "stoney" and siliceous. (Face of cross-cut in very hard "stoney" siliceous ore)
E cross-cut at 221 feet; 6-ft. cuts north side from face back toward tunnel.			
170	43.09	36.00	Broken and jointed; very siliceous and jaspery
171	55.47	19.04	Little good ore throughout section, but on whole very siliceous
E cross-cut at 166 feet.—From face back towards tunnel.			
172	33.37	50.39	3 feet; very "jointy," practically all jasper
173	40.85	39.40	Very jaspery throughout; very broken and jointed
174	36.55	44.00	Very jaspery throughout; very broken and jointed
175	37.24	42.61	Very jaspery throughout; very broken and jointed; face of cross-cut in short-jointed jasper)
176	52.20	23.83	Very jaspery throughout; very broken and jointy; face of cross-cut in short-jointed jasper
E cross-cut at 77 feet.—Starting on west (or tunnel) side of body.			
155	60.46	10.72	Some good ore, but lot of hard "stoney" red siliceous type
156	41.65	38.22	Some good ore, but lot of hard "stoney" red siliceous type
157	38.50	40.12	7 feet; very jaspery
E cross-cut at 142 feet.—5 feet; full width exposed.			
158	39.10	40.35	Red "foliated" ore, with much jasper throughout
MIDDLE TUNNEL.—5-ft. sections; east to west; across full width of lode exposed.			
159	29.31	56.58	Very hard, jointed, and very jaspery; no clean ore
160	39.20	39.75	Very hard, jointed, and very jaspery; one small patch clean ore
161	52.66	60.72	Very hard, jointed, and very jaspery; no clean ore
162	27.03	58.20	Very hard, jointed, and very jaspery; no clean ore
163	40.02	41.97	Very hard, jointed, and very jaspery; no clean ore
164	23.48	63.00	Very hard, jointed, and very jaspery; no clean ore
165	17.63	73.14	Very hard, jointed, and very jaspery; no clean ore
166	17.89	71.80	Very hard, jointed, and very jaspery; no clean ore
167	13.32	79.27	6 feet; eastern half jaspery ore, balance plain jasper
168	55.64	17.90	General sample off isolated outcrop (fall over from main lode), 20 feet wide, just west of cut "K"; hard dense reddish siliceous ore
* "O" CUT.—"Purple Crag" samples; along vertical face of outcrop as shown; east to west; in 5-ft. sections exposed face in 15 to 20 feet high (20 feet at west and south-west falling with slope of hill north-east).			
145	62.69	8.00	Mostly good ore; little silica showing in places
146	59.85	6.80	Mostly good ore; little silica showing in places
147	60.28	10.03	Mostly good ore; more visible silica (much silica showing in face just above this cut)
148	63.12	7.79	Mostly good ore; little silica showing in places
149	65.45	2.04	Mostly good ore; no silica showing
150	67.60	2.40	Mostly good ore; no silica showing; finely jointed section, with much rubbly "cementing" hematite
* "L" CUT.—"Purple Crag"; across outcrop; south to north; in 5-ft. sections.			
151	68.20	1.64	} Mostly all good looking ore showing in these cuts; little silica showing at times in the larger "fragments"
152	67.40	3.66	
153	65.62	4.15	
154	67.08	1.83	
(All "Purple Crag" ore is fragmental or "agglomeratic.")			
* "N" CUT.—Across outcrop; in 5-ft. sections; east to west.			
134	48.76	28.41	Little decent ore, but on whole hard and siliceous
135	46.87	31.56	Siliceous and jaspery throughout.
136	52.98	22.54	Siliceous and jaspery throughout
137	43.84	33.31	Siliceous and jaspery throughout
138	49.70	26.42	Siliceous and jaspery throughout
139	42.66	37.76	Siliceous and jaspery throughout
140	47.90	29.60	Siliceous and jaspery throughout
141	46.27	33.41	Siliceous and jaspery throughout
142	47.96	30.21	Siliceous and jaspery throughout
143	45.06	34.64	Siliceous and jaspery throughout
144	32.16	52.23	Nearly all clean jasper

Note.—Cut is not taken across full width of outcrop; there is about 10 feet of jasper similar to 144 beyond (west of) this point, but owing to the precipitous nature of the outcrop at this point it could not be sampled.

\* See plan for positions of these cuts.

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—*continued.*

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
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SAMPLES 177 to 186.—Taken along same Cuts as 71, 72, and 73; over 2-ft. sections.

177	61·06	12·33	See 71-73; 182 shows siliceous, but all others appear good
178	60·63	13·23	
179	65·19	5·63	
180	62·26	10·02	
181	66·39	4·16	
182	49·70	26·12	
183	67·94	2·81	
184	66·50	5·10	
185	62·78	11·00	
186	58·28	10·35	

SAMPLES 187 to 192.—Taken along same Cuts as 96 and 97, but over 2-ft. sections.

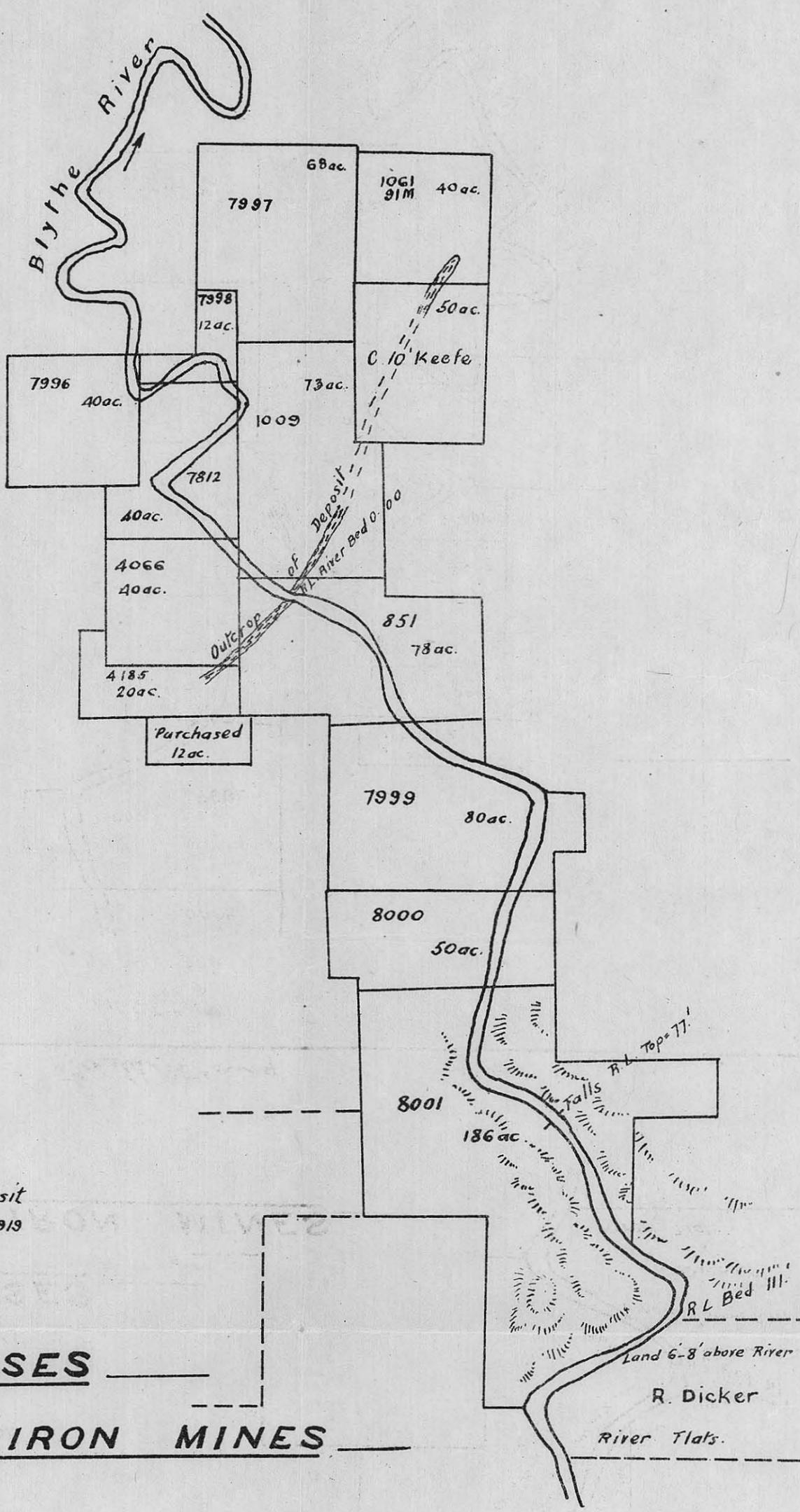
187	46·37	30·72	See 96-7
188	47·42	30·22	
189	50·57	27·64	
190	47·00	32·72	
191	45·85	34·70	
192	47·82	31·30	

PHOSPHOROUS DETERMINATIONS.

No. of samples.	Per cent. of Phosphorous.	No. of samples.	Per cent. Phosphorous.
56	·038	73	·058
57	·030	77	·054
58	·077	78	·110
59	·064	85	·039
60	·037	151	equal parts ·0089
61	·052	152	
71	·060	153	
72	·077	154	

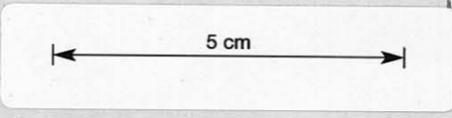
COMPLETE ANALYSIS OF COMPOSITE SAMPLE FROM PROPORTIONAL PARTS OF THE FOLLOWING SAMPLES:—26, 27, 28, 29, 44, 45, 46, 47, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 71, 72, 73.

Organic matter	..	..	Trace
Moisture	..	..	0·13 .. at 100° C.
Hydration	..	..	0·54 .. Above 100° C.
Ferrous oxide	..	FeO	1·200 ..
Ferric oxide	..	Fe <sub>2</sub> O <sub>3</sub>	89·68 ..
Magnetite	..	Fe <sub>3</sub> O <sub>4</sub>	Also present
Phosphorous pentoxide	..	P <sub>2</sub> O <sub>5</sub>	0·119 ..
Sulphur trioxide	..	SO <sub>3</sub>	0·135 ..
Lime	..	CaO	0·165 ..
Silica	..	SiO <sub>2</sub>	7·760 ..
Alumina	..	Al <sub>2</sub> O <sub>3</sub>	0·620 ..
Manganous oxide	..	Mno	0·078 ..
Magnesia	..	MgO	Trace
Cupric oxide	..	CuO	Trace
Chromic oxide	..	Cr <sub>2</sub> O <sub>3</sub>	Nil
Titanic oxide	..	TiO <sub>2</sub>	Nil



To accompany  
 Report on the Blythe River Iron Deposit  
 Dated 15<sup>th</sup> July 1919

**PLAN OF LEASES**  
**BLYTHE RIVER IRON MINES**

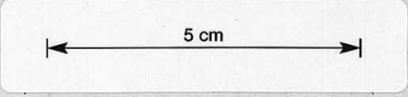
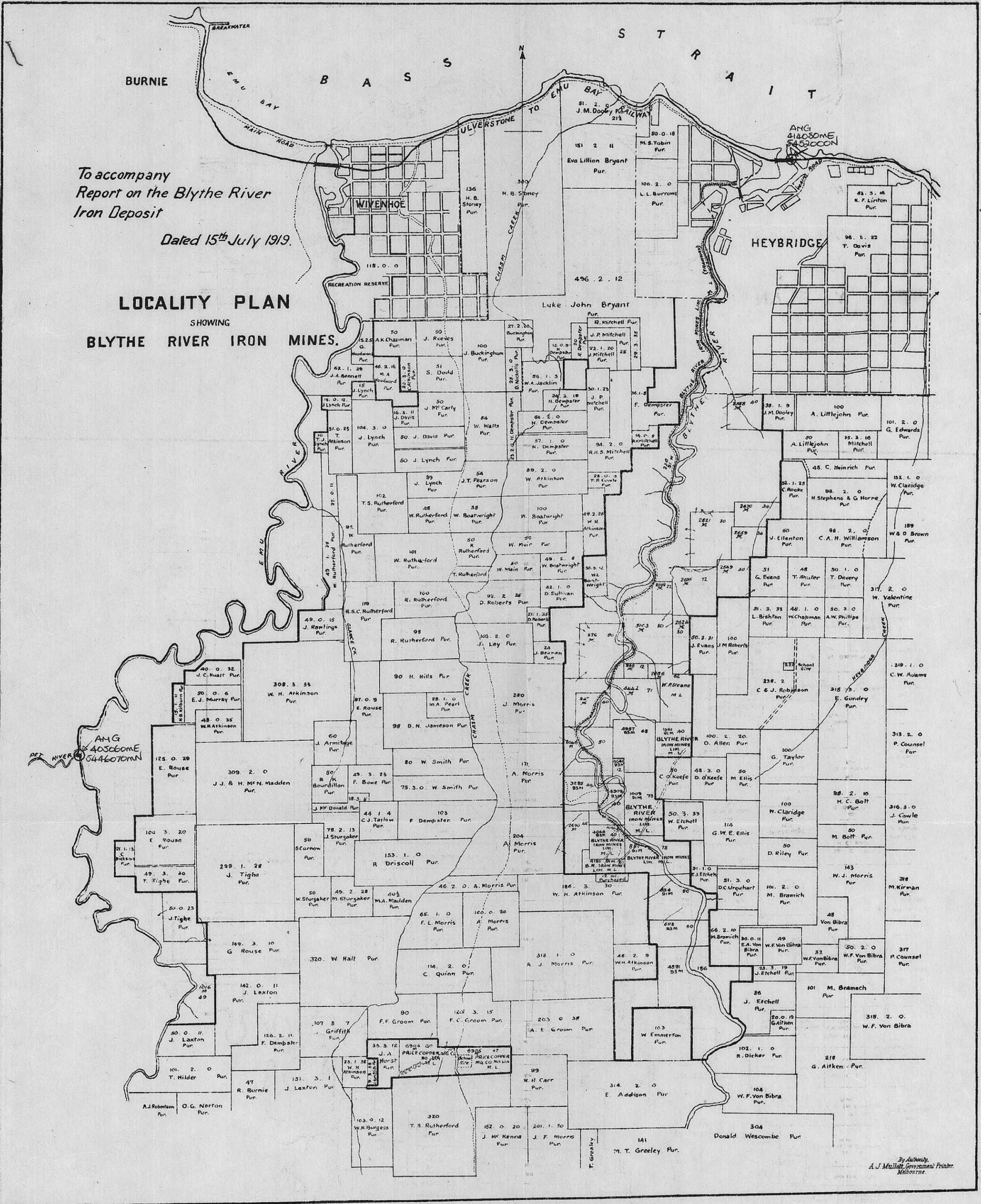


Gerald W. Young

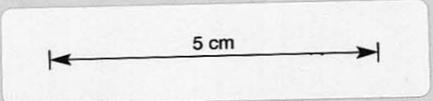
To accompany  
Report on the Blythe River  
Iron Deposit

Dated 15<sup>th</sup> July 1919.

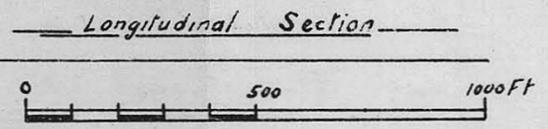
**LOCALITY PLAN**  
SHOWING  
**BLYTHE RIVER IRON MINES.**



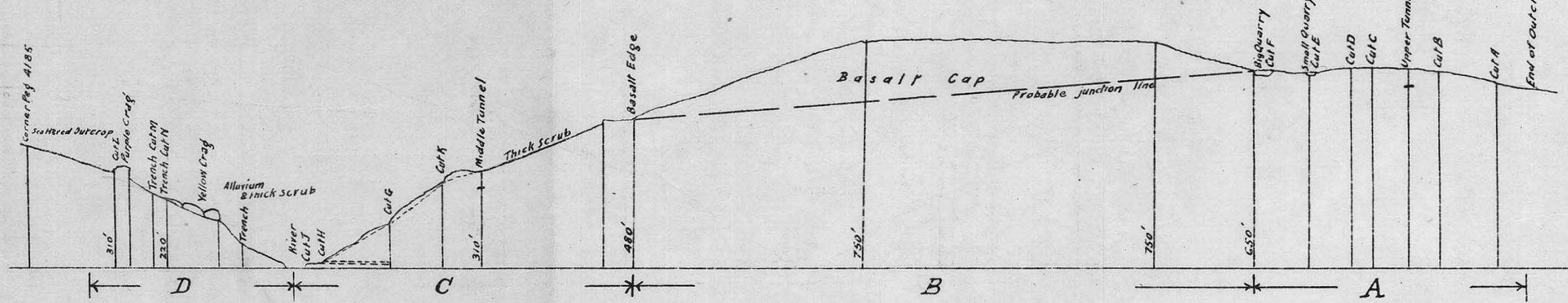
AMG REFERENCE POINTS ADDED



**BLYTHE RIVER IRON MINES**



To accompany  
Report on the Blythe River Iron Deposit  
Dated 15<sup>th</sup> July 1919



ACE  
L. M. Young 2/1/19

# REPORT ON THE BLYTHE RIVER IRON DEPOSIT, BURNIE, TASMANIA.

BY MESSRS A. A. BOYD, CHAS. G. GIBSON AND GERALD W. YOUNG.



Mount Morgan, Queensland,  
14th July, 1919.

## LOCATION.

The property is situated on the Blythe River, which intersects the deposit at about 6 miles above its mouth, the latter being approximately 5 miles to the east of Burnie (see locality plan).

The Main North Coast Railway from Launceston to Burnie crosses the river a few chains above its mouth, and a railway following the river could, if necessary, be built to connect with the mine. A survey and estimate of the cost of this has been prepared by A. Chaplin in 1901, and is in the possession of the Blyth River Iron Mines.

Good roads exist to the upper or north-east portion of the deposit, but the main workings could only be satisfactorily reached by following up the river, and no road exists here at present.

## EARLY WORK.

Although the property has been known for many years and a considerable amount of money expended by the present owners, very little work of a useful or developmental nature has been done.

The only works of any importance are the three tunnels shown on the plan herewith, and known respectively as the "Upper," "Middle," and "River." These were put in about eighteen years ago, and little or no work has been done since.

In addition, there are a number of prospecting trenches on the leases and two small open cuts, or "quarries," towards the north-east end of the outcrop.

At the time of our inspection the tunnels had fallen in and had to be re-opened and in parts timbered before the exposure of ore in them could be sampled. The important trenches, too, had to be cleaned out, and in most cases deepened and lengthened.

## PREVIOUS REPORTS.

The principal reports that have been made on the property from time to time are those by Messrs. Darby (1900), Twelvetrees (1901), Paul (1912), and Jacquet (1912 and 1915), all these being more or less of a confidential nature.

## EXTENT OF THE PROPERTY.

The area held by the Blythe River Iron Mines comprises Crown Mineral Leases numbers 1061, 1009, 4066, 851, 4185, 7812, 7996, 7997, 7998, 7999, 8000, 8001, together with 12 acres of freehold, and mining rights in O'Keefe's 50 acres—in all 789 acres. The position of these is shown on the lease plan herewith.

## GEOLOGICAL FEATURES.

### TOPOGRAPHY.

The country immediately back from the Blythe River consists for the most part of undulating hills through which the river has cut for itself a steep rugged valley, which at the point where the iron deposit crosses it, has a maximum depth of some 750 feet, the sides rising at an average angle of about 1 in 2; both north and south of this point, however, the hills gradually become lower and the river valley consequently not so deep or rugged. The sides and bottom of the valley are invariably densely covered with sword grass, bracken, and undergrowth.

The locations and results of all these samples are shown on the plan herewith, and are also given, together with field remarks on the individual samples, in the Appendix attached to this report.

A careful examination of the results obtained from these samples shows that by far the greater part of the deposit may be at once cut out as of no value. The only ore of any possible present value is that occurring in the "Purple Crag," and at the southern end of the top or north-east outcrop of the main lode.

The results from the various underground workings are especially disappointing. The "Middle" tunnel results simply substantiate the poor opinion formed of this portion of the outcrop from surface inspection, and the same may even be said of the "River" tunnel. Some of the ore in the upper tunnel, however, looked fairly good, and some nice clean ore is showing in one or two places on the surface immediately over the tunnel; the results go a long way towards proving the irregularity and noncontinuity of the better grade of ore exposed on the surface to the south-west, and also that shown in sample trench "B" to the north-east.

Going into the question of this better grade ore in more detail, it will be noticed that cut "A" shows one length of 5 feet of good ore. This, however, is simply an isolated patch, and it is surrounded by siliceous jaspery material of no value. No appreciable quantity of decent-looking ore is to be seen anywhere to the northward of this point, and little or none to the southward until the vicinity of trench "B" is reached; at this point the samples show a consecutive width of 30 feet of ore containing approximately 61 per cent. of iron and 11 per cent. of silica; southward from this spot there are patches of good-looking ore showing and some is to be seen on the surface immediately over the tunnel; the results obtained here, however (*i.e.*, in the tunnel), are disappointing, and they indicate only one small patch (5 feet) of even moderately good ore. Trench "C" again shows 25 feet of ore of an average value of 63 per cent. iron and 9 to 10 per cent. silica, while "D" cut shows 60 feet of ore averaging 63 to 64 per cent. of iron and 7 per cent. to 8 per cent. of silica; in "E" cut this width has been reduced to 15 feet of 62 per cent. to 63 per cent. iron and 9 per cent. silica; while "F" shows only 5 feet of decent ore. Although these sections indicate that there is a continuous stretch of high-grade ore here the actual outcrop shows that there is *not*; the good ore does not occur regularly, but is found in bunches and in seams of all sizes and shapes running irregularly through the lower grade siliceous material. As example, the outcrop between samples trenches "C" and "D" shows much highly-siliceous ore lying between the areas of good ore exposed in these trenches, and a still larger development of siliceous, and in parts jaspery, material separates the good ore shown in "D" and "E," and similarly between "E" and "F." On the other hand, considerable areas of high-grade ore are to be seen corresponding to and replacing low-grade material exposed in other portions of the cuts. In other words, while any individual sample trench may shew 30 feet of good ore and 30 feet of siliceous material over any particular sections, another trench only a few feet away, while showing possibly the same total quantity of good ore, would have the relative values of corresponding sections entirely reversed, and *vice versa* in the next few feet.

With the object of checking the uniformity or otherwise of the silica content throughout the individual 5-ft. sections taken in the higher and medium-grade ore, samples 71/73 and 96/97 were re-cut in the same places over 2-ft. lengths. A comparison of the results shows that the silica occurs regularly throughout.

With the object of further arriving at the possible value of this better grade of ore a series of representative samples were chosen and the phosphorous contents determined. The full list of these samples is given at the end of the Appendix. It will be seen from these that the average phosphorous content of this ore is 0.050 per cent.

A general sample was also made up by taking proportional parts of a typical series of samples of the higher-grade ore, and a complete analysis of this was made with the object of ascertaining the full chemical composition of the ore. The result of this analysis is given in the Appendix.

By taking the general run of the samples, and calculating the total iron as hematite ( $\text{Fe}_2\text{O}_3$ ), it will be seen that the addition of the  $\text{Fe}_2\text{O}_3$  and  $\text{SiO}_2$  allows very little room for other impurities. The ore is, therefore, a varying mixture of hematite and quartz (chert).

With regard to the high-grade ore exposed in the "Purple Crag," this deposit may be considered as something separate from the main lode. It consists of a rugged mass of high-grade iron ore outcropping as shown on the plan. It appears to be formed of angular fragments of hard, dense hematite, cemented together by a more or less rubbly impure hematite. A tunnel, driven from the north side about 20 feet under the outcrop, shows that the deposit is not the outcrop of a permanent lode, but is merely a surface formation resting on upturned soft sandstones.

The origin of this deposit is not by any means clear; it appears to have been originally a surface collection of angular fragments and boulders of hematite, which have become more or less cemented together by a finely-divided limonitic earthy material; subsequently the whole was covered by a thick mass of molten basalt (the deposit is not far below the present basalt level), and the heat thus generated dehydrated the limonite and converted the whole formation into its present form. The apparent weak point in this theory is that there is no high-grade hematite now showing in the main lode—or anywhere else—which could have provided the supply for the deposit; however, it is quite possible that a local patch of high-grade ore may have occurred in the upper portion of the main lode prior to its denudation, and this may have yielded the original supply for the crag.

Near the south-east end of the big trench marked X" on the plan, there is exposed 16 feet of solid "Purple Crag" ore, which appears to be a continuation of the main "Crag" outcrop. A little work on this soon proved, however, that it was only a large tabular mass of "float" ore resting on soft sandstones—evidently a mass slipped down from the main crag.

A reference to the samples taken over the "Purple Crag" shows that the ore is of excellent quality as regards its iron and silica contents, these averaging 64.6 per cent. and 4.9 per cent. respectively. The phosphorus content as shown by samples 151/154 is 0.0089 per cent.

Unfortunately the quantity of ore in this body (12,000 tons) is not sufficient to render it of any economic importance.

#### QUANTITY AND QUALITY OF ORE AVAILABLE.

The gross tonnage of iron-bearing material in the whole deposit above the river level has been roughly estimated at 9,000,000 long tons.

This figure was arrived at as follows:—

The deposit was considered in five separate blocks as shown on the longitudinal section herewith, and the approximate tonnage in each of these calculated —

Block A. Length, 920 feet; depth, 600 feet; average thickness, 60 feet = 2,760,000 tons. Being low grade and siliceous, the material has been taken at 12 cubic feet to the long ton.

Block B. Length, 1,840 feet; depth, 570 feet; average thickness, 45 feet = 3,933,000 tons.

Block C. Length, 1,270 feet; average depth, 300 feet; average thickness, 45 feet = 1,429,000 tons.

Block D. Length, 700 feet; average depth, 200 feet, average thickness, 60 feet = 700,000 tons.

Block E. "Purple Crag," length, 200 feet; width, 30 feet, thickness, 20 feet = 12,000 tons. (Ore being high grade is taken 10 cubic feet to the ton.)

Total—8,834,000, or say, 9,000,000 tons.

*Note.*—In computing the average thicknesses of these blocks, notice has been taken of the fact that at the river level the main lode is only 30 feet wide, thus indicating that the bed is thinning out in depth; a general proportional reduction of the surface widths, has therefore, been made in all cases.

As already stated, however, the bulk of this must be discarded as being far too siliceous to be of any value at the present time. The only portions which can be regarded as iron ore are (a) the south-west portion of the upper or north-eastern block, and (b) the "Purple Crag."

As shown by the sampling and by careful field observations the good ore (*i.e.*, ore of the grade shown in the complete analysis at the end of the Appendix) in the north-eastern outcrop is confined to the portion lying between cuts "B" and "F" and even over this area it represents by far the lesser part of the deposit. Owing to its irregular occurrence, and to its more or less intimate mixture with low-grade siliceous material, it would be impossible to selectively mine any appreciable tonnage. For the same reason it is quite impossible to arrive at even an approximate estimate of the quantity available over this area.

Allowing for the unavoidable admixture of a certain amount of siliceous material, it might be possible to mine ore here of an average grade of, say, 12 per cent. silica. The gross quantity of even this that is available is, however, comparatively small, and the cost of mining and picking it would be prohibitive.

The ore in the "Purple Crag" is of excellent quality, but the small tonnage (12,000 tons) available and its inaccessibility render it of no value at the present time.

CONCLUSION.

It is to be regretted that the result of our examination has been to force us to the opinion that the property is, at the present time, of no economic value; our investigations have shown that (a) the bulk of the deposit is far too siliceous to be considered as an iron ore at the present day, and (b) that the quantity of good ore is too small to be considered of any economic importance.

In view of these facts, the question of working methods, transport, &c., &c., did not warrant consideration.

(Sgd.) A. A. BOYD,  
CHAS. G. GIBSON,  
GERALD W. YOUNG.

15th July, 1919.

Note.—Where the term "clean ore" is mentioned in this report, hematite ore containing not more than 12 per cent. silica is meant.

APPENDIX.

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
1-20	51.81	25.50	100' 90' 80'
3-20	53.61	23.15	
5-20	54.73	21.58	
* "A" CUT.—Across full width of outcrop; starting on west side and cut easterly in 5 feet section.			
1	52.89	23.53	Fairly good looking ore showing blebs of silica
2	18.35	69.80	Very siliceous and jaspery (nearly all jasper)
3	47.24	32.43	Very jaspery for first foot, then mixed hematite and jasper
4	41.97	39.02	First couple of feet jaspery then mottled and "bleby" ore
5	59.22	15.11	Mostly good ore but last foot or so jaspery
6	56.63	18.85	Much "bleby" silica showing throughout
7	57.68	16.60	Jaspery in part and with good deal of "bleby" silica in balance. (Much "bleby" silica showing just north-east of this section)
8	47.25	32.40	Jaspery and siliceous throughout (alternating jasper and hematite inch to inch)
9	51.40	26.00	Mottled and siliceous at first, then hard hematite (just to south-west of 8 and 9 is much jasper)
10	50.84	26.97	Hard mottled siliceous ore, jaspery in part
11	59.91	14.08	Hard mottled siliceous ore, jaspery in part
12	42.85	38.37	Jaspery and siliceous throughout
13	54.30	22.33	Siliceous and mottled type
14	58.45	16.77	Mostly dense fair looking hematite, but only local patch
15	49.49	28.45	Siliceous and coarse mottled, little clean ore
16	66.60	5.01	Mostly dense hematite with blebs of silica
17	51.47	26.19	Siliceous throughout
18	59.68	15.44	Fine mottled siliceous type
19	54.47	21.91	Fine mottled with coarser siliceous type
20	55.50	20.37	(6-ft. cut.) Nearly all coarse mottled siliceous type

\* "B" CUT.—Across full width of outcrop; west to east, 5-ft. sections.

21	45.07	34.80	(Not quite to edge of outcrop.) Very siliceous and jaspery
22	42.43	36.87	(Not quite to edge of outcrop.) Very siliceous and jaspery
23	48.55	28.90	(Not quite to edge of outcrop.) Very siliceous and jaspery. (Surrounding ore also very siliceous)
24	56.58	15.87	Some fair dense hematite, but more or less siliceous throughout
25	57.96	15.26	Some fair dense hematite, but more or less siliceous throughout
26	62.79	8.35	Mostly dense hematite, but siliceous in parts
27	61.24	9.67	Mostly dense hematite, but siliceous towards end of section
28	58.99	13.66	Mostly dense hematite with finely divided silica throughout
29	62.96	8.68	Mostly dense hematite with mottled siliceous type over centre foot
30	58.18	16.35	Mostly siliceous and mottled type throughout
31	63.48	8.20	Mostly fine dense hematite with finely divided silica
32	54.50	21.10	Siliceous and coarse mottled type with little clean hematite
33	..	..	Sample not cut, apparently soft mullocky seam (deeply eroded and not properly exposed)
34	58.09	16.48	(4½ feet only cut.) Mostly coarse mottled and siliceous; few inches clean ore
35	53.04	22.04	Coarse mottled siliceous type
36	55.63	19.74	Siliceous and jaspery, with small patch of clean hematite
37	48.81	29.52	Coarse mottled siliceous and jaspery
38	49.56	28.87	Coarse mottled siliceous and jaspery

\* See plan for positions of these cuts.

Cut A

A

Ave (24-31) 60.27 12.05 = 40'  
 Cut B } 24-36 54.11 13.65 = 65'  
 24-38 53.45 15.72 = 75'  
 21-38 52.10 18.69 = 90'

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

No.	Fe.	SiO <sub>2</sub>	Field Remarks.
Aves AA-47	63.57	8.27	=20'
AA-51	61.27	10.93	=40'
39-51	58.58	12.39	=65'
39-54	57.19	16.46	"C" CUT.—Across full width of outcrop; west to east in 5-ft. sections.
39	57.61	13.46	Little clean hematite, but on whole finely siliceous
40	54.08	20.78	Little clean ore at first, then coarsely siliceous to jaspery
41	54.38	20.55	Coarsely siliceous and slightly jaspery throughout
42	48.64	27.30	Very siliceous throughout, coarse mottled and jaspery
43	56.21	17.80	Hard dense and finely siliceous throughout
44	63.00	9.17	Hard dense and finely siliceous (very siliceous just to south of this cut)
45	61.16	11.40	Hard dense hematite, with siliceous patches throughout
46	66.06	4.44	Dense hematite (good ore over whole section)
47	64.04	8.07	Good hematite throughout except last foot which is finely siliceous. (44-47. There is good hematite all through these sections, but it is mixed with siliceous type, and is nowhere continuous in any direction, and could not be separated; couple of feet north from cut 46 whole outcrop is siliceous, but good ore to south; north from 47 is good, but to south is siliceous a yard or two away. Good deal of this mixed to good ore in this immediate neighbourhood)
48	59.42	13.76	Hard dense and finely siliceous throughout
49	54.90	19.14	Finely mottled and siliceous
50	61.68	9.05	Hard dense reddish hematite (siliceous)
51	60.12	12.30	Good deal of hard dense ore, but with siliceous patches throughout
52	55.25	20.14	Good deal of hard dense ore, but with siliceous patches throughout
53	49.00	28.25	Very siliceous and jaspery throughout
54	49.34	28.00	Very siliceous and jaspery throughout

\* "D" CUT.—Across full width of outcrop; west to east in 5-ft. sections.

55	55.34	20.10	Hard dense finely siliceous ore
56	63.73	8.02	Hard dense ore, some siliceous patches
57	65.04	6.33	Hard dense ore (good). (Very mottled and siliceous 2 to 3 feet north of this section)
58	65.16	5.50	Hard dense ore (good)
59	63.91	8.05	Hard dense ore. (All immediately about here is good, but becomes mottled and siliceous little to north.) (56-59. There is a lot of good ore about here, but 1/2 to 3/4 chain to north outcrop is mottled and siliceous, the occurrences of good ore are irregular, and no quantity can be estimated, as the whole it could not be worked apart from the siliceous)
60	58.95	14.75	Mostly hard dense ore, but good deal siliceous matter in parts
61	67.65	2.55	Most hard ore (good), with finer siliceous (?) patches
62	64.46	5.40	Hard dense siliceous (?) ore. Some mottled ore in section
63	62.98	8.14	Mottled and siliceous at first, then good ore. (Apparently no extent of good ore as outcrop shows siliceous just to north)
64	64.30	7.00	Mostly good ore, last 18 inches mottled to siliceous
65	63.94	6.78	Siliceous at first, but mostly good ore. (Much siliceous ore shown just south of good ore in these cuts; patches of good ore are irregular and mixed up with siliceous)
66	60.21	12.56	Coarse mottled and siliceous throughout (patches of good ore)
67	64.29	5.96	Mostly good ore, with occasional patches of siliceous
68	56.90	17.60	Good deal of good ore, but siliceous bands and bunches throughout
69	58.55	15.60	Siliceous throughout
70	53.51	23.10	Very siliceous throughout (in part jaspery)

\* "E" CUT.—Small (N) quarry samples (as shown); 7-ft. sections west to east on surface and, along top of quarry face N.

Aves 71-75	60.58	13.16	
71-73	63.12	9.12	Note.—Samples 71-76 are cut diagonally, and do not represent true widths.
71	63.71	8.04	On surface 7 feet slightly diagonally to strike of lode. Mostly good ore, but siliceous at first
72	62.09	10.08	7 feet diagonally to strike edge of quarry N face. Mostly good looking ore, with siliceous patches
73	63.56	9.24	7 feet diagonally to strike edge of quarry N face. * Mostly good looking ore, with siliceous patches
74	58.13	17.08	7 feet face of quarry. Siliceous and mottled throughout
75	55.56	21.38	7 feet, very siliceous and mottled; jaspery towards end
76	35.39	48.85	7 feet (type sample only); jasper (no ore at all)

UPPER TUNNEL SAMPLES.—5-ft. sections; west to east along south wall of tunnel.

77	51.33	25.29	Hard dense ore; apparently siliceous throughout. (77-78 are best looking sections in tunnel)
78	55.73	17.42	Hard dense ore; apparently siliceous throughout
79	45.67	32.69	Coarse mottled siliceous; no clean ore (very jointy)
80	50.63	26.09	Coarse mottled siliceous; no clean ore
81	49.06	28.55	Coarse mottled siliceous; no clean ore
82	47.76	28.58	Coarse mottled siliceous; no clean ore
83	49.59	27.35	Coarse mottled siliceous. ("Soft" siliceous ore, friable in part)
84	49.40	28.58	"Soft" friable siliceous ore
85	59.16	15.33	More solid and denser, but still siliceous (other wall worse)

\* See plan for positions of these cuts.

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Aves 77-84	49.90	26.57	= 40'
85-84	59.33	13.71	= 25'
90-92	50.98	26.45	= 15'
77-92	53.05	22.68	= 80'

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
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UPPER TUNNEL SAMPLES—continued.

86	58.80	14.70	Friable and siliceous; no clean ore
87	60.33	11.17	Apparently very siliceous; "scaly" and very jointed
88	59.42	13.72	Little clean ore showing, but bulk siliceous (roof)
89	58.91	13.62	Very broken and jointed, siliceous; soft and mullocky in parts
90	50.92	25.74	Very broken and jointed, siliceous; soft and mullocky in parts
91	53.20	24.00	Very broken and jointed, siliceous; soft and mullocky in parts
92	48.83	29.60	Hard broken siliceous and jaspery
93	25.47	62.40	Hard broken jasper, with occasional small veins of hematite

\* "F" CUT.—Main quarry samples. Across face of quarry and over outcrop to west of quarry (continuous) taken west to east in 5 ft. sections.

94	43.58	37.94	Surface 5 feet hard dense siliceous jaspery ore
95	43.13	38.73	Surface 5 feet; hard dense siliceous jaspery ore
96	52.15	26.20	Surface 5 feet; hard dense siliceous jaspery ore
97	48.04	31.73	Surface 7 feet; hard dense siliceous jaspery ore. (94-97. Intimate mixture of good ore and jasper could not be picked and bulk no good)

98 60.64 14.14 Face of quarry, 5 feet; hard clean looking ore (siliceous ore just behind)  
 99 63.98 7.42 Face of quarry, 8 feet (mostly along joint); good looking ore along cut, but surrounding ore poor and siliceous

Ave 94-97 46.84 33.48 = 22.1  
 98-99 62.70 10.00 = 13.1  
 94-99 52.73 24.72 = 35.1

CUT.—Taken across outcrop from west wall easterly in 5-ft. sections (not quite to east wall, which is here irregular).

100	51.37	21.46	Hard dense reddish ore, with bleby silica throughout
101	37.10	44.85	Siliceous and jaspery throughout
102	49.18	28.28	Hard dense reddish ore, with "bleby" silica (all siliceous?)
103	41.83	36.00	Jaspery, with small patches good ore (section no good)
104	47.69	31.81	Jaspery and siliceous
105	25.64	61.61	Very siliceous and very jaspery (jasper)
106			Cuts are at river (see later)
122			
123	35.70	46.85	Jaspery and siliceous throughout
124	52.23	24.18	Jaspery, with small patches of clean ore
125	49.76	27.45	Jaspery, with small patches of clean ore

Average  
 100-105 Fe 42.14 Sil<sub>2</sub> 34.04 123-125 45.90 32.83

Ave 100-125 Fe 43.39 Sil<sub>2</sub> 35.80

\* "H" CUT.—Across exposed vertical face of main lode at entrance to (E of) bottom tunnel; 5 ft. sections; west to east.

106	34.04	45.24	Hard dense reddish siliceous ore
107	46.81	30.69	Hard dense reddish siliceous ore
108	30.88	51.64	Very "mullocky" and jaspery (centre portion soft and mullocky)
109	63.00	9.21	Mostly good looking dense ore
110	48.30	30.19	Siliceous and jaspery
111	53.29	21.90	Dense reddish siliceous and jaspery, with small patches of decent ore (on general average all these sections siliceous and jaspery throughout)

Ave Fe 46.05 Sil<sub>2</sub> 31.48

\* "J" CUT.—On E lode; across outcrop on bank of river; 5-ft. sections; west to east.

112	48.76	29.09	Hard dense siliceous ore
113	51.94	24.59	Hard and dense, little good ore, but mostly siliceous
114	51.85	24.60	Hard and dense, with blebs of silica and some jasper
115	49.85	27.34	Hard and dense, with blebs of silica and some jasper
116	48.70	29.58	Hard and dense, with blebs of silica and some jasper. (Whole face of outcrop a few feet above section line is very hard and jaspery; is also still more jaspery further north and to south at water's edge)

Ave Fe 50.22 Sil<sub>2</sub> 27.12

\* "K" CUT.—Across outcrop of main lode; west to east; in 5-ft. sections (not quite across full width of lode)

117	55.57	20.18	5 feet (not quite to west wall); hard dense reddish "foliated" and siliceous
118	52.24	23.08	Hard dense siliceous ore
119	59.51	11.89	Very siliceous first half of cut, then fairly decent ore
120	57.24	17.25	Mostly dense reddish "foliated" and siliceous
121	54.95	17.48	6 feet; mostly dense reddish "foliated" and siliceous
122	46.37	31.00	6 feet to wall of cliff (about 4 feet further to wall of lode); very siliceous and jaspery throughout

Ave Fe 54.31 Sil<sub>2</sub> 20.15

\* "M" CUT.—"Purple Crag"; across north-east end of main body; east to west; in 5-ft. sections.

126	57.96	12.92	Mostly good hematite, but some silica showing
127	66.56	3.52	Mostly nice looking dense hematite, slightly rubbly in parts
128	64.15	3.70	Clean hard hematite
129	65.96	2.64	Clean hard hematite
130	66.56	2.26	6 feet; mostly clean hard hematite; few rubbly seams
131	64.50	6.36	Mostly clean hard hematite; some siliceous material near end of section. (All this ore is "agglomeratic")

Ave Fe 64.28 Sil<sub>2</sub> 5.23

\* See plan for positions of these cuts.

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—continued.

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No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
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BOTTOM TUNNEL SAMPLES.—1st E cross-cut.

132	63.81	6.54	North-east side of cross-cut (full width of ore exposed); very broken and jointed ore; mostly fairly good (some mullocky seams, not included in sample)
133	53.92	19.07	South-west side of cross-cut opposite (132); 5 feet. More mullocky than 132, and ore harder and more "stoney" and siliceous. (Face of cross-cut in very hard "stoney" siliceous ore)

E cross-cut at 221 feet; 6-ft. cuts north side from face back toward tunnel.

170	43.09	36.00	Broken and jointed; very siliceous and jaspery
171	55.47	19.04	Little good ore throughout section, but on whole very siliceous

E cross-cut at 166 feet.—From face back towards tunnel.

172	33.37	50.39	3 feet; very "jointy," practically all jasper
173	40.85	39.40	Very jaspery throughout; very broken and jointed
174	36.55	44.00	Very jaspery throughout; very broken and jointed
175	37.24	42.61	Very jaspery throughout; very broken and jointed; face of cross-cut in short-jointed jasper
176	52.20	23.83	Very jaspery throughout; very broken and jointy; face of cross-cut in short-jointed jasper

E cross cut at 77 feet.—Starting on west (or tunnel) side of body.

155	60.46	10.72	Some good ore, but lot of hard "stoney" red siliceous type
156	41.65	38.22	Some good ore, but lot of hard "stoney" red siliceous type
157	38.50	40.12	7 feet; very jaspery

E cross-cut at 142 feet.—5 feet; full width exposed.

158	39.10	40.35	Red "foliated" ore, with much jasper throughout
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MIDDLE TUNNEL.—5-ft. sections; east to west; across full width of lode exposed.

159	29.31	56.58	Very hard, jointed, and very jaspery; no clean ore
160	39.20	39.75	Very hard, jointed, and very jaspery; one small patch clean ore
161	52.66	60.72	Very hard, jointed, and very jaspery; no clean ore.
162	27.03	58.20	Very hard, jointed, and very jaspery; no clean ore
163	40.02	41.97	Very hard, jointed, and very jaspery; no clean ore
164	23.48	63.00	Very hard, jointed, and very jaspery; no clean ore
165	17.63	73.14	Very hard, jointed, and very jaspery; no clean ore
166	17.89	71.80	Very hard, jointed, and very jaspery; no clean ore
167	13.32	79.27	6 feet; eastern half jaspery ore, balance plain jasper
168	55.64	17.90	General sample off isolated outcrop (fall over from main lode), 20 feet wide, just west of cut "K"; hard dense reddish siliceous ore

Ave Fe 28.95  
Sil 60.47

\* "O" CUT.—"Purple Crag" samples; along vertical face of outcrop as shown; east to west; in 5-ft. sections exposed face in 15 to 20 feet high (20 feet at west and south-west falling with slope of hill north-east).

Ave Fe 63.17  
Sil 6.18

145	62.69	8.00	Mostly good ore; little silica showing in places
146	59.85	6.80	Mostly good ore; little silica showing in places
147	60.28	10.03	Mostly good ore; more visible silica (much silica showing in face just above this cut)
148	63.12	7.79	Mostly good ore; little silica showing in places
149	65.45	2.04	Mostly good ore; no silica showing
150	67.60	2.40	Mostly good ore; no silica showing; finely jointed section, with much rubbly "cementing" hematite

\* "L" CUT.—"Purple Crag"; across outcrop; south to north; in 5-ft. sections.

Ave Fe 67.08  
Sil 2.81

141	68.20	1.64	Mostly all good looking ore showing in these cuts; little silica showing at times in the larger "fragments"
142	67.40	3.66	
143	65.62	4.15	
144	67.08	1.83	

(All "Purple Crag" ore is fragmental or "agglomeratic.")

\* "N" CUT. Across outcrop; in 5-ft. sections; east to west.

137	48.76	28.41	Little decent ore, but on whole hard and siliceous
138	46.87	31.56	Siliceous and jaspery throughout
139	52.98	22.54	Siliceous and jaspery throughout
140	43.84	33.31	Siliceous and jaspery throughout
141	49.70	26.42	Siliceous and jaspery throughout
142	42.66	37.76	Siliceous and jaspery throughout
143	47.90	29.60	Siliceous and jaspery throughout
144	46.27	33.41	Siliceous and jaspery throughout
145	47.96	30.21	Siliceous and jaspery throughout
146	45.06	34.64	Siliceous and jaspery throughout
147	32.16	52.23	Nearly all clean jasper

Ave Fe 47.20  
Sil 30.79

Note.—Cut is not taken across full width of outcrop; there is about 10 feet of jasper similar to 144 beyond (west of) this point, but owing to the precipitous nature of the outcrop at this point it could not be sampled.

\* See plan for positions of these cuts.

LIST OF SAMPLES WITH ASSAY RESULTS AND FIELD REMARKS—*continued*.

No.	Fe.	SiO <sub>2</sub> .	Field Remarks.
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598023

SAMPLES 177 TO 186.—Taken along same Cuts as 71, 72, and 73; over 2-ft. sections.

177	61·06	12·33	} See 71-73; 182 shows siliceous, but all others appear good
178	60·63	13·23	
179	65·19	5·63	
180	62·26	10·02	
181	66·39	4·16	
182	49·70	26·12	
183	67·94	2·81	
184	66·50	5·10	
185	62·78	11·00	
186	58·28	10·35	

SAMPLES 187 TO 192.—Taken along same Cuts as 96 and 97, but over 2-ft. sections.

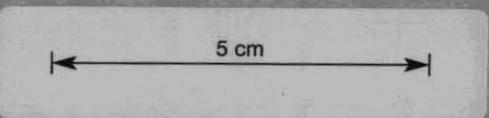
187	46·37	30·72	} See 96-7
188	47·42	30·22	
189	50·57	27·64	
190	47·00	32·72	
191	45·85	34·70	
192	47·82	31·30	

## PHOSPHOROUS DETERMINATIONS.

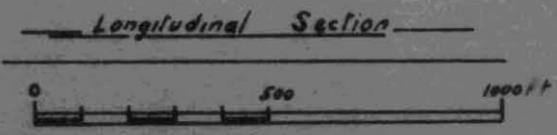
No. of samples.	Per cent. of Phosphorous.	No. of samples.	Per cent. Phosphorous.
56	·038	73	·058
57	·030	77	·054
58	·077	78	·110
59	·064	85	·039
60	·037	151	} equal parts
61	·052	152	
71	·060	153	
72	·077	154	

COMPLETE ANALYSIS OF COMPOSITE SAMPLE FROM PROPORTIONAL PARTS OF THE FOLLOWING SAMPLES:—26, 27, 28, 29, 44, 45, 46, 47, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 71, 72, 73.

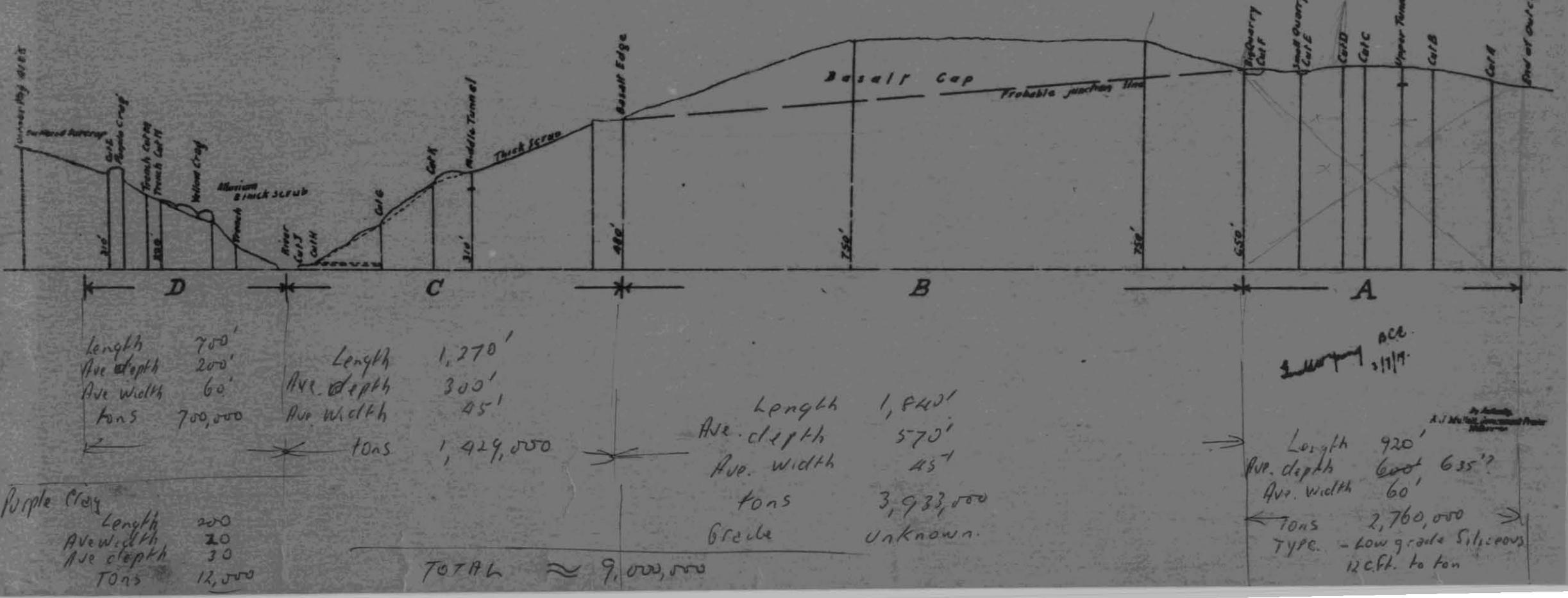
Organic matter	..	..	..	Trace	
Moisture	..	..	..	0·13	.. at 100° C.
Hydration	..	..	..	0·54	.. Above 100° C.
Ferrous oxide	..	..	FeO	1·200	.. } Metallic iron—63·71 per cent.
Ferric oxide	..	..	Fe <sub>2</sub> O <sub>3</sub>	89·68	.. }
Magnetite	..	..	Fe <sub>3</sub> O <sub>4</sub>	..	.. Also present
Phosphorous pentoxide	..	..	P <sub>2</sub> O <sub>5</sub>	0·119	.. P.—0·052
Sulphur trioxide	..	..	SO <sub>3</sub>	0·135	.. S.—0·054
Lime	..	..	CaO	0·165	
Silica	..	..	SiO <sub>2</sub>	7·760	
Alumina	..	..	Al <sub>2</sub> O <sub>3</sub>	0·620	
Manganous oxide	..	..	Mno	0·078	
Magnesia	..	..	MgO	Trace	
Cupric oxide	..	..	CuO	Trace	
Chromic oxide	..	..	Cr <sub>2</sub> O <sub>3</sub>	Nil	
Titanic oxide	..	..	TiO <sub>2</sub>	Nil	



BLYTHE RIVER IRON MINES



To accompany  
Report on the Blythe River Iron Deposit  
Dated 15<sup>th</sup> July 1919



009 > 52% Fe  
009 < 52% Fe  
Composite > 52% Fe  
Country

Sample Averages

1-20 incl.	Fe-51.81%	SiO <sub>2</sub> -25.50%
3-20 incl.	53.61%	23.16%
5-20 "	54.73%	21.58%
1-4 "	40.11%	41.20%
3-A "	44.61%	35.73%

Sample Average	Fe-52.10%	SiO <sub>2</sub> -18.69%
21-28 incl.	45.35%	32.52%
21-23 "	54.11%	13.65%
24-26 "	54.11%	29.20%
37-38 "	49.19%	

Sample Average	Fe-57.19%	SiO <sub>2</sub> -16.46%
39-54 incl.	58.34%	14.80%
39-52 "		

Sample Average	Fe-61.81%	SiO <sub>2</sub> -10.44%
55-70 inclusive.		

Average 71-75 incl.	Fe-60.58%	SiO <sub>2</sub> -13.16%
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Average 94-99 incl.	Fe-52.73%	SiO <sub>2</sub> -24.77%
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Upper Tunnel Average 77-92 incl.	Fe-53.05%	SiO <sub>2</sub> -22.68%
85-89 incl.	59.28%	13.71%
77-82 "	49.40%	26.87%
90-92 "	50.96%	26.45%

Ave 117-122	Cut K Fe 54.31	SiO <sub>2</sub> 20.15
117-121 "	55.50	17.98

Ave 100-125	Cut G Fe 43.39	SiO <sub>2</sub> 35.80
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Ave 154-167	Middle Tunnel Fe 28.45	SiO <sub>2</sub> 60.47
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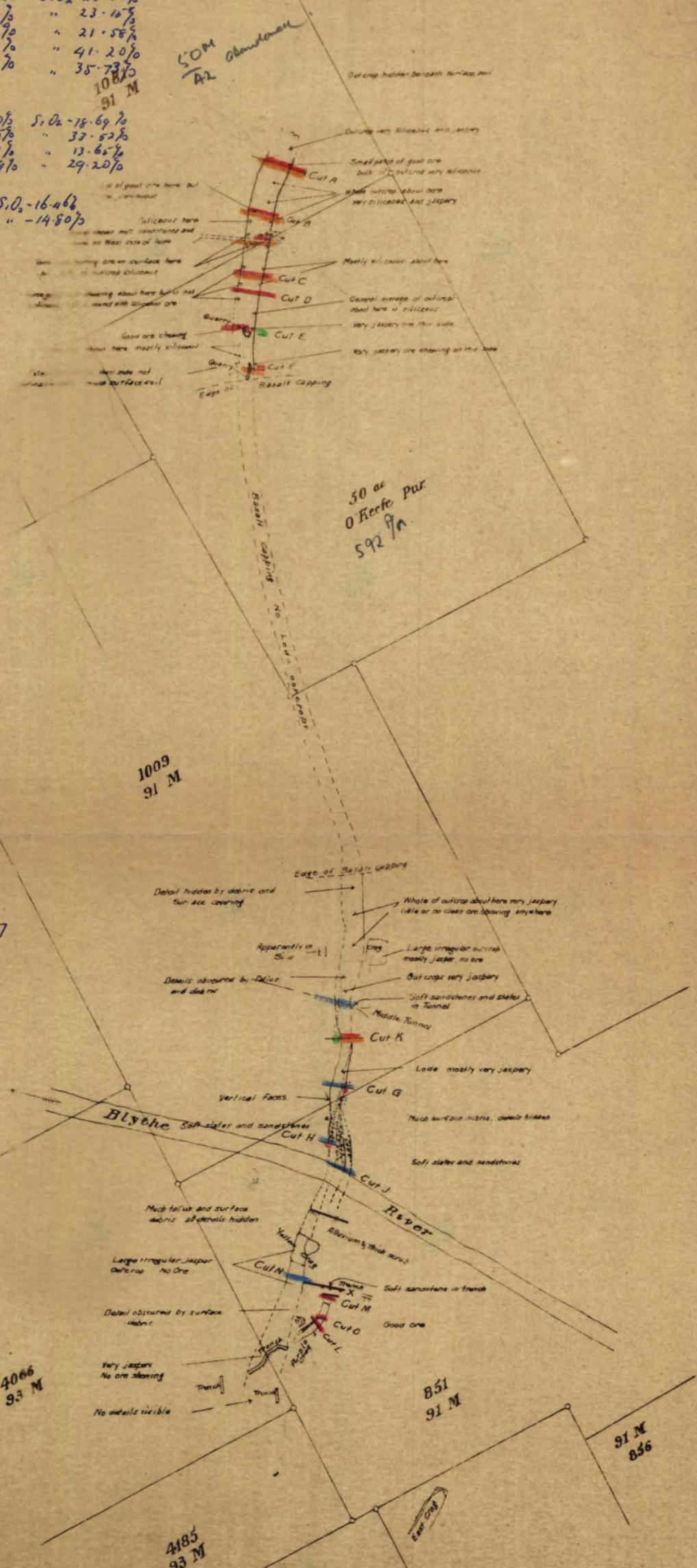
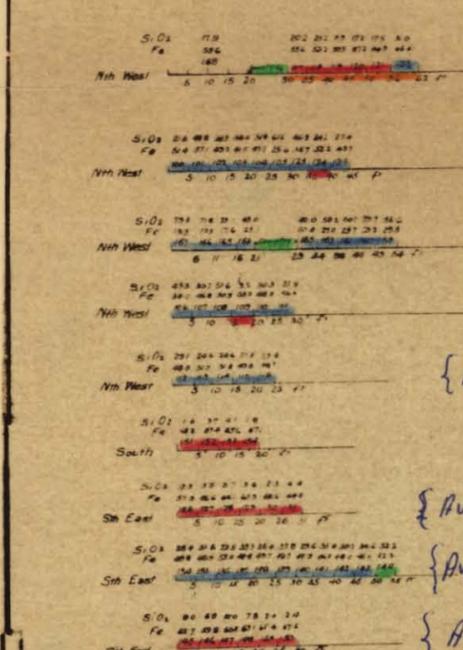
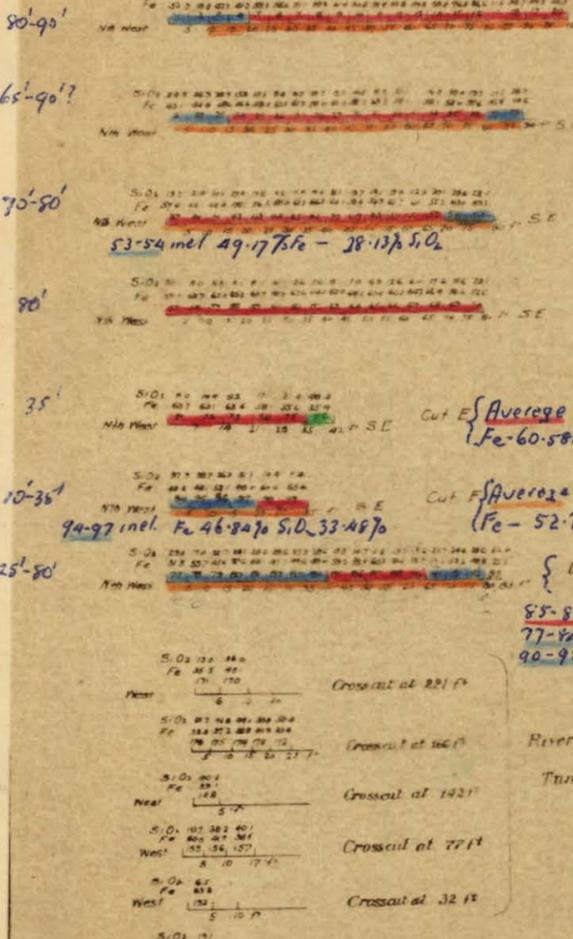
Ave 106-111	Cut H Fe 46.05	SiO <sub>2</sub> 31.48
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Ave 112-116	Cut J Fe 50.22	SiO <sub>2</sub> 27.12
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Ave 126-131	Cut M Fe 64.28	SiO <sub>2</sub> 5.23
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Ave 132-143	Cut N Fe 47.20	SiO <sub>2</sub> 30.79
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Ave 146-150	Cut O Fe 63.17	SiO <sub>2</sub> 6.15
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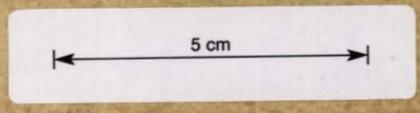
19-022

# ASSAY PLAN

## BLYTHE RIVER IRON MINES

Scale, 200 feet to 1 inch

To accompany Report on the Blythe River Iron Deposit Dated 15<sup>th</sup> July 1913



698025

**Cut A**

SiO <sub>2</sub>	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5	41.5	42.5	43.5	44.5	45.5	46.5	47.5	48.5	49.5	50.5	51.5	52.5	53.5	54.5	55.5	
Fe	45.1	45.4	45.7	46.0	46.3	46.6	46.9	47.2	47.5	47.8	48.1	48.4	48.7	49.0	49.3	49.6	49.9	50.2	50.5	50.8	51.1	51.4	51.7	52.0	52.3	52.6	52.9	53.2	53.5	53.8	54.1	54.4	54.7	55.0
Nth West	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	

**Cut B**

SiO <sub>2</sub>	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5	41.5	42.5	43.5	44.5	45.5	46.5	47.5	48.5	49.5	50.5	51.5	52.5	53.5	54.5	55.5	56.5	57.5	58.5	59.5	60.5	
Fe	47.1	47.4	47.7	48.0	48.3	48.6	48.9	49.2	49.5	49.8	50.1	50.4	50.7	51.0	51.3	51.6	51.9	52.2	52.5	52.8	53.1	53.4	53.7	54.0	54.3	54.6	54.9	55.2	55.5	55.8	56.1	56.4	56.7	57.0	57.3	57.6
Nth West	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	

**Cut C**

SiO <sub>2</sub>	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5	35.5	36.5	37.5	38.5	39.5	40.5	41.5	42.5	43.5	44.5	45.5	46.5	47.5	48.5	49.5	50.5	51.5	52.5	53.5	54.5	55.5	56.5	57.5	58.5	59.5	60.5	61.5	62.5	63.5	64.5	65.5	66.5	67.5	68.5	69.5	70.5	71.5	72.5	73.5	74.5	75.5	76.5	77.5	78.5	79.5	80.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Fe	47.6	47.9	48.2	48.5	48.8	49.1	49.4	49.7	50.0	50.3	50.6	50.9	51.2	51.5	51.8	52.1	52.4	52.7	53.0	53.3	53.6	53.9	54.2	54.5	54.8	55.1	55.4	55.7	56.0	56.3	56.6	56.9	57.2	57.5	57.8	58.1	58.4	58.7	59.0	59.3	59.6	59.9	60.2	60.5	60.8	61.1	61.4	61.7	62.0	62.3	62.6	62.9	63.2	63.5	63.8	64.1	64.4	64.7	65.0	65.3	65.6	65.9	66.2	66.5	66.8	67.1	67.4	67.7	68.0	68.3	68.6	68.9	69.2	69.5	69.8	70.1	70.4	70.7	71.0	71.3	71.6	71.9	72.2	72.5	72.8	73.1	73.4	73.7	74.0	74.3	74.6	74.9	75.2	75.5	75.8	76.1	76.4	76.7	77.0	77.3	77.6	77.9	78.2	78.5	78.8	79.1	79.4	79.7	80.0	80.3	80.6	80.9	81.2	81.5	81.8	82.1	82.4	82.7	83.0	83.3	83.6	83.9	84.2	84.5	84.8	85.1	85.4	85.7	86.0	86.3	86.6	86.9	87.2	87.5	87.8	88.1	88.4	88.7	89.0	89.3	89.6	89.9	90.2	90.5	90.8	91.1	91.4	91.7	92.0	92.3	92.6	92.9	93.2	93.5	93.8	94.1	94.4	94.7	95.0	95.3	95.6	95.9	96.2	96.5	96.8	97.1	97.4	97.7	98.0	98.3	98.6	98.9	99.2	99.5	99.8	100.1	100.4	100.7	101.0	101.3	101.6	101.9	102.2	102.5	102.8	103.1	103.4	103.7	104.0	104.3	104.6	104.9	105.2	105.5	105.8	106.1	106.4	106.7	107.0	107.3	107.6	107.9	108.2	108.5	108.8	109.1	109.4	109.7	110.0	110.3	110.6	110.9	111.2	111.5	111.8	112.1	112.4	112.7	113.0	113.3	113.6	113.9	114.2	114.5	114.8	115.1	115.4	115.7	116.0	116.3	116.6	116.9	117.2	117.5	117.8	118.1	118.4	118.7	119.0	119.3	119.6	119.9	120.2	120.5	120.8	121.1	121.4	121.7	122.0	122.3	122.6	122.9	123.2	123.5	123.8	124.1	124.4	124.7	125.0	125.3	125.6	125.9	126.2	126.5	126.8	127.1	127.4	127.7	128.0	128.3	128.6	128.9	129.2	129.5	129.8	130.1	130.4	130.7	131.0	131.3	131.6	131.9	132.2	132.5	132.8	133.1	133.4	133.7	134.0	134.3	134.6	134.9	135.2	135.5	135.8	136.1	136.4	136.7	137.0	137.3	137.6	137.9	138.2	138.5	138.8	139.1	139.4	139.7	140.0	140.3	140.6	140.9	141.2	141.5	141.8	142.1	142.4	142.7	143.0	143.3	143.6	143.9	144.2	144.5	144.8	145.1	145.4	145.7	146.0	146.3	146.6	146.9	147.2	147.5	147.8	148.1	148.4	148.7	149.0	149.3	149.6	149.9	150.2	150.5	150.8	151.1	151.4	151.7	152.0	152.3	152.6	152.9	153.2	153.5	153.8	154.1	154.4	154.7	155.0	155.3	155.6	155.9	156.2	156.5	156.8	157.1	157.4	157.7	158.0	158.3	158.6	158.9	159.2	159.5	159.8	160.1	160.4	160.7	161.0	161.3	161.6	161.9	162.2	162.5	162.8	163.1	163.4	163.7	164.0	164.3	164.6	164.9	165.2	165.5	165.8	166.1	166.4	166.7	167.0	167.3	167.6	167.9	168.2	168.5	168.8	169.1	169.4	169.7	170.0	170.3	170.6	170.9	171.2	171.5	171.8	172.1	172.4	172.7	173.0	173.3	173.6	173.9	174.2	174.5	174.8	175.1	175.4	175.7	176.0	176.3	176.6	176.9	177.2	177.5	177.8	178.1	178.4	178.7	179.0	179.3	179.6	179.9	180.2	180.5	180.8	181.1	181.4	181.7	182.0	182.3	182.6	182.9	183.2	183.5	183.8	184.1	184.4	184.7	185.0	185.3	185.6	185.9	186.2	186.5	186.8	187.1	187.4	187.7	188.0	188.3	188.6	188.9	189.2	189.5	189.8	190.1	190.4	190.7	191.0	191.3	191.6	191.9	192.2	192.5	192.8	193.1	193.4	193.7	194.0	194.3	194.6	194.9	195.2	195.5	195.8	196.1	196.4	196.7	197.0	197.3	197.6	197.9	198.2	198.5	198.8	199.1	199.4	199.7	200.0	200.3	200.6	200.9	201.2	201.5	201.8	202.1	202.4	202.7	203.0	203.3	203.6	203.9	204.2	204.5	204.8	205.1	205.4	205.7	206.0	206.3	206.6	206.9	207.2	207.5	207.8	208.1	208.4	208.7	209.0	209.3	209.6	209.9	210.2	210.5	210.8	211.1	211.4	211.7	212.0	212.3	212.6	212.9	213.2	213.5	213.8	214.1	214.4	214.7	215.0	215.3	215.6	215.9	216.2	216.5	216.8	217.1	217.4	217.7	218.0	218.3	218.6	218.9	219.2	219.5	219.8	220.1	220.4	220.7	221.0	221.3	221.6	221.9	222.2	222.5	222.8	223.1	223.4	223.7	224.0	224.3	224.6	224.9	225.2	225.5	225.8	226.1	226.4	226.7	227.0	227.3	227.6	227.9	228.2	228.5	228.8	229.1	229.4	229.7	230.0	230.3	230.6	230.9	231.2	231.5	231.8	232.1	232.4	232.7	233.0	233.3	233.6	233.9	234.2	234.5	234.8	235.1	235.4	235.7	236.0	236.3	236.6	236.9	237.2	237.5	237.8	238.1	238.4	238.7	239.0	239.3	239.6	239.9	240.2	240.5	240.8	241.1	241.4	241.7	242.0	242.3	242.6	242.9	243.2	243.5	243.8	244.1	244.4	244.7	245.0	245.3	245.6	245.9	246.2	246.5	246.8	247.1	247.4	247.7	248.0	248.3	248.6	248.9	249.2	249.5	249.8	250.1	250.4	250.7	251.0	251.3	251.6	251.9	252.2	252.5	252.8	253.1	253.4	253.7	254.0	254.3	254.6	254.9	255.2	255.5	255.8	256.1	256.4	256.7	257.0	257.3	257.6	257.9	258.2	258.5	258.8	259.1	259.4	259.7	260.0	260.3	260.6	260.9	261.2	261.5	261.8	262.1	262.4	262.7	263.0	263.3	263.6	263.9	264.2	264.5	264.8	265.1	265.4	265.7	266.0	266.3	266.6	266.9	267.2	267.5	267.8	268.1	268.4	268.7	269.0	269.3	269.6	269.9	270.2	270.5	270.8	271.1	271.4	271.7	272.0	272.3	272.6	272.9	273.2	273.5	273.8	274.1	274.4	274.7	275.0	275.3	275.6	275.9	276.2	276.5	276.8	277.1	277.4	277.7	278.0	278.3	278.6	278.9	279.2	279.5	279.8	280.1	280.4	280.7	281.0	281.3	281.6	281.9	282.2	282.5	282.8	283.1	283.4	283.7	284.0	284.3	284.6	284.9	285.2	285.5	285.8	286.1	286.4	286.7	287.0	287.3	287.6	287.9	288.2	288.5	288.8	289.1	289.4	289.7	290.0	290.3	290.6	290.9	291.2	291.5	291.8	292.1	292.4	292.7	293.0	293.3	293.6	293.9	294.2	294.5	294.8	295.1	295.4	295.7	296.0	296.3	296.6	296.9	297.2	297.5	297.8	298.1	298.4	298.7	299.0	299.3	299.6	299.9	300.2	300.5	300.8	301.1	301.4	301.7	302.0	302.3	302.6	302.9	303.2	303.5	303.8	304.1	304.4	304.7	305.0	305.3	305.6	305.9	306.2	306.5	306.8	307.1	307.4	307.7	308.0	308.3	308.6	308.9	309.2	309.5	309.8	310.1	310.4	310.7	311.0	311.3	311.6	311.9	312.2	312.5	312.8	313.1	313.4	313.7	314.0	314.3	314.6	314.9	315.2	315.5	315.8	316.1	316.4	316.7	317.0	317.3	317.6	317.9	318.2	318.5	318.8	319.1	319.4	319.7	320.0	320.3	320.6	320.9	321.2	321.5	321.8	322.1	322.4	322.7	323.0	323.3	323.6	323.9	324.2	324.5	324.8	325.1	325.4	325.7	326.0	326.3	326.6	326.9	327.2	327.5	327.8	328.1	328.4	328.7	329.0	329.3	329.6	329.9	330.2	330.5	330.8	331.1	331.4	331.7	332.0	332.3	332.6	332.9	333.2	333.5	333.8	334.1	334.4	334.7	335.0	335.3	335.6	335.9	336.2	336.5	336.8	337.1	337.4	337.7	338.0	338.3	338.6	338.9	339.2	339.5	339.8	340.1	340.4	340.7	341.0	341.3	341.6	341.9	342.2	342.5	342.8	343.1	34