REPORT ON WAVERLY OR SIBERIA DISTRICT

1909.

WESTERN AUSTRALIA.

DEPARTMENT OF MINES.

REPORT

ON THE

WAVERLEY OR SIBERIA DISTRICT

BY

A. MONTGOMERY, M.A., F.G.S.,
STATE MINING ENGINEER.

Issued under the authority of the Hon. H. Gregory, M.L.A., Minister for Mines.

PERTH, 18th FEBRUARY, 1909.

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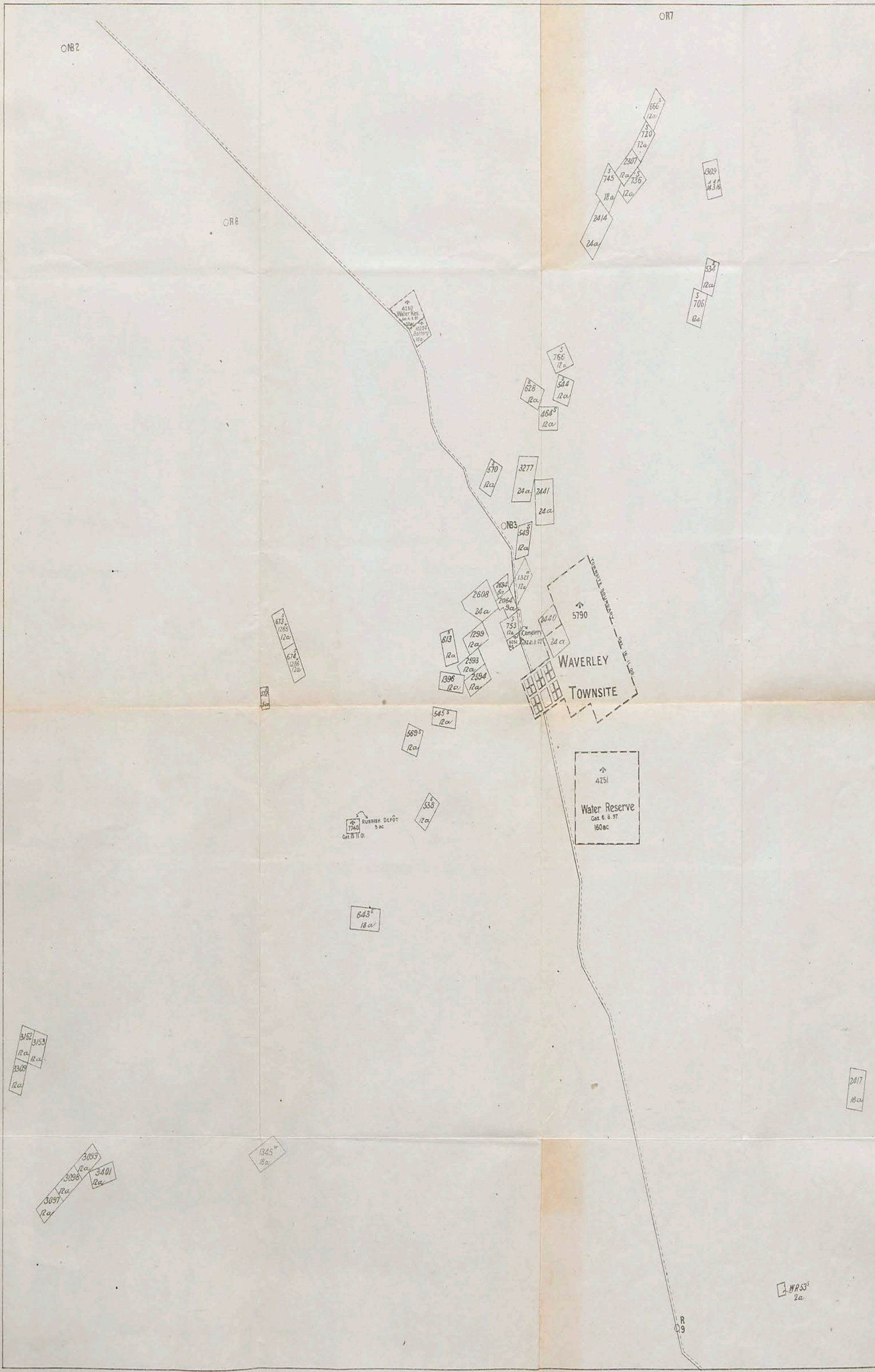

ONB2
OR7
OR8
ONB3
4250 Water Res.
Battery
5790
TOWNSITE BOUNDARY
WAVERLEY
TOWNSITE
Cemetery
4251
Water Reserve
Gaz. 6. 8. 97.
160ac
RUBBISH DEPOT
5 ac
7740
3277
24a
2441
24a
2608
24a
2414
24a
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Report on the Progress of Mining in the Waverley or Siberia District.

Office of the State Mining Engineer,
Perth, W.A., 18th February, 1909.

The Secretary for Mines,—

I have the honour to report that in accordance with instructions from the Hon. the Minister for Mines, I made a short visit to the Waverley district from 30th September to 3rd October last, for the purpose of looking into the conditions of the mining industry there. The time available did not admit of more than a very cursory examination, which was for the same reason confined to the mines in and about Waverley, and did not include the southern portion of the Siberia district near the Ora Banda Battery. The notes hereunder on the various mines visited are therefore to be taken as results of a merely cursory inspection, and not as those of a careful detailed examination and sampling, which would in many cases, no doubt, greatly alter the views taken of them, and would certainly allow much more precise and reliable information to be given about them. The inspection was furthermore almost entirely confined to mines which were at work at the time of my visit, and little is therefore said hereunder about leases which were abandoned.

In my Annual Report for 1903, published in the Annual Report of the Department of Mines for that year, a short account has already been given of the Siberia district, and as this mentions some mines then visited which are not dealt with in the present report, a copy of it is attached hereto as Appendix No. II.

GENERAL DESCRIPTION.

The Waverley Township lies about 12 miles W.S.W. from the Canegrass Railway Station of the Eastern Railway line, and is connected therewith by a fairly good road. The country in its vicinity forms undulating low hills, fairly well timbered and nearly surrounded by low-lying flats, or "lake country." The hilly country is mostly composed of dioritic greenstones, both massive and schistose, while the surrounding flats, so far as I have seen them or could get information, are mainly granite. An occurrence

of serpentine is noted hereunder near the Cave Hill mine, and occasional granitic and felsitic dykes penetrate the greenstones, as noted in describing the "Golden" leases.

ALLUVIAL DEPOSITS.

The Siberia district has long been noted for being one where alluvial miners can make a living by "dry-blowing," and traces of their operations are seen all over it, particularly along the belt running N.E. and S.W. through the field, which comprises most of the gold-mining leases. Along this belt numerous flat gullies and depressions in the hill sides have been worked with more or less success, usually in very shallow ground largely composed of brown oxide of iron. In several places, however, there are fairly deep buried water-courses, or "deep leads," which have been worked. In these the lead is usually covered with a thick bed of brown iron ore, and it seems probable that the shallow deposits of iron oxide on the hill sides may often be portions of what was once a much more extensive sheet of this material.

One of the most prominent occurrences of the brown iron ore is seen about a mile N.E. from the Pole mine (3098-1300w), on the S.E. side of the road from it to Waverley township, where a hill is seen to be capped with a heavy deposit of ironstone. It is a brown iron ore of considerable purity, likely to be of value some time for flux in smelting operations or as an ore of iron. It is a conglomerate of brown oxide of iron nodules cemented together with more oxide of iron, and lies in a layer on a whitish clayey rock, which, however, is very little exposed. Somewhat similar but less prominent outcrops of brown iron ore conglomerate are seen to the N.E. and E. of Waverley township. As nearly all the deep leads of the Eastern Goldfields have brown iron ore cappings over them, all these iron ore deposits are worth attention as possible covers to deep alluvial ground. They are a different sort of ironstone from the "laterite" deposits common in many parts of the goldfields, which are ferruginous concentrations derived from chemical alteration of the decomposed bed rock. The brown iron ore deposits covering the deep leads are more of the nature of bog iron ore beds.

Less than a mile S.W. of Waverley township a number of dry-blowers were working on both sides of a hill superficially capped with a layer of ironstone conglomerate of very similar character to that above described. They were only working the softer surface soil, without breaking much of the ironstone bottom. In this I noticed some rounded dioritic pebbles which make it probable that there may be deeper alluvial ground in places under the ironstone. One shaft had been sunk through into greenstone schist bedrock, but this is not sufficient to prove that elsewhere there is not deep alluvial ground to be found under the capping of iron ore.

North of Waverley township there are a lot of alluvial workings close to the road to Callion. Many of these were on a calcareous or dolomitic cemented bottom, which need not necessarily be the bedrock, and I am inclined to think that there is some chance of deep ground being found in this vicinity.

A little further north-west we find the head of "Nuggetty Gully" alluvial workings, which are on a flat gully dipping to the north-west. The ground at the head of the gully is much covered with ferruginous cement, in which some gold has been obtained. Another alluvial area is seen about a mile further north at the "Pearling Grounds" (766s, 1309w), and near this on the west side of the hills is "the Deep Lead" and on the east side McLelland and Smyth's "Deep Lead."

The "Deep Lead" lies a short distance south of the "Palmerston North," G.M.L. (745s) 1299w, and has been pretty well worked out. It runs north-westerly from the higher ground down into the flats, and the deepest workings are about 25 feet below the surface. There is a distinct, somewhat narrow "gutter," and over the wash there is an ironstone deposit. The head of the lead is nearly on the line of the schist lode supposed to form the main axis of the Siberia field.

The workings on McLelland and Smyth's Deep Lead are about six chains N.E. from the easternmost shallow alluvial workings on the "Pearling Grounds" (old G.M.L. 766s, 1309w). Two shafts have been sunk to a depth of nearly 100ft. Only one was accessible at the time of my visit, the first one sunk having partly fallen in, but I understand that a third shaft has since been sunk also. The shaft I visited was sunk 96ft., mainly through ironstone ground, reaching soft weathered diorite bedrock at 94 feet. There was on the bedrock a thin layer of waterworn wash much cemented by oxide of iron but carrying only mere "colours" of gold. A fault which passes through the ground a short distance above the bottom of the shaft is well seen in a crosscut west, and throws down the bottom several feet. The crosscut goes down on this slide and so a depth of about 100 feet from the surface is reached, where a drive has been made south along what is supposed to be the "gutter" of the lead. There is, however, but little rise of the bedrock on the sides of the gutter, and the layer of "wash" is very thin and poor. It is unquestionably waterworn material, but there seemed little sign of any considerable amount of concentration having gone on through the action of running water, and the "wash" was quite unpayable. The prospectors are, however, pluckily following the lead south, in the hope that it will improve. In a piece of country like the Waverley field, where so much alluvial gold is found on surface, there seems every reason to think that in older days when the lead was a water course much of the loose surface soil would become concentrated in it, and there is

therefore hope that the prospectors may yet be successful. I could not see whether the bottom of the lead was falling to north or south. The present fall of the surface is to the N.E. towards Lake country, but it is quite possible that the lead runs south through Waverley township.

Another lot of alluvial workings are found further north-east in "Noah's Ark" Gully. This is near the old "Majestic" lease, 534s, about a mile S.E. from the "Invincible" (720s) mine, and is a rather wide flat gully falling north-easterly which has been worked by dry-blowing for a width of about 10 chains for half a mile in length. The layer of "wash" contains many well water-worn stones of diorite, and is capped by a thick layer of brown iron ore conglomerate. The wash is 14 to 30 feet from surface, and has yielded fairly well, much of the larger gold being water-worn. There is no very distinct "gutter," the wash lying in a very flat shallow gully dipping to the N.N.E. In the lower part of the workings there is a good deal of dolomitic cement, some of which may be magnesite, as at the Government Tank hereafter described. The truly alluvial character of this "wash" is of much interest in connection with speculations concerning the origin of our deeper alluvial deposits throughout the Eastern Goldfields, a subject which has been dealt with at some length in my report of 16th July, 1908, on the Kanowna mines. At the time of my visit the "Noah's Ark" Gully had been nearly worked out and only a few men were left on it.

These various runs of deep ground falling both east and west from the central ridge of the field and disappearing in the flats show that a system of water courses once existed which had cut into the bedrock much more deeply than the existing valleys, and have since been filled up. The question at once suggests itself that there may be continuations of some of these leads under the flats, and it seems to me that there is a strong presumption that this is the case. The experience of following such leads down into the deep flats has, however, not as yet been very favourable in any of them with which I am acquainted in our Goldfields, though there seems no strong apparent reason why this should always be the case.

In a township allotment in the centre of Waverley township, Mr. R. Bertaux has sunk a shaft to a depth of about 165 feet, which seems not to have met with solid bedrock, but to have been sunk through clayey material and much weathered boulders, probably part of the filling of a deep lead. I did not go down this shaft and could only judge by the material thrown out on the dump. No water was met with in sinking, and probably the bottom of the deep ground was not reached. This may be a continuation southward of McLelland and Smyth's lead, but a good deal of work would have to be done by boring or sinking before this could be

demonstrated. Mr. Bertaux says he got a little gold in the shaft at 70 feet.

The flat in which Bertaux's shaft is situated continues south-east to the Government Tank for fresh water supply, about three-quarters of a mile from the township. The ground in which this is excavated is superficial detrital material, largely composed of ironstone pebbles, and does not hold the water satisfactorily, and the tank therefore rapidly loses its contents by leakage, except for a few feet in the bottom where fine mud brought in during rains has closed the pores of the ground. The tank requires lining to make it watertight. The whole of the material excavated appears to be "made ground" or superficial detritus, and there is much probability that the deep lead continues right through the flat under it. Some bores near the tank are stated to have struck hard rock at somewhat shallow depth, but this was a layer of magnesite, which might readily cover deeper alluvial ground and not be on the bedrock at all.

If further exploration should result in proving that the deep leads do carry gold down into the deep flats there would be strong reasons for proving their position and depth by systematic series of borings. It would be preferable, however, to trace them downwards from the known gold-bearing parts rather than start prospecting at once in the deep ground.

MAGNESITE DEPOSIT.

During excavation of the Government Water Tank the layer of magnesite above-mentioned was encountered and a good deal of this material is seen thrown out on the spoil embankment round the tank. The bores show that it is somewhat extensive. A sample of the mineral taken by me from the spoil-bank near the intake to the tank was sent for analysis to the Geological Survey Laboratory and proved to be of great purity, containing 98.71 per cent. of magnesium carbonate, the analysis being:—

	%
Silica SiO_2	0·16
Titanic oxide TiO_2	Nil
Carbonic dioxide CO_2	51·62
Phosphoric Anhydride P_2O_5	Nil
Combined water H_2O	0·16
Hygroscopic water H_2O	0·12
Lime CaO	Minute trace
Magnesia MgO	47·09
Manganese protoxide MnO	Nil
Ferric oxide Fe_2O_3	0·20
Alumina Al_2O_3	0·61
Sulphur Trioxide SO_3	0·08
Total	100·04

Sp. gr. 2·9.

In a recent number of the "New York Engineering and Mining Journal" of 29th August, 1908, p. 434, the average analysis of several shipments of Grecian magnesite was given as—

	%
Magnesia MgO	44·90
Carbon dioxide CO_2	44·56
Silica SiO_2	0·52
Ferric oxide Fe_2O_3	0·80
Lime CaO	1·50
	92·28

from which it is clear that moisture and other constituents amounting to 7.72 per cent. have not been stated. The Waverley mineral is therefore well above the average of good commercial magnesite.

Magnesite is used for production of carbon dioxide used in manufacture of aerated waters, being for this purpose much preferable to carbonate of lime, as a refractory material and flux in smelting, for manufacture of steam pipe coverings and boiler lagging, and after conversion into sulphate of magnesia in manufacture of wood pulp in paper making, also for making various salts of magnesia. The principal producing countries are Austria-Hungary, which in 1905 exported 92,359 metric tons of calcined magnesite, and Greece whose output of crude magnesite was 64,424 metric tons in 1906, these being the latest figures (Mineral Industry, Vol. XVI., 1907) readily available. The price in New York for crude Grecian magnesite during 1907 "was steady at $7 to $8 per 2,240lbs. up to the end of the year, when the price was advanced about $1.00 per ton." ($1.00 = 4s. 2d.). At these prices the Waverley deposit does not offer much inducement for mining at present except for any local demand which may arise, but might be worth attention from aerated water manufacturers and those interested in coverings for steam pipes. It has not been opened up enough to prove its extent, but there seems a good prospect of the deposit being of size worth working and that the mineral could be raised at a cheap cost.

LODES AND REEFS.

The main lode of the Waverley district is locally considered to be a large schist "formation" running north-north-easterly from near the Cave Hill lease on the south to the Invincible mine on the north. This has been worked in the old Horseshoe (643s) and Merriwee King (538s) leases, is seen again in the Bonnie Doon (753s), (1305w), and may be the lode in the Invincible (1292w, 720s). My examination of the district was much too cursory to enable me to say if there are good grounds for the belief that

there is a fairly continuous lode right through the district, but it is clear from the plan of the leases that these have been taken up along a narrow belt of country running N.N.E. and S.S.W. on the line indicated, and in the leases above mentioned a large schist "formation" is visible. The "formation" is a wide belt of squeezed and contorted greasy-looking flaky schist, with numerous interlaminated and cross veins of quartz ramifying through it, many of which have yielded rich ore in small bunches. I am doubtful as to the Invincible lode being part of this "formation" as it is composed of silicified schist and quartz of somewhat different character, and its line coming southward runs to the west of the general line of the supposed main schist lode.

In the Missouri lease (718s, 628s) there is a wide fractured zone of country with numerous quartz reefs running in various directions, which may be a phase of the fractured and sheared zone of which the schist "formation" is the most representative type. The occurrence in this lease is more fully described hereunder.

Most of the other lodes worked are fairly distinct quartz reefs. They have mostly been poor in gold when taken in bulk but have been notable for yielding rich patches of specimens. They have very various courses and are probably more or less connected with the main north-easterly zone of fracture above mentioned. The "Indicator" hereafter described in Messrs. Cullens and Backhouse's P.A., is worthy of attention, and may prove a key to the proper understanding of the occurrence of rich but apparently isolated bunches of ore.

The following mines were visited:—

Pole, G.M.L. 1300w, 3098.—This mine was not being worked at the time of my visit, and I have not seen the underground workings. According to such information as has been given to me it has been worked to a depth of about 240 feet from a vertical shaft and a shaft on the underlay. The reef is said to be nearly vertical for the first 50 feet in depth, then flattens to an underlay of about 1 in 1; it is a quartz reef averaging about 18 inches in width and the ore-shoot has been proved for about 180 feet in length. The country is diorite, with granitic dykes, pretty hard below the water level. The stone crushed has been of fair quality, 1,100 tons treated to end of 1903 having returned 1,594.72ozs. of unrefined gold, and 202 tons treated thereafter to end of 1908 having given 719.08 fine ounces, inclusive of 169.02 fine ounces from cyaniding the old tailings. Some of the stone in the bottom of the mine is stated to be worth quite an ounce to the ton. It is however questionable if this small reef can be profitably worked deeper in the hard country. The best hope of doing so is by straightening the

underlay shaft by cutting it through to surface on one regular angle of inclination and then continuing the sinking on the underlay, and providing a good equipment of winding and bailing machinery. The reef might become larger when sunk upon, and on improvement in size and value would depend the principal hope for its successful working. The deeper development of this mine does not appear to be a promising mining venture but is by no means an unwarrantable one.

There are a 5-head stamp battery and small cyanide plant on the Pole mine which have been of much service to the district by crushing ore for the public. At the time of my visit preparations were being made to treat the accumulated slimes.

Cave Hill (1345w).—This mine has only lately been opened and has been notable for several very rich crushings, viz.:—
(As given to me by owner.)

20 tons for 273ozs. 15dwts. 0grs. of unrefined gold.
64 tons for 766ozs. 7dwts. 0grs. of unrefined gold.
46 tons for 939ozs. 17dwts. 0grs. of unrefined gold.
100 tons seconds for 70ozs. 0dwts. 0grs. (about) of unrefined gold.

Total, 230 tons for 2,049ozs. 19dwts. 0grs. of unrefined gold.

The first of these crushings does not appear to have been officially recorded. The later three of 210 tons in all returned 1,527.07ozs. of **fine** gold, according to the Mining Statistics.

The workings are down to about the 80-feet level, at which depth there is as yet no water. The rich ore has been found in bunches of iron and manganese oxides and quartz irregularly distributed in what appears to be a somewhat large lode "formation" of shattered and weathered dioritic material. Its course is nearly E. and W. and dip about vertical, with but slight underlay to the north. The "formation" shows very smooth well-marked walls in the bottom level, and is clearly of considerable width, but has not been sufficiently cut through to say how wide it is. It appears to be a somewhat wide lode of shattered and crushed wall-rock material, with only strings of quartz and iron oxides through it. The richness of these veins, however, gives much reason to hope for the occurrence of larger bodies of ore in portions of the "formation," which may prove payable. The mullocky lode-stuff itself, except where the iron-stained quartz veins penetrate it, seems to carry very little if any gold, according to the panning tests made by the owners. The best policy at present seems to be to follow the strings of richer stuff as closely as possible in the hope that they will lead on to larger and more dependable bodies of ore. Notwithstanding the richness of the crushings there was practically nothing visible in the mine at the time I visited it to give one much confidence that working would continue to be success-

ful, and future success will depend entirely on the results of developments. There seems, however, great probability that by working on the lode other rich bunches of ore will come to light, and some of these may lead to more permanent ore bodies.

The Cave Hill lode is on the south edge of a line of hills running N.E. and S.W. for a long distance which presents many features characteristic of a huge "lode formation" or "mineralised zone." A short distance west of the mine these hills are crossed by a flat gully, one of the heads of the Six-Mile Creek, and in this gully the surface has been extensively worked for alluvial gold by dry-blowers, the valuable ground having been apparently that where the gully crosses the mineralised zone. The locality gets its name of "Cave Hill" from small caves in rocky outcrops of ironstone near the top of the hill. On examination these outcrops are found to consist of quartz and oxide of iron veins plentifully distributed through much weathered dioritic material, thoroughly kaolinised and heavily charged with oxide of iron. They are quite different from the "laterite" iron oxide deposits common in our goldfields, and seem to me to be decidedly of lode character. They appear most likely to be the surface cappings of a large lode of shattered country full of veins of quartz and, in depth, pyrites. The S.E. side of the mineralised zone shows a great width of dioritic schist, full of ramifying veins of cellular quartz. From its position and strike this zone seems likely to be portion of the large schist "lode" previously referred to as running in a N.N.E. and S.S.W. direction right through the Waverley field, and which has been worked a little over a mile to the north-east in the Horseshoe lease, 643s. The prospectors however consider that the latter's lode runs a good deal further west, and it is therefore not unlikely that this main schist "formation" has divided into two branches at the south end.

Though these huge mineralised belts of country are rarely likely to be themselves workable in bulk, they are deserving of very close attention from prospectors, as they probably contain numerous payable veins and occasional larger ore bodies worth working. There are alluvial workings more or less all along the line of the belt, from which a good deal of gold has been taken.

McCulloch & Hawk's P.A.—Some 15 to 20 chains N.E. from the Cave Hill workings two prospectors were trenching on the S.E. side of the mineralised zone above mentioned, and had got some good prospects in leaders but had no very definite lode at the time of my visit. The run of the veins appeared to be more or less N.E. and S.W. in weathered diorite country.

Golden, G.M.L. 1286w, 674s., and Lochiel, G.M.L. 1367w, 673s.—These two leases are worked as one property by Messrs. Christie and Sons, who have somewhat extensive workings on four lodes

running about N.N.W. and S.S.E. Several shafts have been sunk, one to about 60 feet, and another to 80 feet. The best gold has been got in veins of iron oxide and much iron-stained quartz, which often give good dollying ore. There is also, however, said to be a good deal of low-grade ore, which may be treated eventually. The lodes are from 2ft. to 12ft. wide, but work has been mainly confined to the rich specimen veins. The official returns show 112.16 tons crushed to end of 1908 for 451.37ozs. of fine gold, inclusive of 126.43ozs. from stone dollied.

The country is diorite but several small dykes of felsite and quartz porphyry are met with, probably connected with the main granite country lying not far to the north-west. Some of these dykes in parts are almost entirely quartz, and not easily distinguishable from quartz reefs, a fact of much interest in view of theories which have been brought forward as to quartz reefs in general having a genetic connection with deep seated dykes of acidic igneous rocks. Another instance of a similar occurrence was lately noted by me at Kathleen Valley.

Cullen's & Backhouse's P.A. (formerly Bonnie Doon, G.M.L. 1305w, 753s).—Some good ore has lately been obtained in this holding from an ironstone vein lying about 30 to 35 feet west of the main schist lode, and underlaying easterly similarly to it. Course about N.N.E. and S.S.W. Mr. Cullen informed me that he had traced this vein for nearly two miles in about the same relative position to the schist lode. The vein is separated from the schist by a bar of hard diorite. The workings are quite shallow, the deepest being about 40 feet, and have been made on the theory that the ironstone vein is an "indicator," as it has been found that on many occasions when quartz veins have been intersected by it these have carried good gold at the intersection. The workings are therefore carried along the outcrop of the indicator to locate intersections with cross veins of quartz, and have met with very fair success. It does not seem to me to be yet altogether demonstrated that there is here an instance of the "indicator" mode of occurrence of gold, but there certainly seems a good deal of evidence in favour of its being such, and the progress of this prospecting work is worthy of being noted. The ironstone vein is a thin but distinct vein of brown oxide of iron and schist and is probably a vein of very pyritic schist in depth.

On the old Bonnie Doon lease, 1305w, there has been a large amount of work done in the past on the southern end of the Reward or Waverley reef.

Waverley, G.M.L. 1283w, 2064.—No one was working on this mine at the time of my visit. A main shaft has been sunk in hard diorite to a depth of 145 feet. The reef is a large body of quartz, up to 14 feet wide, and has been on the whole of low-grade, but

with a good many very rich patches. The recorded returns to end of 1908 are 2,635.05ozs. of fine gold from 2,317.80 tons of ore crushed, inclusive of 496.67ozs. from stone dollied.

Tyler's P.A.—About three-quarters of a mile north of the township a little work has been done on a flat body of ironstone and quartz, which may be a flat-lying reef, but is at present a very doubtful deposit to classify. A crushing through the Waverley State Battery is said to have returned only from 1 to 4 dwts. per ton. A start had been made to break out another crushing at the time of my visit, but the prospects did not appear very encouraging.

Missouri (late G.M.L. 718s, 628s).—In my previous report this mine was described under the very similar name of "Mystery," G.M.L. 628s., and in the Mining Statistics for 1902 it is recorded to have produced 32 ounces of unrefined gold from 50 tons of stone crushed to end of 1902. Subsequently 808.50 tons of ore have yielded 296.99ozs. of fine gold to end of 1908. It is by no means clear yet how many lodes there are in this ground, or how their occurrence should be classified. Two principal reefs are distinguished and the principal shaft lately worked is on the eastern one and has been sunk to a depth of 100ft. On the western lode there are also some workings of about the same depth, but work here was much hindered by a large granitic dyke which cut through the reef. This dyke appears to behave much the same as the pegmatite dykes or "mica bars" described in my report of 14th September, 1908, on the Yilgarn Goldfield. The lode walls seen in the eastern workings run nearly east and west or a little south of east and north of west. There are also, however, cross leaders of quartz, one of which I found to be running N. 65 degrees E. On surface the general run of the auriferous ground is about north-easterly. The position of the lease is fairly well on the line of the main schist lode above described, and I am inclined to think that the Missouri veins represent another phase of the same "formation" wherein a hard strong country rock has been fractured for a considerable width without much formation of schist and veins of quartz have been formed in the crevices, ramifying more or less irregularly through the whole broken mass. Many of the veins and leaders have been found to carry gold, and much of the superficial soil has been worked for loose gold by dry-blowing. The most northerly workings show in an open cut a rather wide mass of lode "formation" of quartz and weathered diorite, from which crushings have been taken. Some gold has been found in the soft material as well as in the quartz veins. It will take a large amount of patient and persevering work following the auriferous veins to open up the ground enough to show clearly the nature of this ore-deposit. Should it prove to be of the nature I anticipate there would be considerable probability of soft mullocky ore-bodies being found in it which might be worth working as low-grade

propositions, and a possibility of larger bodies of quartz being got in depth.

Anderson's P.A.—In this claim there was a 65ft. shaft to work a small quartz reef running about N.E. and S.W. with underlay to N.W. In the crosscut to the reef from the shaft the country is seen to be much disturbed, indicating a possibility that the small quartz reef is only a vein in a large lode "formation."

Palmerston North (G.M.L. 1299w, 745s).—On this lease very creditable work was being done by the owners, who had opened their mine in very good miner-like style by means of an inclined shaft on the underlay of the reef. The latter dips at 30deg. from the horizontal, and consists of a strong body of quartz, with a little schistose lode matter, from three to five feet thick. The shaft is down 120 feet on the incline, to water level. Shallow workings below the water level have given some ore very heavily charged with dense iron pyrites, with a little blue and green carbonate of copper and some chalcocite (sulphide of copper) but above water level the quartz is fairly free from sulphides. The ore is hauled up the incline by a whip and horse to a loading bank, whence it is carted to the State battery. The first crushing of 159 tons is stated to have yielded 4dwt. 4grs. per ton by amalgamation with 3dwt. 21grs. per ton by assay in the tailings. At the time of my visit 359 tons had been crushed and there were about 120 tons at the battery. The official returns to end of 1908 are 505 tons crushed for 61.18ozs. of fine gold.

Towards the north end the lode becomes steeper in its underlay, and is considered by the owners of the mine to be identical with the Invincible lode, with which it agrees very well in position. It has been of somewhat low grade as yet, but seems very well worth persevering with, especially as the veins of this locality have often yielded very rich bunches of specimens.

Camperdown (late G.M.L. 1290w, 2307).—No work was going on at this mine, on which little has been done. In the official returns for 1900 the lease is credited with a production of 100ozs. of unrefined gold from 1cwt. of stone crushed.

Invincible, G.M.L. 1292w, 720s.—On this lease a lode has been worked from two shafts 110 and 90 feet deep on a course about N. 30deg. E. for a length of about 400 feet. The lode dips almost vertically, and consists of schist, often much silicified, and quartz, up to 16 feet in width. Sulphides make their appearance at about 50 feet in depth, the ore being then somewhat heavily charged with them, and in consequence the extraction by amalgamation alone is not satisfactory. Crushings giving only 2½dwt. of gold per ton by amalgamation are said to have shown by assay up to 1oz. per ton in the tailings. Most of the work done has therefore

been in the oxidised part of the lode, above the 50 feet level. The lode in the deeper parts of the mine bears a strong resemblance to those of the schistose type at Kalgoorlie.

There is also an eastern reef running about N. and S. through the lease, its line meeting that of the western one near the north boundary. It underlays westward and should therefore also meet the western lode in depth. This reef is composed mainly of white quartz and is generally rather poor, but has yielded some very rich bunches of ore. Two shafts are sunk on it to 90 feet and 68 feet. A crushing of 21 tons from about 80 feet is stated to have given a return of about 14ozs. per ton, with 4ozs. 19dwts. per ton in the tailings.

From this mine, according to information given to me, some 1,800 tons of ore have been crushed, which seemed a reasonable amount from the excavations visible. The official returns to end of 1908 however only show 1,156 tons, from which a return of 651.17ozs. of fine gold has been obtained. These show a very good grade of ore, and appear to justify much more energetic working than this mine has yet had. The proposition, so far as one can judge without sampling it, seems well worthy of attention from persons prepared to invest capital in opening it up more thoroughly.

OTHER MINERAL OCCURRENCES.

Asbestos.—Within two chains north of the Cave Hill mine workings there is a strong outcrop of serpentine with numerous small veins of chrysotile. The Government Mineralogist who examined this rock reports that "Microscopic slide shows the rock to be wholly composed of serpentine (pseudomorphous after olivine) and magnetite." The veins of chrysotile are too small to be of any value for production of commercial asbestos, but it is interesting to note that this mineral does occur in the Waverley district, and there is of course a possibility that there may be other outcrops of the serpentine rock, containing asbestos of workable length.

Cobalt Ore.—A small specimen of a red mineral given to me by the Cave Hill prospectors as coming from their mine proved to be Cobalt Bloom or Erythrite, and according to the Government Mineralogist is the first recorded occurrence of this mineral in the State. It is hardly likely to occur in sufficient quantity to be of any commercial value, but as Cobalt ores fetch a very good price, prospectors would do well to keep a look out for them.

STATE BATTERY.

The Siberia State battery is situated two miles N.N.W. from the township on the road to Callion, in granite country. There

are five heads of stamps and a cyanide plant. The following is a list of crushings and returns therefrom, as supplied by the State Batteries Branch:—

Siberia State Battery.

List of Crushings from Inception to 31st December, 1908, showing Tons and Yield, also Sands resulting, etc.

Name of Lease or Holding.	Tons.	Yield.
		oz. dwt. gr.
Crown Lands	20	1 3 9
Invincible Consols, 720 S.	1,451½	574 2 0
Lochiel	50	16 5 0
Pearling Ground	124	53 18 0
Missouri Lode (1291 W. 628 S.)	92	20 0 0
Missouri 718 S.	723	283 5 5
Port Arthur, 464 S.	87	56 7 0
Prospecting Area, 155 S.	20	5 11 0
Waverley, 124 S.	1,023	535 9 0
Ora Banda Nellie	34	32 6 0
Ora Banda	290	146 3 0
Prospecting Area, 63	8	21 12 0
Prospecting Area, 46 S.	49	39 15 0
Annanias	15½	8 11 0
Alluvial Claim, 97608	10	25 9 0
Prospecting Area, 186 W.	24½	3 19 0
Ora Banda Extended	8	2 1 0
Slippery Gimblet, 1336 W.	452⅔	283 2 0
P.A., 108 W.	12	3 9 0
P.A., 110 W.	21	54 7 0
Palmerston North, 762	596	95 10 0
P.A., 68 S.	28	14 6 0
Bonnie Doon, 745	23	6 0 0
Golden, 1286 W.	76	99 7 0
Alluvial Wash	13	4 6 0
Munro's P. A., 180 W.	10	50 14 0
Majestic P. A., 128 W.	32	20 6 0
Palmerston	68	6 13 0
P.A., 251 W.	18	1,357 8 0
P.A., 242 W.	30½	56 6 0
Lode Claim	33	22 18 0
Expectation	74	95 8 0
P.A., 237 W.	5	42 18 0
P.A., 233 W.	19	6 0 0
P.A., 252 W.	30	0 17 0
P.A., 247 W.	10	1 14 0
Total	5,580.5	4,047 5 14

	tons.	fine ozs.
Sands from various crushings from inception to 31st December, 1907	1,547	215.27
Sands and Slimes from various crushings from 1st January to 31st December, 1908	876	162.91

GOLD PRODUCTION.

Appended (Appendix No. 1) is a table showing the total gold production of the Siberia District to end of 1908 as supplied by the Statistical Branch of the Department. It is to be noted that in the statistics as ordinarily published the returns for this centre are included in the Kunanalling District of the Coolgardie Goldfield until a date in 1906 and thereafter are in the Siberia Centre of the Broad Arrow Goldfield. In the appended table both sets of returns have been combined. The total production of alluvial gold is returned as 67.46 fine ozs., which is probably a far smaller figure than really obtained, and of gold got by dollying as 1,710.10 fine ozs., while 29,767.61 tons of ore have been treated for a yield of 22,371.91 fine ozs. Grand total, 24,149.47 fine ozs. There is much probability that the returns understate the actual production. As will be seen from the table it includes mines in the southern part of the Siberia district not referred to in this report.

SUMMARY.

The Siberia field has never been a very active one, but continues from year to year to support a fair number of alluvial diggers and a good many workers on reefs. It has been notable for very rich bunches of ore, but on the whole appears to be rather a low-grade field. There are some fairly promising mining propositions in the district which might become of importance if worked with the aid of some capital, but which at present merely afford a hand-to-mouth subsistence to a few prospectors. The line of the schist "lode formation" seems to deserve very careful prospecting not only for rich leaders in it but also for larger workable bodies of low-grade ore, and close observation should be made of any signs of occurrences of ore of the "Indicator" type. The deep alluvial deposits are of much interest, though as yet they have not given much evidence of being payable, and are worth more attention from prospectors than they have hitherto received. The magnesite deposit at the Government Tank also deserves some exploration.

I have, etc.,

A. MONTGOMERY, M.A., F.G.S.,
State Mining Engineer.

APPEND

Production of Gold and Silver from all Sources, showing in Fine Ounces the Output as

BROAD ARROW GOLDFIELD, SI

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Area in Acres.	PREVIOUS TO 1905.				
				Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
				Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
	1316w	Band of Hope	12	..	..	21.00	13.84	..
	1345w	Cave Hill	..	..	..	..	..	..
	1362w	Colossus	..	..	..	..	..	..
	1284w	Denver City	12	..	..	4.00	7.08	..
	1347w	Expectation	..	..	..	..	..	..
	1344w	Gimblet Extended	..	..	..	..	..	..
	1338w	Gimblet West	18	..	..	71.00	48.87	..
(674s)	1286w	Golden	12	..	85.93	90.66	280.46	..
	1358w	Golden Mount	..	..	..	..	..	..
(720s)	1292w	Invincible	12	..	..	839.00	569.31	..
	1289w, 1308w	Lady Evelyn leases	24	..	..	805.00	645.14	..
	1367w	Locniel	..	..	..	..	..	..
	1322w	Lone Hand	24	..	20.66	128.00	73.86	..
(728s)	1293w	Mexico	13	..	..	340.50	704.72	..
	1293w, 1298w	Mexico leases	..	..	..	..	..	..
(718s)	1291w	Missouri	12	..	4.84	588.00	214.49	..
	1348w	Old Identities	..	..	..	..	..	..
	1335w	Ora Banda Boulder	..	..	..	8.00	1.77	..
	1288w, 1303w	Orabanda leases	24	..	..	6,468.00	1,526.23	..
	1295w	Ora Banda Nellie	12	..	..	468.00	131.01	..
(736s)	1294w	Palmerston	12	..	26.04	159.00	25.10	..
	1299w	Palmerston, North	18	..	..	68.00	5.75	..
(746s)	1300w	Pole	12	..	..	190.00	510.92	..
(744s)	1306w	Port Arthur	12	..	..	66.50	43.97	..
	1336w	Slippery Gimblet	24	..	..	603.50	333.31	..
	1332w	Try Again	6	..	32.23	..	..	..
(1248)	1283w	Waverley	9	..	496.67	1,836.80	2,030.80	..
		Voided Leases	..	1.07	977.13	6,211.65	7,633.17	..
		Sundry Claims	..	66.39	2.01	1,386.75	1,297.92	..
		Total	..	67.46	1,645.51	20,353.36	16,097.72	..

IX I.

reported to the Mines Department during 1908, and the Total Production to date.

BERIA MINING CENTRE.

TOTAL FOR 1908.					TOTAL PRODUCTION TO 31ST DECEMBER, 1908.				
Alluvial.	Dollied and Specimens.	Ore treated.	Gold. therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold. therefrom.	Silver.
Fine ozs.	Fine ozs.	Tons. (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
..	..	24.00	4.23	..	..	..	45.00	18.07	..
..	..	210.00	1,527.07	..	..	..	210.00	1,527.07	..
..	..	140.00	14.42	..	..	..	140.00	14.42	..
..	..	..	..	..	..	..	4.00	7.08	..
..	..	74.00	85.95	..	..	..	74.00	85.95	..
..	..	17.00	3.35	..	..	..	17.00	3.35	..
..	..	357.00	245.73	..	..	..	428.00	294.60	..
..	31.95	21.50	44.48	..	..	117.88	112.16	324.94	..
..	4.26	129.00	77.62	..	..	4.26	129.00	77.62	..
..	..	317.00	81.86	..	..	..	1,156.00	651.17	..
..	..	893.25	730.49	..	..	..	1,698.25	1,375.63	..
..	8.55	..	..	..	..	8.55	..	..	..
..	..	37.00	25.64	..	..	20.66	165.00	99.50	..
..	..	51.00	125.85	..	..	..	391.50	830.57	..
..	..	61.00	104.16	..	..	..	61.00	104.16	..
..	3.80	220.50	73.86	..	..	8.64	808.50	288.35	..
..	..	94.00	79.69	..	..	..	94.00	79.69	..
..	..	..	..	..	..	..	8.00	1.77	..
..	..	1,733.00	245.54	..	..	..	8,201.00	1,771.77	..
..	..	170.00	43.30	..	..	..	638.00	174.31	..
..	..	..	..	..	..	26.04	159.00	25.10	..
..	..	437.00	55.43	..	..	..	505.00	61.18	..
..	..	12.00	208.16	..	..	..	202.00	719.08	..
..	..	..	..	..	..	..	66.50	43.97	..
..	..	2,963.00	832.93	..	..	..	3,566.50	1,166.24	..
..	..	..	..	..	..	32.23	..	..	..
..	..	481.00	107.58	..	..	496.67	2,317.80	2,138.38	..
..	..	..	..	..	1.07	977.13	6,211.65	7,633.17	..
..	16.03	972.00	1,556.85	..	66.39	18.04	2,358.75	2,854.77	..
..	64.59	9,414.25	6,274.19	..	67.46	1,710.10	29,767.61	22,371.91	..

APPENDIX II.

Report on the Siberia District, being an Extract from the Annual Report of the State Mining Engineer for 1903, from the Annual Report of the Department of Mines for the year 1903.

SIBERIA.

The mines in this district are in the vicinity of the townsite of Waverley, but are a good deal scattered. There are quite a considerable number of reefs known to carry some gold, and a large amount of alluvial gold has been obtained by dry-blowing; but, owing to want of crushing facilities and absence of good water supply for battery purposes, very little progress has been made.

The country is greenstone and greenstone schist, with a good many dykes of quartz-porphyry and felsite traversing it. A little further North granite country comes in and continues to the Siberia soak.

Waverley Mine (known also as Christie's Reward, Lease No. 124s).—There are two big quartz reefs in this mine, lying parallel and close together, giving up to 14 feet in width of stone. Strike North-East and South-West. A shaft is sunk 120 feet, and a winze from the bottom level goes 25 feet deeper, and appears to have reached the water level. The reefs have been patchy, but phenomenally rich at times. They have not been worked in a systematic manner, and it is impossible to say what is their average value; but with local crushing there seems a good prospect of payable returns. The owners have a Tremain mill at a Government well about two miles away to the North, but did not appear to be well satisfied with its performance either in regard of capacity or cost.

A little to the South of the Waverley Mine is the old "Bonnie Doon" shaft, 160 feet deep, in hard greenstone country. Near the bottom a quartz-porphyry dyke was cut. A drive is said to have been made about 35 feet to the East at the bottom. There is a little water in this shaft, but it only makes about 30 gallons a day. The country became somewhat softer in the end of the drive. The shaft is 6 feet by 3 feet, timbered right down, and in good preservation, and is very centrally situated in the field. The ground falls from it to the Eastward, and would be very suitable for a battery site if a good supply of water were obtained by sinking the shaft or extending the Eastern drive. To the East of this shaft there is a large soft schist "formation," which runs North-East and South-West through the field for a long distance and carries a little gold in many places. It is up to 60 feet in width, and probably constitutes a water channel, so a shaft sunk in it

would be likely to obtain a battery supply. Continuing the drive East from the Bonnie Doon shaft would also intersect this "formation," but the distance to be driven would be considerable, and it might be cheaper to sink a new shaft than to make the crosscut.

Mystery (formerly Marquis of Lorne, Lease 628s).—This piece of ground seems full of reefs and veins of quartz, three or four lines being recognisable, all carrying some gold. The principal reef is a strong body of quartz two feet to eight feet wide running North-Westerly. I was informed that 30 tons crushed at the Pole battery had returned 10dwts. to the ton, with tailings assaying 6dwts. and concentrates 2ozs. per ton. The cost of crushing was 20s. a ton for parcels over 20 tons, and 25s. for those under 20 tons, and the cost of carting to the battery, about 7½ miles, was 10s. 6d. a ton. Another crushing of 32 tons returned 13dwts. per ton. The leaseholders have from 200 to 250 tons of stone at grass, of rather low grade, but worth putting through a local battery, and they could rapidly turn out a much larger tonnage. There has been a lot of gold got by dry-blowing about the surface of this lease.

The Admiral Dewey (Lease No. 529s) lies to the South-East from the Mystery, and has two shafts, 130 feet and 110 feet deep, on a small reef 10 to 12 inches thick. A crushing of 35 tons is stated to have returned 28dwts. to the ton, and several smaller ones, amounting to about 40 tons, to have averaged 22dwts. per ton.

On old lease 544s, to the North-East from this, another small lode 10 to 12 inches thick, is reported to have given 22dwts. and 10dwts. per ton from two parcels of about 22 tons.

Invincible (Lease 519s, formerly Camperdown North).—A crushing from this lease of 15 tons is stated to have given about 10ozs. to the ton, and was obtained from a small reef running more or less North and South, from one to four feet wide. The lode material appears to be a mixture of country rock and quartz veins rather than clean quartz. The shaft on this is 60 feet deep. There is also a large lode, up to 20 feet in width, of soft schistose material, with quartz veins, much resembling some of the Kalgoorlie lode outcrops, running North-North-Easterly through this lease, from which fair returns have been got; 100 tons crushed at the Pole battery are reported to have yielded 30dwts. per ton by crushing and cyaniding, and another 15 tons 27dwts. by amalgamation alone. This lode seems decidedly well worth further testing.

Silksworth (Lease 655s).—The Invincible lode continues Northward in this lease, and has been worked upon by open cutting; 39 tons crushed shortly before my visit at the Pole battery were stated to have yielded only 7dwts. per ton by amalgamation, but the 15 tons of sands saved for cyaniding assayed 2ozs. per ton. About 44 tons sent to Hannan's Reward battery gave 8dwts. to the ton by amalgamation and 1oz. 19dwts. per ton in the tailings as-

says. One hundred tons of seconds, from which the 39 tons parcel had been picked, are said to have assayed 23dwts. per ton. These results are as given to me on the ground by the owners, and I had no means of verifying them, but accepting them in good faith it would seem that this is a valuable lode, well worth further development. The oxidised part of the lode for eight feet wide is said to have assayed 16dwts. per ton over and over again.

Three or four chains East of this lode there is a quantity of quartzitic stone outcropping, which appears to be felsite or quartz-porphyry much hardened by infiltration of silica, and this dyke is seen running South-Westerly across the country at intervals for six or seven miles.

Victory (Lease 685s).—This lease lies on the South-West end of the Invincible, and has a shaft 90 feet deep, in which is seen a lode eight or nine feet wide of bluish altered country and quartz, with a good deal of iron pyrites and copper pyrites. Ten tons of this ore are said to have returned 27dwts. per ton at Kalgoorlie, mostly in the concentrates. A little water was making in the bottom of the shaft at the time of my visit.

Majestic (Lease 703s).—A large amount of work has been done on this ground on an ironstained quartz lode running a little East of due North. Probably quite 1,000 tons of quartz have been raised, but it is said to be very poor. I was told, however, that 20 tons picked from the heaps had gone 2ozs. 6dwts. per ton at the Pole battery. I saw a little gold in some of the iron oxide that accompanies the quartz. Five shafts have been sunk to test this line of lode, but after a trial it was abandoned. The reef is a strong one and may yet prove worth working if there were a battery on the ground.

Stanhope.—Here there is a shaft about 60 feet deep with a good sized quartz reef. A crushing of under 20 tons is said to have given 15dwts. per ton in the Tremain Mill.

Merriwee King (538s).—On this lease there are three shafts sunk, one being about 120 feet deep, partly on the underlay of the reef, which is somewhat flat to the Eastward. Strike North 10deg. East. About a foot of quartz is showing, much ironstained. The gold seems to be very fine and rather scaly, and the stone shows a little indigo copper at times, betokening copper pyrites in depth. I saw gold pretty freely in 8 to 10 tons of stone paddocked at the middle shaft. Crushings of 60 and 40 tons at the Pole battery are stated to have given returns of 2ozs. to the ton, and one of 42 tons gave 5ozs. 1dwt. per ton. This lode is on the West side of the schist "formation," which passes to the East of the Bonnie Doon shaft, and which is traceable nearly to the Majestic. It seems a very greasy talcose schist with much contorted foliation with general dip of the laminæ to the Eastward, and is stated to carry a little gold right along its course. A short distance to the South-

West of the Merriwee King shaft there is a big open cut on this schist "lode," where a quantity was taken out for crushing. The surface here was worked by dry-blowers, with good results. In this cutting is seen a dyke of bluish porphyry, the course of which is not clearly visible.

The Horseshoe (Lease No. 643s) is on the same schist "formation," which here contains a good deal of quartz. A shaft has been sunk 30 feet vertically and 40 feet on the underlay, and a drive has been made 50 feet to the East without getting through the "formation." Some of the stuff is very rich, two lots of 79 and 73 ozs. of gold being reported to be got by dollying. Some 30 tons at grass were expected to return 6 to 7 ozs. per ton, and gave very good dish prospects. The porphyry dyke is seen a little to the West of these workings. Further South about 10 chains on the same lease there is another shaft down 60 or 70 feet on the underlay, which is somewhat flat, and some very good ore has been got from a vein of quartz and soft lode stuff, which twists irregularly about through the schist "formation." About 20 tons of very good ore and 20 tons of seconds were on the dump at the time of my visit.

This schist "formation" seems to me to deserve careful prospecting, and to be of the nature of a large soft lode. It runs right through the fields and most of the best mines are in its close vicinity.

Pole (299s).—Very little work appears to have been done on the Pole mine, but as no one was on the ground at the time of my visit I could not get much information at first hand. The shaft is said to be about 140 feet deep, but has not a very large supply of water. On surface there is a five-head battery and a cyanide plant, which have done a good deal of work for the field. Unfortunately it is at the extreme South-West end of the field, about 4½ miles from the townsite of Waverley, and is, therefore, inconvenient as a public battery. It is in somewhat low-lying ground, and probably could get a better water supply by sinking the shaft deeper.

Golden and Lochiel (Leases 674s and 673s).—In these leases there are three parallel lodes running about North-North-West and dipping somewhat flatly to the East, composed of laminated dark cherty material with much iron and manganese oxides, and cut through by East and West veins of quartz. In one of these quartz veins I observed some silvery mica and a little felspar, showing an approximation to the structure of the quartz-porphyry dykes—a fact of considerable genetic interest. A good deal of gold has been got, especially at the intersections of the quartz veins with the lodes, and the owners of the leases are said to be able to make a living by dollying. They could raise a good deal of stuff worth

crushing pretty easily if a State battery were erected in the district.

Nevertire (Lease 545s).—A reef 12 inches to 18 inches wide in this lease is said to have given two crushings of 1oz. 18dwts. and 2oz. 2dwts. per ton from parcels of about 40 tons each, and there are some 40 to 50 tons at grass, estimated to be worth 10dwts. to 12dwts. per ton.

Mexico Extended (Lease 151s).—In this lease a reef is seen running West-North-West and East-South-East, with flattish underlay to South-South-West. The quartz vein appears to have been 12 inches to 18 inches wide, with well defined smooth walls. The stone lying about the old dumps and in the paddock (about 15 tons) shows some copper pyrites. Three small shafts have been sunk, one of them a whip shaft. About 200 tons are said to have been crushed at the Mexico battery, for a return of about 12dwts. per ton of gold of poor standard (£2 15s. per ounce).

Mexico (106s) and **Mexico West** (518s).—A large amount of work has been done on this property on two small very flat-lying veins which have been of very good value, yielding over 5,000ozs. of gold from a little over 3,000 tons crushed. The stone is from three inches to 24 inches in thickness, but averages about six inches, and is practically worked out down to the 70-feet level. The country is weathered greenstone. There is a water shaft sunk 205 feet, and with 150 feet of driving done from it, and as it was situated in low-lying ground a supply of water might have been expected, but only about 400 gallons per day were obtained. The water was not very salt, but contained a good deal of magnesia salts. There was a five-head battery and cyanide plant at the shaft, but on account of the want of water it was removed to the Fair Adelaide lease, which belongs to the same company.

Lady Harris (Lease 170s).—Very little work has been done on this mine, which has a small, flat quartz reef, from which four tons were crushed for 8dwts. per ton. This is close to the contact of the greenstone country with the granite, the latter appearing in the hills which form a sort of amphitheatre round the South side of the Mexico Flat. There is an outcrop of porphyry close to the Lady Harris workings which seems to be intruded through the greenstone country.

Christmas (309s).—There are very large outcrops of quartz in this neighbourhood, and a large amount of money was spent in developing them, but the best crushings only returned 3dwts. to 4dwts. per ton. A water shaft was sunk 170 feet, and obtained about 200 gallons of water per day. A good deal of heavy gold has been picked up on the surface in this vicinity, but the source of it does not appear to have been yet discovered.

Fair Adelaide (479s).—There is a reef in this lease, but it was very poor, and was not worked for any length of time. The shaft was sunk 160 or 170 feet as a water shaft, and gives about 4,000 gallons a day of salt water, said to contain 1½ per cent. of solids, mostly sodium chloride. The mill on this lease is one of five stamps, of very old and light pattern, and in very bad repair. At the time of my visit a nice new cyanide plant had been erected for treatment of the Mexico slimes by decantation, but owing to charcoal having been ground up with them, through addition of wood ashes while amalgamating, the extraction was unsuccessful. This water supply would be valuable for a public battery, but it is too far away from the principal mines, being about four miles South-South-East from the Waverley townsite.

The Siberia district stands greatly in want of a good central battery at which crushings could be made, and furnished with cyanide plant for saving the fine gold. None of the three batteries on the field are centrally situated, nor was any one of them in good order and suitable for public crushing when I saw them. Though the field seemed almost deserted, there were 32 men engaged upon it, and all the residents appeared to have great faith in it, and agreed in saying that many others would return to it if a State battery were provided. It has yielded a large amount of alluvial gold, and the quartz veins are numerous, and many of them have been proved gold-bearing. It seems to me a case where a State battery can be recommended as being the best means of putting fresh life into the district and allowing it to be properly tested. It might, however, very possibly have to be run at a loss at first. Before erecting a battery it would be necessary to obtain a good water supply, and this could most probably be got by sinking to cut the soft schist "formation" in the flat to the East of the Bonnie Doon shaft. This would also have the effect of testing what may possibly prove to be an important gold-bearing lode.

By Authority: Fred Wm. Simpson, Government Printer, Perth.