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1891.

WESTERN AUSTRALIA.

REPORT

BY

THE GOVERNMENT GEOLOGIST

UPON

THE YILGARN GOLDFIELD.

Ordered by the Legislative Assembly to be printed, 17th February, 1891.

PERTH
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EXTRACTED FROM THE MINUTES.

TUESDAY, 17TH FEBRUARY, 1891.

16.–PAPER.—Mr. Marmion presented the Report of the Government Geologist upon the Yilgarn Goldfield.

Report ordered to lie upon the Table.

From the Honorable the Commissioner of Crown Lands to the Government Geologist.

Crown Lands' Office,
Perth, 16th January, 1891.

THE GOVERNMENT GEOLOGIST.

SIR,—

I have the honor to inform you that it is of the utmost importance that you should proceed, with all possible despatch, to the Yilgarn Goldfield for the purpose of making a General Report upon the said goldfield. Such report should embrace the following points, viz.:—

Special reports on each of the localities best known as Golden Valley, Southern Cross, and Parker's Range, and containing particulars of those mines now being worked, or having exemption, their present position and future prospects, more especially with regard to probable permanence; the same with regard to Protection Areas, Mining Leases, and Mines outside the understood limits of the above-named localities and within intervening country.

General report should indicate your opinion as to area and extent of auriferous country, and as to whether the general prospects both below ground, where shown, and upon the surface, lead you to suppose that an extensive, rich, and permanent goldfield exists at Yilgarn.

WATER SUPPLY.—You should express your opinion as to the prospects of obtaining a water supply (after due examination of the reported find at Golden Valley), and suggest a mode of proceeding, either by boring, or conservation of rain water, or otherwise. This is an important matter, and should demand your serious consideration and attention.

The Report should also convey any suggestions as to what might be done by the Government that would in your opinion be most likely to give an undoubted and immediate impetus to the development of Yilgarn; and in concluding your Report, after well weighing all the opinions expressed in previous portions of it, and the reasons which caused you to arrive at such conclusions, it would be well that you should state (by way of emphasising your remarks), as shortly and pithily as possible:

1. What do you consider the area and extent of auriferous country at Yilgarn?

2. Do the indications on surface and underground warrant you in expressing an opinion that the reefs generally are likely to be permanent? Are the reefs rich in gold—as rich or less so than upon other well-known Australian Goldfields?

3. Are the prospects of Yilgarn Goldfield such as to enable you to express an opinion—Whether such Goldfield, if its development is assisted and expedited judiciously by the Government, is likely in the near future to be capable of sustaining a large mining population?

I merely give you the above as special points, leaving to your own judgment arrangement of all other matters that may be considered by you important, useful, and necessary to include in your report.

As the Report is required to place before the Legislature, I would ask you to be good enough to prepare and transmit it to me at as early a date as may be possible, and consistent with the time necessary for due inspection and examination of the auriferous area comprised within the limits of the Yilgarn Goldfield. Mr. Warden Finnerty will be instructed by me to render you all the assistance in his power, and the Commissioner of Police has promised me to issue orders to the Police at Yilgarn to do the same, so as to facilitate transport, and expedite the fulfilment of your work. You should interview both Mr. Finnerty and Major Phillips, before leaving Perth.

I shall be glad to see you to-morrow, Saturday, at 10·15 a.m.

I am, &c.,

W. E. MARMION,
Commissioner of Crown Lands.

Report by the Government Geologist upon the Yilgarn Goldfield.

From the Government Geologist to the Honorable the Commissioner of Crown Lands.

SIR,

I have the honor to report that, as instructed by you, I proceeded to the Yilgarn Goldfields, and have now the honor to hand you my report on the same.

I have, &c.,

HARRY PAGE WOODWARD,
Government Geologist.

14-2-91.

GOLDEN VALLEY.

At Golden Valley at the present, there are only two areas on which any work is being done; these are the Water Hall, where there are about three men at work, and the Kathleen, the men from which are engaged in sinking a water shaft on the machinery area at the bottom or South end of the Valley.

On the Kathleen a good deal of work has been done on the two reefs, the first of which, on the eastern side of the Valley, has been opened up to a depth of 83ft., the stone averages 42in. in width, is well defined. This is a true vein and will probably carry gold in depth, but no prospecting has been done to follow the shoot of gold from the surface. To the westward, in the middle of the Valley, a large reef and lode mass has been opened by two shafts, one 60ft. and one 80ft. This is a well formed lode in depth, the whole mass being about 25ft. in thickness, and to judge from the richness of the stone at the surface, should pay well to work, and has all the appearance of being a permanent lode in depth. On the Water Hall, which is on the same line of reef, this main lode has not been touched; a spur dipping to the east has been followed, very rich in patches, very irregular both in size and dip, but there is nothing to indicate that it will continue down for any great depth, but it will pay well to follow, so long as it carries the same class of stone it has up to the present, but as the large main lode is also on this area, they have always that to fall back upon when this small rich vein pinches out or is too poor to work.

On both these mines there is a very large quantity of rich stone at grass, and the prospects of both these mines are very encouraging (samples from the deep shafts will be assayed shortly), and the reefs present all the appearance of going down.

Several other areas have been taken up here, work has either ceased from want of capital, or the areas have been abandoned, but on some of them very good surface indications were visible; and, to judge from the regularity and extent of the reefs at the surface, these will probably be found permanent in depth, and many of them will be worked as soon as faith is established in any of the principal mines.

SOUTHERN CROSS.

At the Southern Cross there are at present only three mines in full work, but three others are working, with a few hands, under partial exemption.

Centrals have a large mass of stone, a great part of which would pay to crush if they had about 50 heads of stamps, but now only a small vein, from 2 to 7ft. wide and 80ft. in length, is being worked, which has yielded 1523 oz. 2 dwts. 23 grs. of gold for 2205 tons of stone crushed. This stone has been worked out on the underlay to a depth of 86 feet, and just at present the stone at the bottom is about the most showy yet met with. This mine is proved payable, and there is every indication that it will continue so in depth.

Frasers have also an immense lode, but only work from 4 to 10ft. of it at present, but this stone has yielded 2158 oz. 13 dwts. 12 grs. of gold from 1776 tons of stone. This reef has been tested at the North end of the area to a depth of 60ft., and the stone proved payable for a length of 200ft. along the line of reef.

At the South end of the area another reef has been opened to a depth of 82ft., and this reef, although smaller, proved to be much richer, a trial crushing yielding over 2 oz. to the ton. This mine has more payable stone in sight than any other on the field, and has some 20 feet or so of gold bearing stone that is being put aside, as nothing but rich stone will pay to work on this small scale.

As on Centrals, there can be very little doubt but that this lode will prove payable in depth.

Fraser's South is at the South end of Fraser's mine, and a continuation of the reef which proved so good on that mine. There is about 6ft. of stone, and the trial crushing of 100 tons proved it to carry over 2oz. to the ton. The reef is well formed and presents every indication of going down, and, although it will probably not be so rich in depth as at the surface, it should be a payable mine.

No. 1 Central Extended is at the North end of the Central, and on a continuation of the same lode. There is a great mass of stone (tested, 25ft. in thickness), carrying a rich leader on the foot wall, which crushed, from between 40 and 60 feet down, 186oz. 15dwts. of gold from 104 tons of stone.

The lode is well defined, and, being on the same as worked on the other mines, has the same prospects of going down.

The Exchange is situated on a line about 600 yards to the West, the stone from which proved payable at 30ft. below the surface, and is being worked N. and S. of the shaft at the 50ft. level.

This lode is as well defined as any on the field in depth, and there is not the least reason to doubt that it will continue in depth.

The shoot of gold has not yet been followed, as this mine, as far as work done, is yet quite in its infancy, but is very promising in every way.

The only other area taken up at the Cross is one South of Fraser's South, but no work has yet been done; considering, however, the persistency of the reef, which can be traced at the surface, carrying gold in rich shoots here and there for a distance of 1,200 yards, there is a good prospect of these enterprising miners striking something good.

There are many other areas on which a considerable amount of work has been done here, and others where gold has been found at the surface rich enough to work; these have mostly been so badly managed that shareholders got tired of paying calls; but many of them will be sure to be re-opened as soon as the good crushings from the mines at work establish these fields.

PARKER'S RANGE.

At Parker's Range there are a larger number of areas being worked than on any other part of the field, the principal of them are Parker's, Sewell's, Thorn's, Toomey's, Rickey's, Macintosh's, Uphill's, O'Driscoll's, Potter's, and two or three others.

On Parker's there are about three lines of reef carrying gold at the surface, the principal of which has been opened up to a depth of 80ft. by a vertical shaft and 75ft. on the underlie; the reef in these shafts is about 2ft. 6in. and well defined, but as to its richness in depth nothing can be said until assays are made. This reef has all the features which would lead one to suppose that it would continue to a great depth, and considering the surface show of gold, rich shoots will probably go down.

Sewell's is on a line to the West of Parker's, opened on the underlay to a depth of 80ft., showing stone from the surface of from 2ft. to 4ft. in thickness, and has every indication of going down.

Thorn's joins Parker's to the South, and there is a large body of stone at the surface which has been followed down 55ft. and seems to be going down.

Toomey's is part of the original Parker's area, and has some very rich outcrops of stone.

Rickey's at the South end of Parker's line has been tested on the underlie about 50ft., where there is from 3ft. to 4ft. of well-defined stone showing gold in places, and appears to be going down.

Macintosh's is opened up about 80ft., showing a body of from 3ft. to 4ft. of stone, 45 tons of which were lately crushed, yielding over two ounces to the ton. When the well defined character of the lode is considered, and that this stone was a mixed sample from below, the gold bearing stone is certainly going down as far as tested, and it is almost certain to continue to in depth, so that everything considered this may be reckoned as one of the payable mines, with a very promising future before it.

Uphill's joins this area, it has been tested on the same reef to about the same depth, and the stone from all the way down crushes well. In a few days the results of a crushing will be known, which, if good, will be a pretty good test of the mine as it is all taken from the underlie shaft and a level near the bottom. This reef is well defined and will probably go down, so will be a promising property if the stone proves payable.

The Yilgarn joins this area on the same reef and a good deal of rich stone has been raised, but the mine is at present at a stand-still.

O'Driscoll's has been tested by an underlie shaft 70ft. and a vertical 50ft.; there is from 18in. to 3ft. of good looking stone, and the reef appears to be going down.

Potter's & Co. is opened up to 42ft. and there is from 4ft. to 7ft. of stone, and the reef appears to be well formed.

There is also another area at work on O'Driscoll's line, and the Union or Parker's.

The reefs, generally, here are more compact and better formed than on any other part of the field, and very rich stone is found at the surface; but as to reporting on the probably payable character in depth is out of the question till they have been tested nearer the surface; however, should the stone down to 100 prove payable, it is highly probable that it will also continue so below this level.

Jacoletti's is about 15 miles north of Parker's, and here a very rich surface patch was found, but has not been traced down, although the shaft is down 80ft. There are no special features about the reef in depth.

Blackburn's is about 5 miles South of Southern Cross, where there is an outcrop of stone showing gold about 100 yards long at the surface. It has been opened up to a depth of over 100 feet, showing a reef of from 18 in. to 5 ft., a crushing from which yielded 129 oz. 14 dwts. 12 grs. of gold, from 70 tons of stone. The reef is well defined, the gold is going down, so this will, in all probability, be a payable mine in depth.

Hope's Hill, 5 miles North of Southern Cross, is a great hill of quartz, carrying rich stone on the foot-wall or eastern side, the crushings from which are giving very good results. To judge from the size of the lode, its character, the length along the outcrop which carries gold, it will probably pay well when more extensively worked. It is quite impossible to express an opinion on the payable character of so many of these mines in depth, as up to the present nothing is proved on them below the patches of rich specimens at the surface. Many of these will, most probably, prove very rich, but until some large quantities of stone have been crushed, it would be folly to predict their future from their very imperfect development.

The extent of gold-bearing country has now proved to run in a North and South line of over 80 miles, and although the fields are separated by patches where no gold has yet been found, these are gradually getting lessened by intermediate discoveries. The line now starts at the North, with Golden Valley, then there is about 25 miles of forest and sand-stone ridges to Hope's Hill, then 5 miles to Southern Cross, 5 miles to Blackburn's, 20 to Jacoletti's, 15 to Parker's, and 5 to Uphill's. The forest country between these different finds is mostly very promising country being often strewn with quartz, but as the reefs do not often outcrop, prospecting would be rather expensive work, and as at present there are a great many more reefs taken up than there is money to work, this country will not at present be touched.

This belt seems to form the Western limit of the gold-bearing country, but how far it extends to the Eastward is impossible to say, until that country is examined. North, this belt is met with near Mt. Kenneth and Austin's Lake; and South, on the South coast at the Phillips and Fitzgerald Rivers.

To judge from this and the appearance of the mines at work, there is every reason to predict that this will be both an extensive, rich, and permanent goldfield.

Water Supply.—There is a large supply of salt water on the fields, but although it will work with the tables it is almost unfit for boiler purposes, and this is a serious drawback to the development of the field.

In the first report, published three years ago, it was suggested that a series of bores should be sunk to the water level at Golden Valley, along an East and West line, when if salt water was struck it should be at once abandoned. The idea was, as the rocks here are nearly vertical, to test if any fresh water lines of country existed cut off from the salt by impervious lines of rock. If this suggestion had been followed, the fresh water struck at the Valley would have been found over two years ago. This work might be done with the small drill, as a great depth would never have to be sunk, and it would have to be moved frequently.

This well at Golden Valley should be secured as a fresh water supply for the town, there being only about 300 gallons a day supply, which is quite useless for battery purposes. The sinking is being continued, and salt water will be struck before long when the well will be quite useless for drinking purposes.

More tanks might also be made, but these are not to be depended on, as the rainfall which fills tanks is so uncertain.

Condensers are the only reliable means of insuring the safety of the inhabitants, as an abundant supply of salt water can always be obtained by sinking.

This goldfield will never make a great stride until it is connected by railway with the settled districts, as the enormous price charged for carriage of goods to the field is a very serious consideration to a field in course of development. Also the great delay in obtaining necessary things in case of a breakdown, which might cause a stoppage of work for a month or more.

But the really great bar to the development of the fields is want of capital now; as it is not here it must come from outside, and people bred in this Colony do not know the insurmountable obstacle 180 miles of bush travelling is to a man used to a civilised life, who wants to see the mines himself, before putting his money into them.

The new line of road will be certainly a great improvement when finished, if the single line of horse teams are kept off it, which they are not at present; because when the first rains fall this road will be as bad in a week as all the old ones, and all the money spent will be thrown away. Also a straight track, or better still, three should be cut down the road, as at present one track winds about from side to side and when this gets bad the whole road will be spoilt.

This question deserves really serious consideration at once. There is no longer the excuse for teamsters on a new, open, and clear road, that they cannot drive double, which existed on the old rutty and cut-out track.

An impetus might also be given to the field by the Government subsidising sinking as done in the other Colonies, either so much for the first shaft opening up payable stone at say 500ft., or so much per foot for deep sinking to prove the reefs to that depth. Or the Government might subsidise the mine that put in the lowest tender to sink to a depth of 500ft.

Any of these methods would prove the field in depth, on which now only an opinion can be expressed.

The reason why this field will probably prove permanent in depth is: the great extent of gold-bearing country in a north and south direction; the length that individual reefs can be traced at the surface; the length over which they carry gold; their great size and well-defined character in depth; the settled nature of the country; the length of the shoots of gold-bearing stone which have proved to go down as far as tested in the mines which have been worked.

GENERAL.

It must be distinctly understood that the statements made here are only opinions, for nothing with regard to the future is yet proved as reefs tested to a depth of 100ft. are only a slight criterion as to their gold-bearing character in depth.

Golden Valley.

There are two mines at work, both of which have several hundred of tons of very rich stone at grass and the Kathleen a large lode about 25ft. wide at 80ft. in depth. These mines appear permanent, and many others here are worth prospecting.

Hope's Hill.

A large mass of stone carrying rich gold on the E. side for a considerable distance, from which the crushings give very good results. This lode will go down and probably the gold with it, so is very promising.

Southern Cross.

Two mines have proved payable as far as they have gone, and three more have had good enough returns to start work at once. These lodes are so well-defined so large and rich, that there is not the least reason to doubt that they will pay in depth.

Blackburn's

Is a well-defined reef, the trial crushings from which prove it payable as far as opened up (100ft.) The lode is going down well, and will probably continue to be rich in depth.

Jacoletti's.

There was a rich surface patch here which would be worth opening up.

Parker's Range.

Several lines of reef, all very well defined as far as tested (80ft. to 100ft.), very rich at the surface, and the one mine (Macintosh's) from which a crushing has been taken in depth proves to be very rich. And other reefs have all the character of going down and will probably pay to work in depth.

Extent.—The proved auriferous country is over 80 miles in length, but probably extends from Austin's Lake to the South Coast and out eastward to the Hampton Plains.

Water.—Some boring might be done on the lines laid down in fuller reports. Some more tanks sunk, but condensers must be their stand-by.

The well at Golden Valley should be purchased at once before the fresh water is lost.

Works.—A railway is of vital importance to the field, and a telegraph line would be a great benefit.

Single horse teams must be kept off the new road, and some of the wells and tanks want looking after.

1. It would be impossible to say what extent of auriferous country there is without an examination or exploration at a time of year when there is water about, but it is 80 miles in length.
2. The indications on the surface and in depth warrant me in expressing the opinion that I believe these reefs will be permanent in depth.

   The reefs, as far as tested, are rich in gold and compare very favorably with the surface shows on the great reefing fields of the Eastern Colonies.
3. I am of opinion that were the development of this field assisted by the Government by construction of a railway and a telegraph line, it would very shortly be capable of sustaining a very large mining population.

HARRY PAGE WOODWARD,
Government Geologist.

13-2-91.

SOUTHERN CROSS.

THE CENTRAL MINE.

This mine occupies an area of 17 acres, at the South-west corner of the township of Southern Cross; and it was on this block that the first payable gold here was found.

The reef, at the surface, presents to the *trained eye* from the Eastern colonies a very unattractive appearance, and would be put down at once as a barren quartz blow. Even the class of stone on this line would be said by many *experts* to be more like road metal (quartzite) than auriferous quartz. But so much for appearance, as, on breaking the stone at the cap of this reef, it was found to be rich in gold, and has since proved to carry this precious metal for a distance of about 1,200 yards, in a N. and S. direction.

The reef itself or, to speak more correctly, the reefs (as this large body of lode matter is composed of several veins) dips (underlies) at an angle of from 55° to 60°, in a Westerly direction, whilst the course of the lode is N.N.W. and S.S.E. The whole mass is, roughly, about 25 feet in thickness; but it is difficult to determine its exact width, owing to the fact that it has no defined hanging wall. That side of the lode being composed of many strings and leaders, intermixed with the country rock, into which they often extend for a considerable distance.

Only a portion of this great lode mass has, with the limited crushing power at present on the field, proved payable. This is a reef of from 2 to 7 feet in width, with well-defined walls, of a compact granular quartz, highly mineralised, whilst the rich gold is carried in a shoot of about 80 feet in length, dipping in a Southerly direction.

The stone is of a dense nature, granular and glassy, with patches of brown (chalybite) and green (chlorite), whilst on the outside and down the faces it is coated with a red greasy clay. It also contains small traces of galena, yellow copper ore, and mundic; but these minerals are in such small quantities, that they will not seriously hinder the perfect amalgamation of the gold. Portions of this reef are very rich in gold, and patches of very showy specimens are from time to time encountered in sinking, about the richest of which was struck lately at the lowest level.

This lode has been opened up by three shafts:—

No. 1.—A vertical shaft, situated about 100 yards south of the battery, has been sunk to a depth of 105ft., with a drive of 50ft. at the bottom; this is now used as a water shaft, and from it the battery is fed by a two h.p. Tangye's boiler and pump.

No. 2 Shaft is an underlie, sunk from the cap of the reef to a depth of about 110ft. in the reef all the way down. This is the main working shaft, and by it the mine has been worked to the water level, and the shoot of rich auriferous stone has been worked out on both sides of the shaft, from the surface to the 86ft. level, where the main body of payable stone is found to be to the south of the shaft.

No. 3 Shaft is near the southern boundary of the area, and has been sunk 45ft. The stone has been taken out at the surface on the north side of this shaft, but on following the gold bearing stone down, the shoot is found to cross the shaft between 20 and 30 ft. from the surface. The stone crushed from this shaft yielded 30 oz. of gold for the 175 tons crushed, which not being satisfactory the work was abandoned here for the present.

Since the mine has been opened 2205 tons of stone have been crushed, which yielded 1523 oz. 2dwts. 23grs. of gold. On this area there is a ten-head Langland's battery and a 16 h.p. Tangye's engine and boiler, with a 6in. drawlift pump and 65 ft. water shaft to supply the tables, also a tramway from the main shaft to the machinery.

Bedan Pans are now being erected to treat the concentrates, and a condenser is being constructed in connection with a boiler, which is already fixed.

It is highly probable that this mine will shortly have to suspend crushing for a time, as its development has been sacrificed to make the mine pay present working expenses, for although there is plenty of good stone at the lowest level, all above it has been stoped; so until the mine has been opened up at a lower level, it will be difficult to raise sufficient stone to keep the battery at work.

As far as this mine has been worked it has certainly proved payable, as the stone crushed has yielded up to the present something over 16 dwts. to the ton. This of course has been from the best available stone; but when the great size of the lode is taken into consideration—all of which carries more or less gold—a very large quantity of it should average ½ oz. per ton; when the crushing plant is increased, this—even with the great difficulties and expenses of working there at present—should pay handsomely.

From the appearance of the lode at the lowest level, its great size, length of its course at the surface, character of the walls of the individual reef, regular underlie of whole mass, and character and

richness of stone in depth, there is every prospect of this reef not only going down, but of proving to be a payable if not a very rich mine in depth.

FRASER'S MINE.

This comprises an area of 25 acres, joining on the South end of the Central lease.

The same huge reef mass as that opened up on the Central's can be easily traced for some distance at the surface into this block, and it is upon this that the principal workings are situated.

The reef worked here, although forming part of the same lode mass as worked on the Central's, is not probably the same reef, from which it differs a good deal in character, being more iron-stained, and not carrying all the minerals met with in the former. Large quantities of semi-alluvial gold were met with at the cap of the reef on the faces and down the cracks in the stone; but, as a rule, the gold is more through the stone, and not so much of a specimen mine as Central's.

The general character of the lode mass is very similar to what it is on its Northern neighbour, consisting of a well-defined lode of about 35 ft. in thickness, with a well-defined foot-wall on which the mass of stone that is being worked rests, whilst on the hanging wall side there is a large mass of broken rock, full of small reefs and leaders, a great portion of which will pay to work when more crushing power is available.

The reef that is at present worked is a compact mass of stone, with good walls of from 4 to 10 ft. in thickness, the whole of which, as far as is at present opened up, is found to pay for crushing.

Near the North end of the area is Fraser's shaft, which has been sunk to a depth of 60 ft., at which level the stone was found to be 12 ft. in thickness and well-defined, with a mass of mullocky leaders 20 ft. wide on the Western side, parts of which are very rich in gold.

The main work has been done above the 36 ft. level, which is 180 ft. in length, and it is from the slopes above this that most of the stone crushed was taken, however there still remains a great body of payable stone overhead to work on; but before this is exhausted, it is proposed to open up the reef at a lower level. This reef has not been followed to the Northern boundary, as at this level it pinches and gets too poor to be worth following in that direction.

About 200ft. further South is Simpson's shaft, which is 44ft. in depth, with a short level at the bottom, connected with the main level from the other shaft by a rise.

240yds. further South, a large shaft has been sunk on the same or part of the same lode, which has been thrown a little out of its course by a granitic dyke, which crosses it at the surface a little to the North of this shaft. This shaft is being used at present to supply the machinery with water, but the reef is at the same time being opened up in a Southerly direction, where it is forming into a good body of stone, which is well seen in a small shaft on the Southern boundary (see Fraser's South), and also in several pits at the surface. There is also a vertical shaft, 82ft. in depth, on this reef, at about 100ft. from the Southern boundary of the area. From these shafts and pits the best crushings from this mine have been taken, the stone yielding over 2oz. per ton; but lately only the small quantity of stone encountered in developing this part of the mine has been crushed, and that has been added to the stone from the main workings.

It is proposed to continue the 60ft. level, in the water shaft, in a Northerly direction, where the granitic dyke will be struck, also probably a large body of water on the other side of it, as at present the greater part of the water in this shaft comes in from a Southerly direction, whilst the water level of the country, as proved by the other shafts, is much higher on the Northern side of this bar than on the South, also the water is not so salt as it is from those shafts sunk on the lower ground near the lake.

When this work is done it will probably considerably lower the water level in the northern shaft, which will be a great benefit to them in working the lower levels, but the question arises whether it may not affect the water supply of the Central mine.

The machinery on this mine consists, at present, of a ten-head stamper battery (Martin's, Gawler, S.A.) with engine, two large boilers, Bedan and Wheeler pans, &c., but another ten head of stamps have been ordered. This is very necessary, for with a lode of this great size so much would pay to crush when there is more crushing power, which, at present, has to be thrown aside or not raised, and this later on can never be worked, so the gold in it is lost for ever.

Up to the present 1776 tons of stone have been crushed, yielding 2158 ozs. 13 dwts. 12 grains of gold, or at the rate of $1\frac{1}{4}$ ozs. per ton, which must be a most satisfactory result to every one connected with this mine, and they should strain every nerve to get 50 head of stamps on so rich a mine as soon as possible, for there is such a great body of stone carrying gold, most of which would pay handsomely to crush on a large scale.

From the general appearance of this reef at both ends of this area, its formation in depth, its richness, and the great body of stone, there is every prospect of this proving to be a very valuable property in depth.

FRASER'S SOUTH.

To the South end of Fraser's is an area of 25 acres, taken up on the same line of reef as that worked at the South end of Fraser's, which on testing proved to be exceedingly rich.

The first trial crushing made in Adelaide of 18 cwt. of stone yielded 4 oz. 4 dwts. 6 grains of gold, whilst a subsequent crushing on the field of a 100 tons yielded over 2 oz. per ton. Three shafts have been sunk, one on the Northern boundary 44ft., one 50ft. further South 50ft., and one 100 yards further South in the lake cut the reef at 70ft.

The shaft on the Northern boundary is 15ft. vertical, after which it follows down the underlie of the lode, which here dips at an angle of 63° in a Westerly direction.

The lode is from 5 to 6 feet in width, of which 2ft. to 2ft. 6in. is solid stone, whilst the remainder is mullocky full of quartz veins and leaders.

At the bottom of the 15ft. vertical shaft, there is a level connecting this shaft with the shaft 50ft. further South, and above this all the stone has been stoped.

The stone in this lode is very different in character from that on the more Northern claims, as it is much less iron stained, and contains more chlorite, which often gives it quite a green appearance. Gold is visible in the cracks and faces of the stone at the surface, but in depth it is only seen in a very fine state all through the stone.

The machinery here consists of a Fulton 10 head battery, and Tangye engine, boilers, pumps, &c.

Judging from the returns yielded by the stone crushed, the appearance of the lode in depth, there is every prospect of this proving a permanent and rich mine.

No. 1 CENTRAL EXTENDED.

This area of 17 acres is situated at the North end of the Central area, and two vertical shafts have been sunk to test the same lode as worked on that area. The first of these, at a distance of 150ft. from the Southern boundary, has been sunk to a depth of 60ft. on the Western side of the lode, and is connected by a level of 67ft. in length with another shaft further North, which is down 104ft.

There is a rise from this level to a level on the foot wall side of the lode 25ft. above, which is 20ft. in length, in which a green reef, 2ft. in thickness, rich in gold was met with.

From this level the reef was cross-cut, and followed down on the hanging wall side on the underlie for 28ft., and here the lode is found to be dipping at an angle of between 55° and 60° to the West, the course of the lode being much the same as Central's. On this side of the lode there is a body of stone which shows gold freely about 3ft. in thickness, and is found to be making in a Southerly direction in depth.

The entire lode mass is about 25ft., and much resembles that on the Central in general character both of stone and mullocky leaders, with the exception of the green magnesian veins on the footwall. A cross-cut has been driven across the country to the East for a considerable distance, but no more veins were cut.

The gold-bearing shoot dips in a Southerly direction as in the other mines here. It is rich for about 60ft. in length, and from this 104 tons of stone were crushed from between the 35 and 60 feet levels, yielding 186oz. 15dwts. of gold.

The stone and the general appearance of the lode in depth are of a very promising character, and as this is evidently the Northern extension of the Central lode if, when the stone from the bottom which is now at grass is found payable, there is every reason to expect this mine to continue so in depth.

THE EXCHANGE.

This mine is situated on a line of lode about 600 yards to the Westward of the Central line; on this two shafts have been sunk to a depth of 50ft. and 110ft.

Near the surface very little gold was found, and the reef was not well defined, consisting mostly of a brown mullocky mass with small quartz veins and leaders. At 20ft. from the surface a rich vein formed on the footwall of the lode, which has proved to carry more or less gold to the bottom of the deep shaft. In the deep shaft a level has been driven, N. & S., at 50ft. from the surface, and from this the stone has been crushed. The lode is here from 3ft. to 6ft., dipping at an angle of 80° W., of a well defined character and carrying a good body of stone very much like Central's in character, but there is also a vein of the same green magnesian vein stuff as met with in No. 1 Central Extended. The walls at this depth are better formed than any other lode on this field, and the soft nature of the lode renders it very easy to work.

The machinery is situated about $1\frac{1}{2}$ miles to the South, consisting of stone breakers, Huntingdon mill, and Tangye engine, &c.; but as the boiler was not large enough to keep the mill going, work is at present at a standstill.

It is a pity the machinery is so far off the mine, where enough water might have been obtained with a little trouble, as in the deep shaft the water now stands at 80ft.

Up to the present a good many tons of stone have been crushed, but although not so rich as the other mines here, it will from its soft nature and well defined character probably pay in depth, and when the lode comes to be more opened a good rich shoot of gold will probably be found.

GOLDEN VALLEY.

THE KATHLEEN.

This mine is situated at the North end or head of Golden Valley. There are two reefs on this area, the one towards the Eastern side being the first that was discovered on this field. This reef goes down nearly vertically, so that a shaft sunk 83ft. is on the reef all the way down. It is a good deal broken in places, and cuts out altogether in one place, but averages 42 inches in width, although it is only 12 inches at the bottom of the shaft.

The stone is a white granular approaching more nearly sandstone in appearance than quartz, but carries fine gold throughout; although not or rarely visible with the naked eye the stone crushes well. From the 30ft. level a trial crushing was sent away, the result was not made public, but it was said to be satisfactory.

In the centre of the Valley or further to the Westward, a large gossany reef has been opened up by several large paddocks and two shafts, and from the surface some of the richest specimens on the fields ever found.

Near the surface the reef and country is a good deal broken, dipping first East, but lower down from 55° to 80° West.

One shaft has been sunk 60ft. with a level at 30ft., where the whole lode mass is about 25ft. in thickness, with about 3 to 4ft. of solid stone on the hanging wall and another small body of quartz on the footwall, the intermediate mass being composed of broken schists full of small veins and leaders of quartz, containing a quantity of yellow copper ore and mundic. 50ft. further North there is another shaft 80ft. in depth, with a 15ft. winze at the bottom to the East. The solid reef here on the hanging wall is about 16tft. wide, of solid stone, containing a good deal of mundic.

The gold is probably contained in the copper ore and mundic, as the rich cap was composed of a ferruginous gossan with copper stains. Although so broken at the surface the reef is so well defined at 90ft., and there is such a body of stone, that if the gold proves to go down to that level this should be a permanent mine. There is a very large quantity of very rich stone at grass.

THE WATER HALL MINE.

This is a small area situated at the south, or lower down the valley than the Kathleen. The same reef cap was opened as that in the middle of the valley in the adjoining mine, but a spur dipping to the east has been worked, as the main lode at the surface did not show so much gold.

A vertical shaft was sunk 42ft., cutting the reef at 35ft., where it was 3ft. 6in. in thickness and much better formed than in the pits at the surface: from this point it dips S. at an angle of 28°, and down this underlie it has been followed for a distance of 82ft. At the top of this underlie the reef is only 6in. to 1ft. wide, but about half way down it makes to about 3ft. and continues this size to the bottom.

There is an underlie shaft, 21ft. to the north of the vertical shaft, connected with it by a level; here the reef is dipping to the east. There was a nice body of good stone here, but it cuts out at the bottom, and near the vertical shaft where the angle of the dip changes.

This is not a true vein and cannot be depended on to go down, although may do so for a considerable distance; and so long as stone, like that which has been raised up to the present, can be obtained, it will pay to get out. There is a great mass of very rich stone at grass, which should give a very good return when crushed. This money, if no other is available, should be spent in prospecting the main reef that dips to the west, which has all the appearance of being a true lode.

HOPE'S HILL.

This area now embraces not only the original Hope's Hill but also the Caledonian's, which joined it further down the hill on the South side.

Two shafts are sunk on this reef, one on the East side 32ft., and one on the West 82ft., connected by a cross-cut 52ft. long through the lode.

This is about the most wonderful lode for size on the field. It is, like the other large ones, composed of a number of reefs, but here there is no country intermixed with the lode, the part which is not stone consisting of a magnesian clay, resulting, probably, from the decomposition of talcose veins.

The richest stone is carried, as in most of the other mines, on the foot wall, where 2ft. of stone and 1 to 3ft. of mullock are being taken out for crushing. The richest stone here is a soft sandy stone, but the finest specimens are seen in the white clayey cavities in the solid stone.

The stone from here was found to be too clayey to crush by itself, so had to be mixed with some solid quartz from the Caledonian, which has greatly reduced the return per ton. This stone was taken from the surface near the old shaft that was sunk on the foot-wall side of the reef to a depth of 60ft. with a cross-cut at the bottom of 16ft., through a mullocky lode full of leaders carrying gold.

Considering the great mass of stone that will, one day, pay to crush here, the ease with which it is worked, running up, as it does, a steep hill, its character in depth, and the richness of the stone, this will probably be a permanent mine.

The machinery is erected and at work about a mile away. This must be a mistake, as carting, where horse feed is so dear, must eat up the profits. It would have been far better to have sunk the 82ft. shaft down to the water, as it would have been useful to work the mine.

BLACKBURN'S MINE.

About 5 miles to the Southward of Southern Cross a batch of mines were started, but only one has been really tested, and this has yielded very good results.

The quartz outcrops for about 100 yards in length, after which it is either cut out by cross-course or pinches out. It runs in a North and South direction, dipping at an angle of 60° to the East.

The main shaft is down 63 feet vertically and 40 feet on the underlie, with a drive of 25 feet.

The stone that was crushed was taken out between 70 and 85 feet from the surface, 70 tons of which yielded 129 ozs. 14 dwts. 12 grs. of gold. This was a very good trial, as it proves the gold to be going down.

The reef at the bottom of the mine is about 3 feet in thickness, but in the shaft it is from 18 inches to 3 feet, whilst further North it is from 4 to 5 feet wide.

The lode is very well formed, having good walls, with 6 inches of casing between the lode and the mica slates.

The shoot of gold-bearing stone is between 30 and 40 feet in length, all of which stone will pay to crush.

One hundred feet South there is another shaft, which has been sunk 32 feet. The reef has the same dip here, and is about 2 feet 6 inches wide, and carries gold; 70 feet further South is another shaft 50 feet in depth; the reef here is a good deal broken at the surface, but at the bottom it is well-defined, and about 2 feet 6 inches in width, but more mullocky, and not so solid.

To judge from the character of the lode and its richness so far as tested, this will probably be a payable mine.

JACOLETTI'S.

This area is situated about 15 miles North of Parker's Range, and several areas were taken up, but only one is at present at work.

A very rich surface outcrop was here discovered, the crushing from which went about 4oz. to the ton; but this was either a rich patch or the shoot of gold has not been followed, as the stone from the bottom of the shaft does not appear to be very rich.

The shaft is down 80ft., partly vertical and partly on the underlie, as the reef goes down nearly vertically, but dips a little to the N.E.

At the bottom of the shaft there are 20 inches of stone.

PARKER'S RANGE.

PARKER'S MINE.

This area is situated at the North end of Parker's Range, and has on it the outcrop of some very rich lodes. On one of these a vertical shaft has been sunk 80 feet, cutting the reef at the bottom, where it is well defined and promising looking stone. There is also another shaft on the same reef, 25 feet vertical and 50 feet on the underlie, showing a well defined reef of about 2 feet 6 inches in width.

From the surface some of the richest stone on the fields was obtained; but little is visible in depth; although it may pay very well to crush.

The reef is well defined in character, and will go down; and if it is found to carry gold in depth, will probably be a very payable mine.

SEWELL'S MINE.

This area joins Parker's on the West side; and a deep underlay shaft has been sunk 80 feet, showing a well defined reef of from 2 to 4 feet all the way down. It dips at 50° W., and gives every indication of continuing to do so in depth.

TOOMEY'S MINE.

This mine is part of Parker's, which he abandoned; and on it there are two very rich outcrops of quartz, but in depth they will make into Parker's.

THORN'S MINE.

This joins Parker's to the South, and a good deal of stone has been raised. The reef dips at from 30° to 35° West, and a shaft has been sunk 55 feet, but it is now being opened up at the 25 feet level, where the stone is from 2 to 2 feet 6 inches, well defined, and appears to be going down.

UNION MINE.

There was no one at work on this mine.

RICKEY'S MINE.

This area is at the South end of Parker's Range; and a very rich reef has been opened up by a vertical shaft, and a vertical of 20ft. and underlie of 30ft.; the reef is from 3ft. to 4ft. in thickness, and is carrying gold down, and is a very promising looking lode.

MACINTOSH'S MINE.

This is on another line, three or four miles to the South. It is a well-defined reef dipping at an angle of 32° to the West, of about 3ft. to 4ft. in thickness.

A shaft has been sunk to a depth of 30ft. vertically, and 50ft. on the underlie, and at the bottom there is a cross-cut and a level. A trial crushing was taken from the stone raised, 45 tons of which yielded over 2oz. to the ton.

The reef is well-defined, and after this test, which was not picked stone, this will probably prove a payable mine in depth.

UPHILL'S MINE.

On the same line, South of Macintosh's, is an area which gave its name to this line of reef, but it has lately changed hands, and is now being worked by the Working Miners' Company. The reef has been tested to 78ft. on the underlie, and a level at the bottom showing a well-defined reef of 5ft., 2ft. of which is a mullocky casing.

The stone crushes well and is well formed, so will probably go down, and if the crushing which is now being made of the stone raised proves good, there is every prospect of this proving a rich mine in depth.

YILGARN MINE

Is on the same line to the North of Uphill's, where the same reef has been opened upon, and a large quantity of stone raised which crushes very well. It is now just sold, so will probably be properly tested, and to judge from the surface indication, and the indications in depth on the other mines on the same line, should have a promising future before it.

O'DRISCOLL'S MINE.

This area is situated on an area more to the South-East of Uphill's line, and on this a reef rich in gold at the surface has been opened upon by a vertical shaft of 50ft. where the reef shows at the bottom 18in. wide, and further South by an underlay shaft 70ft., where it dips at an angle of 42°, and is 3ft. wide.

A large pit has been opened at the surface from which a quantity of very good stone has been raised, both the body and rich stone seems to be carried in a shoot to the Southward. This reef is very promising.

There is another claim being opened up further South on this same line, where the stone shows gold freely at the surface.

POTTER AND OTHERS.

This area is further North and is being worked by a working men's syndicate. They have a very promising reef of from 4ft. to 7ft. in thickness, showing gold freely at the surface. It has been opened up to a depth of 42ft. by a vertical and an underlie shaft, the two being connected by a level. At the bottom the reef cut out by a granite cross course, as in Macintosh's, Uphill's, and the Yilgarn, but as in connecting the two shafts the dyke was cut through, there is no fear of the reef being cut out altogether, as they have now found it on both sides of the dyke; the only effect on it being that it has thrown it a little out of position. This is of great interest, as it is the first dyke yet passed through on the fields, for where it was struck in the other mines it so frightened the shareholders, as the managers were not able to find the reef on the other side, that the mines were either abandoned or sold. The enterprising working miners have a very good prospect of doing very well on this area.

IN CONCLUSION.

At Golden Valley a good deal has been done to develop the areas working there, and a large quantity of stone raised, but it is impossible to predict much about stone till a quantity has been crushed, when if the reef is well defined and the stone is rich in gold at 100ft. in depth, there is a good prospect where there are such masses of stone as here and at the Cross.

The Kathleen has started a water shaft on its machine area at the South end of the valley, where some beds bearing fresh water were struck between 70 and 75ft. from the surface, yielding a supply of about 300 gallons a day. This shaft is now down 92ft., through hard hornblend slate and mica slate dipping to the west.

The water comes into the shaft from the South-west, which seems to indicate a good supply as the country stretches away low-lying in that direction, which is a better indication for permanency than if it came from the N., as the small hill and valley might lead one to suppose that the supply would be limited from this small catch.

The supply is insufficient for machinery purposes, so sinking is being continued and salt water is certain to be struck in depth, when this precious supply of fresh water will be lost.

The other mines here are in the same state they were two years ago, but when machinery is erected here some of them will probably be started again.

At Hope's Hill the only two areas still held have amalgamated to put on machinery, which is erected near the lake ($1\frac{1}{4}$ miles from the mine) for water supply; this must prove a mistake in the long run, as carting is so expensive. As to the stone itself there is more of it and it is easier to work than any other mine of the fields. As all that is needed is a face on the southern end of the hill, or a series of levels and tramways, as there is about 200ft. of rise from the south end of the area.

At Southern Cross there four mills at work, and a great deal of work has been done during the last year, during which time a large quantity of stone has been crushed, which has yielded such good results that no one can doubt that at last we have payable gold reefs.

The great fault in some of those mines is that they are too rich in specimens, which the Managers encourage the men to look for, and when found to bag up. This searching for specimens cannot be too strongly condemned, as when it is made a practice of a mine never pays. The other thing that strikes one is that amalgam is not considered of any value apparently, as the boxes on the table are never locked.

Blackburn's and Jacoletti's now form the connecting link in the gold bearing country between Southern Cross and Parker's, at which latter place several shafts have been sunk to 80ft.; but very little can be said to have been done during the last two years except shepherding the areas.

A public crusher has now been erected, which is giving at last an impetus to this promising portion of the field. It is to be hoped before long that several companies will erect machinery on their property, for surface indication fully warrant them in so doing. But if they have not enterprise enough to do this, let them get 100 tons crushed from the lowest level on each mine.

The whole field seems to follow one anticlinal fold in the country, the centre of which is exposed at Golden Valley, where the reefs dip both East and West; the country is hard here, and the stone carries much copper. Hope's Hill and the Cross are on the Western side of this fold, whilst Blackburn's is on the other side of a synclinal further West still, for here the reefs dip to the East. All along this line of country the stone is highly mineralised, containing carbonate of iron and chlorite.

At Parker's the reef again dips west in pretty firm country, the stone here containing a great deal of iron pyrites (mundic) which will carry the gold in depth.

Taken as a whole, the fields have lately made great strides towards development, and few weeks pass now without the papers ringing with the news of some new and splendid crushing. Up to the present all the reefs tested have proved good, and one cannot help predicting a bright future for the Yilgarn goldfield.

The great want at the present moment is quick and cheap transport to and from the fields, and until this is obtained the development of the fields must be necessarily slow.

HARRY PAGE WOODWARD,
Government Geologist.

February 16th, 1891.

By Authority: RICHARD PETHER, Government Printer, Perth.

Assays of Stone from various Mines at Yilgarn.

From the Government Geologist to the Honorable the Commissioner of Crown Lands.

Sir,—

I have the honor herewith to hand you the result of the assays of stone collected by myself from the lowest levels of one or two of the important mines on the field which have not been tested. From those mines which have been tested by crushings I consider it unnecessary to make assays.

I have, &c.,

HARRY PAGE WOODWARD,

25–2–91. Government Geologist.

Report on Specimens of Auriferous Quartz received from the Government Geologist, 20th February, 1891.

Waterhall	2oz. 5dwts. 22grs.	gold	to	the ton
Parker's	16dwts. 8grs.	,,	,,	
Sewell's...	1oz. 9dwts. 4grs.	,,	,,	
Kathleen (copper lode)	9oz. 17dwts. 15grs.	,,	,,	
Kathleen (South) ...	16dwts. 8grs.	,,	,,	
Kathleen (North) ...	19dwts. 14grs.	,,	,,	
Jacoletti	6dwts. 12grs.	,,	,,	

Bernard H. Woodward,

Perth, 25th February, 1891. Assayer.

Appendix to Report on Yilgarn Goldfield.

GOLDEN VALLEY.

Kathleen Mine.—From the quartz leaders carrying copper pyrites in the large mass of broken rock or central portion of the lode in the Southern shaft, at the 30-feet cross-cut, the very high result of 9 ozs. 17 dwts. 15 grains of gold to the ton was obtained. This is the portion which I considered would be rich from the character of the rich gossan at the surface. From the white quartz, which is about four feet in thickness, on the Western side of the lode, at the bottom of the 60 ft. Southern shaft, the stone yielded 16 dwts. 8 grains of gold to the ton. This is a very high result from such poor looking stone.

The third sample, from the Northern shaft, at 95 feet from the surface, was taken from the large mass of white quartz on the Western side of the lode, which is here 16 feet in thickness, being composed of solid white quartz, containing lots of pyrites. This sample yielded 19 dwts. 14 grains of gold to the ton.

These assay results, which were samples selected by myself, may be taken as a fair test of the reef at these depths and must be considered as most satisfactory. The richest stone seems to be the mass of leaders to the Eastern side of the lode, where there is most copper.

Waterhall.—The sample was taken from the bottom of the workings, which consist of a vertical shaft 42 feet, then an underlie, 82 ft.; but, as the reef dips at such a slight angle, this is about 75 ft. from the surface. The reef here is three feet wide, and yielded 2 ozs. 5 dwts. 22 grs. of gold to the ton, which is most satisfactory; and if the stone raised in sinking this underlie is as good (of which, I think, there is no doubt), the stone at grass must be of considerable value.

The good assays from the Kathleen should encourage this Company to test the large reef which also runs through this claim; and if the rule which seems to prevail at the Southern Cross of shoots of gold running South, this lode should be rich in depth on this area.

Jacoletti's.—The stone from the bottom of the shaft, which is 20 inches in width at a depth of 80 feet, assayed 6 dwts. 12 grains of gold to the ton; which seems to carry out my idea that they are off the shoot of gold, which I should advise being prospected for North and South at a 50-feet level.

Parker's.—This stone was taken from the bottom of the 80-feet shaft, where the stone is 2 feet 6 inches in width; this yielded 16 dwts. 8 grains of gold to the ton. This reef should also be tested North and South for richer stone, as so small a body needs to be rich to pay to work.

Sewell's.—From the bottom of the 80 feet underlay, the stone yielded 1 oz. 9 dwts. 4 grains of gold to the ton, and as the reef is from 2 to 4 feet in thickness, this should pay to work.

As a whole, these assays are very satisfactory, as they prove that the reefs carry gold in payable quantities, to a depth of 80 feet, and that the despised Golden Valley may yet prove to be worth working.

No assays were made of the small mines, as depths of 20 and 30 feet were not worth troubling about.

HARRY PAGE WOODWARD,

25-2-91. Government Geologist.