REPORT ON THE MATHINNA GOLD-FIELD.

Geological Surveyor's Office, Launceston, 12th September, 1892.

SIR,

I HAVE the honor to forward to you my Report on the Mathinna Gold-field. A month in all was spent in my examination of the district, from 30th May to 11th June, 1892, and again from 4th July to 15th July, inclusive. Owing to it being necessary to do a great deal of actual survey work in the mines and on surface in order to locate the various reefs correctly on the map and render intelligible their relations to each other, I was not able to extend my observations to the outlying parts of the district, and the present Report, therefore, deals only with the mines in the immediate vicinity of the Township of Mathinna.

This gold-field is situated about half-way between Tower Hill and Mount Blackboy, and distant 17 miles by road from Fingal Railway Station. The road from Fingal to it runs alongside the South Esk River all the way, skirting wide alluvial flats formed by the stream. Opposite the Township of Mathinna, at the bridge crossing the South Esk, the elevation above sea-level is between 900 and 1000 feet according to aneroid barometer. The principal mines are on three spurs running down to the Esk from the foot-hills of Tower Hill, and separated by two valleys known as Black Horse Gully and the Long Gully. The township lies in the former gully. In the lower portions of these valleys, where they debouch upon the alluvial plains formed by the South Esk, there are considerable accumulations of alluvial gravels, some of which have been payably auriferous.

All the hills in this district are formed of slates, schists, and sandstones of Lower Palæozoic age, part of the extensive formation which is found all the way east from the Ben Lomond range to the mouth of the Scamander River, and which extends northward to past Mount Victoria. It is almost certainly the same formation that is found again at the Lefroy, Denison, Mount Horror, Gladstone, and Mount Victoria gold-fields, and has therefore proved auriferous over a large area. Fossils being almost if not entirely unknown in it, the geological age is uncertain, though probably not younger than the Lower Silurian. The general geological features of the country lying eastward of Ben Lomond are well seen in Mr. Chas. Gould's Map of the Fingal Gold-field and Mount Nicholas Coal-fields (House of Assembly Journals, 1869, No. 20), which shows plainly that the rocks of the auriferous series have been formerly covered by those of the coal measures, remains of which are now found in rings round all the high mountains; Ben Lomond, Mounts Victoria and Albert, Mount Young, Mount Blackboy, Tower Hill, Mount Nicholas, and the north slope of the Fingal Tier all showing the same fringes of Upper Palæozoic strata. It follows from this that the present surface of the older formation is in the neighbourhood of Mathinna, probably never more than 900 or 1000 feet at the most lower than that which existed before the coal measures were laid down, and consequently the upper parts of it have been subjected from time immemorial to the various atmospheric and other influences which produce disturbance and chemical alteration in the superficial layers of the earth's crust. This may have much to do with the unsettled character of the reefs at higher levels in the Mathinna field, and the large quantities of veins and bunches of quartz in the surface strata.

The strike of the beds of country has not been determined very satisfactorily, though I took its bearing wherever a good observation could be obtained. The slates and schists show a foliation or slaty cleavage running across the strike at an acute angle, which is often impossible to distinguish from true bedding, especially on the weathered outcrops of the rock. In the adits of the North Eldorado, Telegraph, and East Golden Gate mines, however, the true bedding planes can be clearly followed, and are found to run about

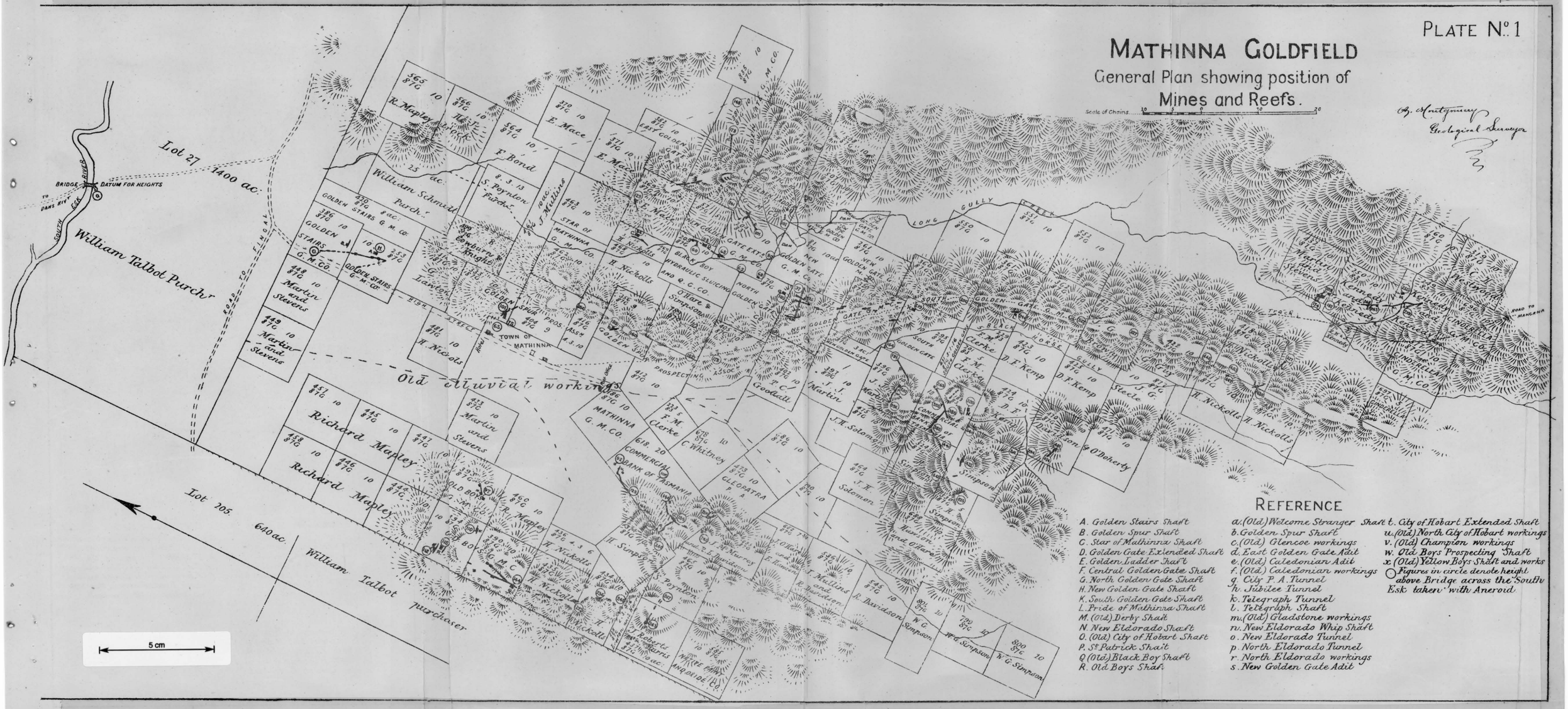
PLATE No. 1

MATHINNA GOLDFIELD

General Plan showing position of Mines and Reefs.

Scale of Chains 10 0 5 10 20

A. Montgomery
Geological Surveyor



REFERENCE

A. Golden Stairs Shaft
B. Golden Spur Shaft
C. Star of Mathinna Shaft
D. Golden Gate Extended Shaft
E. Golden Ladder Shaft
F. Central Golden Gate Shaft
G. North Golden Gate Shaft
H. New Golden Gate Shaft
K. South Golden Gate Shaft
L. Pride of Mathinna Shaft
M. (Old) Derby Shaft
N. New Eldorado Shaft
O. (Old) City of Hobart Shaft
P. St. Patrick Shaft
Q (Old) Black Boy Shaft
R. Old Boys Shaft
a. (Old) Welcome Stranger Shaft
b. Golden Spur Shaft
c. (Old) Glencoe workings
d. East Golden Gate Adit
e. (Old) Caledonian Adit
f. (Old) Caledonian workings
g. City P.A. Tunnel
h. Jubilee Tunnel
k. Telegraph Tunnel
l. Telegraph Shaft
m. (Old) Gladstone workings
n. New Eldorado Whip Shaft
o. New Eldorado Tunnel
p. North Eldorado Tunnel
r. North Eldorado workings
s. New Golden Gate Adit
t. City of Hobart Extended Shaft
u. (Old) North City of Hobart workings
v. (Old) Champion workings
w. Old Boys Prospecting Shaft
x. (Old) Yellow Boys Shaft and works
◯ Figures in circle denote height above Bridge across the South Esk taken with Aneroid

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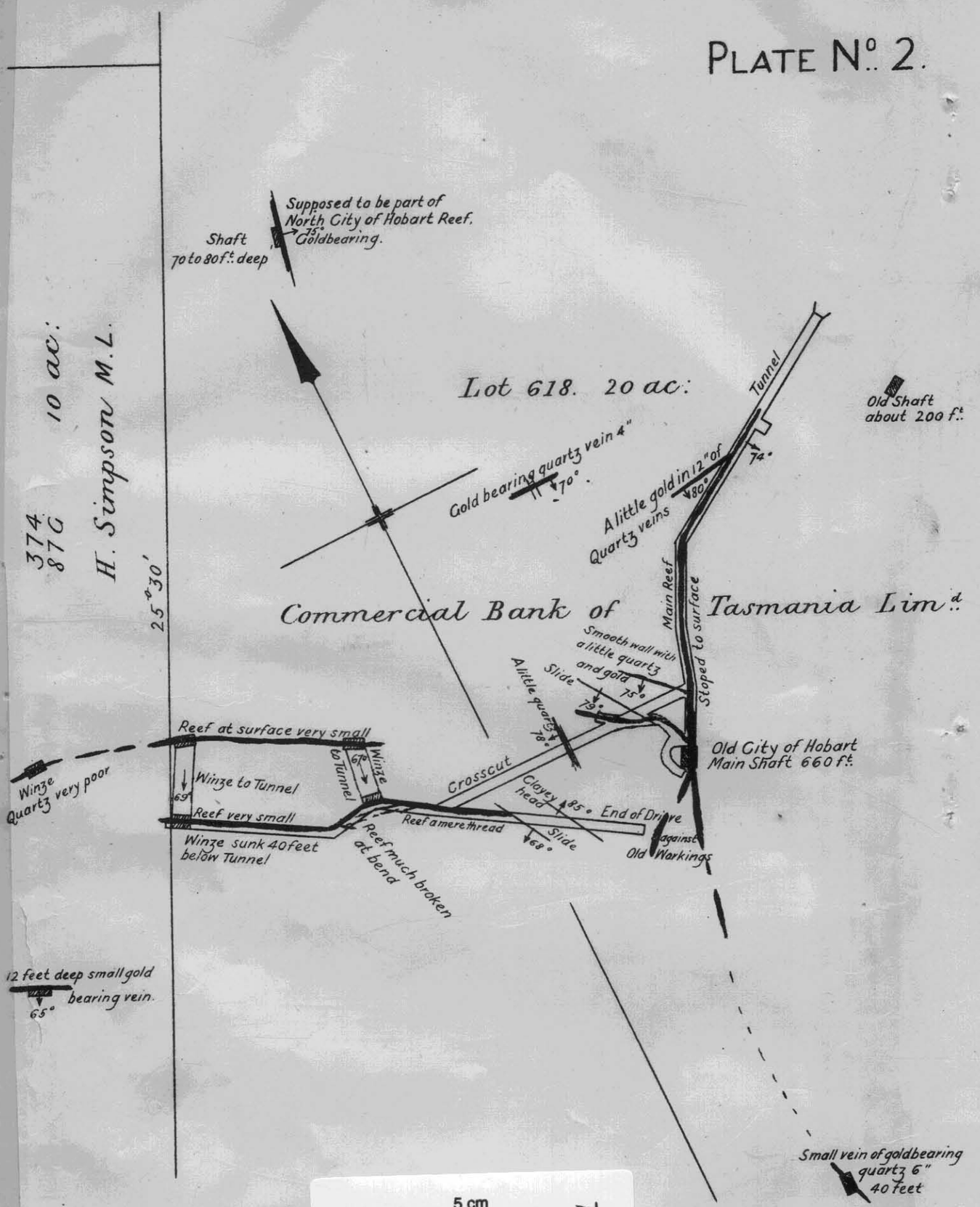
PLATE No. 2.



Plan of Workings of the MATHINNA MINE

Scale of Links

0 50 100 200 300 330

0 5.0 1.00 2.00 3.00 4.00 5.00

Scale of Feet

A. C. Montgomery
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north west and south east, and to dip north-easterly at angles from 25° to vertical. These three tunnels, being at considerable distances from each other and giving concordant results, we may consider the above to be the normal strike of the country beds. The foliation planes run about N.N.W. and S.S.E. and dip pretty vertically. Several sets of joints cross the beds, but I was not able to find any degree of regularity in their direction: in the New Eldorado mine the main joints have a strike about N. 60° E., but elsewhere they varied very much. These points are noticed because a connection is sometimes traceable between shoots of gold in reefs and the beds and joints of the country enclosing them. The flat dip of some of the strata should accordingly be borne in mind: in the East Golden Gate adit it is only 28°, and in the North Eldorado adit from 25° to 60°. They are doubtless bent into a succession of synclinal and anticlinal folds, and it will be worth noting, as sections are exposed in the mines, whether these recur at short intervals, showing the beds to lie on the whole fairly horizontally, or whether there is a general dip of the whole mass of strata to the north east or south west. This will be of importance in enabling the position of belts of hard country and of strata favourable and unfavourable for gold, should such be found to exist, to be foretold as likely to be encountered in the mines. Present appearances incline me to think that on the whole the strata have a dip to the north east.

It may be here noted that the occurrence of cleavage planes more or less directly across the planes of sedimentation of slaty rocks is essential for the production of good roofing-slate; and as this character is seen to obtain in the Mathinna district, there are grounds for hoping that some of the harder belts of the country rock may be found to yield this valuable product. This possibility is commended to the attention of prospectors.

Though this gold-field was one of the first worked in the Colony, surprisingly little mining worthy of the name has been done in it till quite lately. The old City of Hobart mine, it is true, went down to a depth of 660 feet, but, with this exception, almost nothing had been done at greater depths than 100 feet, and very little even below 50 feet, until the recent success of the New Golden Gate mine led to a revival of speculation and the sinking of several deeper shafts. Numbers of bunches and veins of good stone have been found and worked downwards from surface as long as they were payable in the earlier days of the field, but no systematic work was done, and as soon as the stone became poor, or broken up, or faulted, the mines were promptly abandoned, and the district has in consequence got the name of being "patchy" and unreliable. Later developments have shown that a principal cause of the uncertainty of the veins at surface is, in all probability, the disturbed nature of the superficial country rock, it being necessary to sink some distance before really solid and settled country is reached. A possible explanation of the unusual amount of superficial disturbance has already been suggested. The following description of the various mines will enable me to show what has been done in each case, and allow conclusions to be drawn as to whether this field has been fairly tried and found wanting, as its detractors aver, or if it is a very promising and practically untouched one, as is my own opinion.

Mathinna Mine.—Under this name are now included the old City of Hobart, North City of Hobart, and Champion mines, situated in 20-acre Section, No. 618. The relative position of these is seen on the General Plan, Plate No. 1, sent herewith, and the principal workings on a larger scale in Plate No. 2. The old City of Hobart lower workings are now not accessible, the ground having fallen in. The following particulars have, however, been very obligingly supplied to me by Mr. Peter Irvine, who was manager of the mine in its last days. He writes:—"My remarks will be from memory, but will be approximately correct. In 1877 I took charge of the mine, and was in charge until it was abandoned in 1881-2. When I took charge a shaft 9′ × 3′ was sunk to a depth of 460 feet from surface. The reef is what is called a 'North-and South reef'; the true course is about 15 degrees east of north, with an underlay of 1½ in 6 to the west, and with a slight strike or pitch to the north. The quartz from the surface down to about 300 feet was of a white, rather loose nature, averaging about 3 feet wide and very good, being considerably over an ounce to the ton; stone being easily got, the walls or country being a nice soft slate. The quartz below that down to 660 feet, the depth to which I sunk it, was of a beautiful laminated character, the seams greatly charged with arsenical pyrites carrying a good percentage of fine gold; the stone in size about 16 inches; the country here a hard blue slate. At 580 feet deep a slide was met with which threw the reef over 8 feet to the west and also carried the shoot of gold away to the north at an angle of 45 degrees, and I may say that shoot of gold is still there. I tried to induce the company to drive for it, and also the men to tribute for it, but it is left there for a future generation to take out. Now I come to what I believe to be the cause of the stoppage of the works at that mine. There were several reasons: the principal one was the short shoot of stone, only 50 feet in length, and too small to take out without breaking into the hard walls; also want of prospecting, that is, crosscutting and driving on the line of reef, which had splendid walls as far as it was driven on; also the hard country to sink. The last contract for sinking was £9 per foot, good men, and they did not do very well out of it. We sunk for 60-feet levels, so you will see that it took more gold than came out of the one 60-feet stopes to sink for another 60 feet and so on, and we had nothing to spare to do any other dead-work. We had a very nice winding and pumping engine on that shaft with a 7-inch plunger and draw-lift, but not a great deal of water to contend with; but the machinery was too light for the depth—the one engine had to do both winding and pumping." Mr Irvine concludes his letter by saying, "But I have not the slightest doubt that the mine is a good one, and the time will come that, with proper machinery and systematic working, it will prove to be one of the regular dividend-paying mines of the Colony." I may remark that Mr. Irvine's account of this mine agrees entirely with what was told to me by other old residents of Mathinna familiar with the workings. The "eyes were picked out" of the reef, as miners say, and no driving was done on the course of it to find other bunches and shoots of good stone. Where the quartz became too narrow to work profitably it was left standing, and sinking was resorted to until the increasing cost of working and need for more powerful machinery made the mine unremunerative. The machinery was forthwith sold off, the battery dismantled, and the mine allowed to fall in.

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It is to be noticed that in the lower workings described by Mr. Irvine the underlay was to the westward: in the adit shown on my plan it is to the eastward. I have not been able to ascertain exactly the depth at which the turn took place, but all accounts agree that there was a change of underlay. The shaft, 200 feet deep, seen on the plan just east of the entrance to the adit was sunk to cut the reef, but failed to do so on account of the change. The main shaft is said to be sunk in solid slate of the footwall country for about 400 feet in the bottom, which, if correct, would show that the turn took place somewhere about the 200-feet level.

The workings now accessible consist of the adit and drives from it shown on the plan. Two attempts have been made to get round the broken ground at the shaft in order to drive southward on the line of reef, but in both cases the old workings were encountered, and the drives were not persevered with. In the western drive from the adit a small reef has been followed, and the same has been traced on surface by trenching, and followed down to the adit level in two winzes. It is gold-bearing, but very small. In the winze at the boundary of the Section it averaged from two to three inches only; and did not improve in size, but rather got smaller in a continuation of the same winze sunk 40 feet below the level of the adit. The quartz is stated by Mr. Clerke, the manager of the mine, to have yielded 13 dwts. of gold to the ton. In this winze the stone was on the hanging-wall; in the one further east it was the same also, averaging perhaps four inches in size, and yielding 12 to 13 dwts. to the ton, but in this case at the tunnel level there appears to be a good deal of quartz running into the footwall as well, and a little cross-cutting might be done with advantage. This reef has in parts very well-defined smooth walls, but in other parts is very much split up and hard to follow. In the drive on it from the cross-cut towards the old main shaft the smooth footwall is cut off short by a slide which doubtless heaves it to the southward, but no attempt has been made to recover it. There are several of these clayey heads and slides running about N.W. and S.E. in the angle between the two reefs, but none of them appear to be faults of any magnitude. Some of them have a little quartz in them, and one at the east end of the cross-cut carries a little gold. It is possible that they may have some connection with what is known as the North City of Hobart lode, which is due to join the City lode somewhere about this place, though possibly the latter lode is itself identical with the former, in which case the vein of stone followed in from near the mouth of the adit would only be a branch. The North City lode is supposed, however, to have been struck in the old shaft, seen in the top left-hand corner of the plan (Plate 2). About 10 inches in thickness of quartz is here visible, and a good deal of stone is said to have been taken out and crushed, but I have no information as to the yield of gold. It thus seems probable that there are either two or three lines of lode joining or intersecting one another near the old City of Hobart shaft; but there appear to be so many small aurifierous veins in the surrounding country that definite conclusions as to lines of lode cannot yet be come to.

The main lode is supposed to have been picked up again to the south of the main shaft, in a prospecting shaft about 40 feet deep, shown on the plan. The reef in this is small, about six inches wide, but carries some gold. Further south, on the adjoining Section 885-87G, held by M'Murray and Davidson, a shaft, known as the City of Hobart Extended shaft, has lately (in 1891) been sunk in search of this lode to a depth of some 130 feet. It is only six feet by 3 feet in size—an example of false economy, as such a small shaft can never be used for working purposes. The workings were shut down when I saw them, and much water was in the shaft, so that I could not go below, but gold-bearing stone is reported to have been obtained.

In the south-east corner of Section 618 there are some old workings formerly known as the Champion mine. The reef in these has two branches running between N.W. and W.N.W. A considerable amount of stoping has been done, but the workings are now inaccessible. The quartz is stated to have returned about 7 dwts. to the ton. This lode also should run into or through the main lode.

The workings on the old North City of Hobart lode are in the north-western portion of the same section. For about 130 feet along the boundary a surface trench or underhand stope on the reef still remains open, the channel being from 18 to 30 inches wide, which is said to have been the width of the quartz. The lode dips eastward 75°. A little further to the north-east, in flat ground, are several old pits and trenches in which quartz was obtained. Two shafts were sunk about here, both now fallen in, one 60 feet or thereabouts, from which gold-bearing quartz carrying 6 dwts. to the ton was taken, and the other over 100 feet deep, which was being sunk as a whim-shaft, but never reached the reef. The quartz from the whole of this lode is said to have been of low value, only about 2 dwts. of gold to the ton as a rule.

It will be seen from the above that gold-bearing stone has been obtained throughout the whole length of Section 618, and that there are probably three or four distinct lines of lode in it. The veins as a rule have been small, and difficulty has been experienced in tracing them owing to the quartz running very thin and breaking up into strings. All the lines of lode appear to be converging to a point a little south of the old City of Hobart shaft. The prospects of mining are not very bright, but still in my opinion warrant a trial. It would not, I am afraid, be possible to re-open the old City of Hobart shaft without as much expense as would sink a new one of larger and more convenient size. Further prospecting would be best done from a shaft, and at such a depth as to be in solid settled country. In the old workings the friable white quartz was replaced by laminated stone carrying pyrites at about 300 feet, which indicates this depth as a proper one for opening out at. Exploratory work should then be done by cross-cutting and driving upon the various lines of lodes.

The Mathinna Company possess a fairly good 10-head battery of the usual type, which would be much improved by the addition of a pan to grind blanket sand, and some concentrating appliances such as Frue vanners, for saving pyrites. There is a large quantity of old tailings on the flat ground near this battery which would probably be worth grinding over again.

New Eldorado Mine.—The lodes and workings of this mine are shown on plan, Plate No. 3. The main workings are in 10-acre Section 183-83; they consist of an adit and drives therefrom, some small shafts and trenches on surface, and a new main shaft 3 ft. 8 ins. by 9 ft. 8 ins., 171 in depth. From the latter a cross-cut is being driven at the 163-feet level towards the reef, which was in 100 feet when I visited the mine and has since been extended. This will cut the lode 220 feet below its outcrop, and a little over 100 feet below the adit. The country driven through in it is a hardish slate, the rate of progress of driving

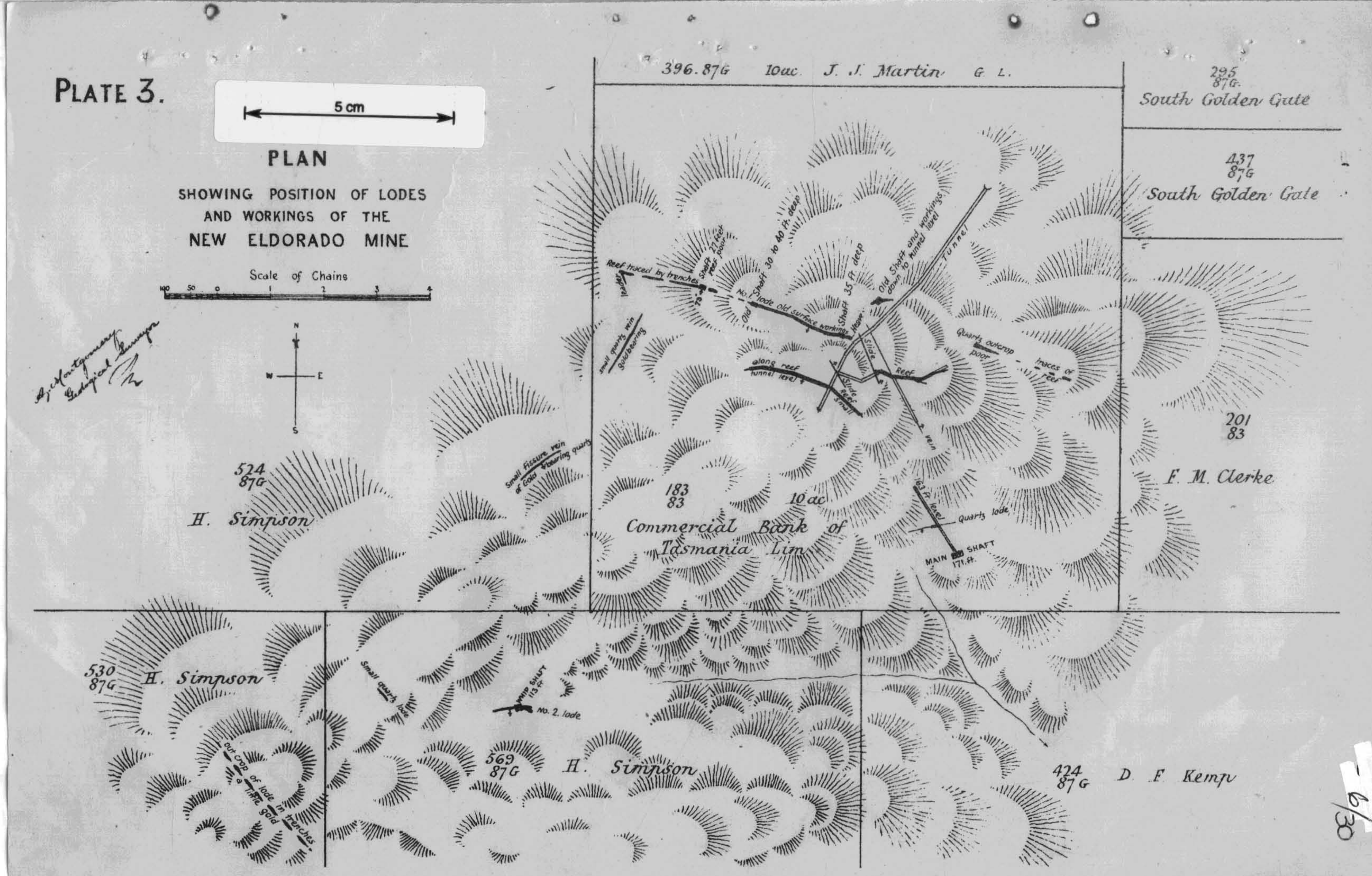

PLATE 3.
5 cm
PLAN
SHOWING POSITION OF LODES
AND WORKINGS OF THE
NEW ELDORADO MINE
Scale of Chains
100 50 0 1 2 3 4
N
W
E
S
A. Montgomery
Geological Surveyor
396.87G 10ac J. J. Martin G. L.
295
87G.
South Golden Gate
437
87G
South Golden Gate
201
83
F. M. Clerke
Reef traced by trenches
To Shaft 27 feet reef poor
Old Shaft 30 to 40 ft. deep
No. 1 lode old surface workings
Shaft 35 ft. deep
Old Shaft and workings down to tunnel level
Tunnel
small quartz vein goldbearing
along reef tunnel level
Slide
Reef
Quartz outcrop poor
traces of reef
vein
Small fissure vein of Gold bearing quartz
524
87G
H. Simpson
183
83
10 ac
Commercial Bank of Tasmania Lim.
163 ft. level
Quartz lode
MAIN SHAFT
171 ft.
530
87G
H. Simpson
Small quartz lode
No. 2. lode
out crop of lode in trenches a little gold
569
87G
H. Simpson
424
87G
D. F. Kemp

being about 12 feet a week with three shifts. At 58 feet from the shaft a vein of lode slate and quartz about four feet wide was passed through, running N. 80° E. and dipping southerly 47½°. On its footwall there is a good deal of quartz, much stained with brown oxide of iron, and yielding a little gold. It has been called No. 3 lode; since my visit I am informed that it has been driven on both east and west, and that two walls crossing it have been encountered, the distance between them being some 25 feet; the western one runs N. 20° W., carries quartz, and is again met with in the cross-cut at 51 feet past the No. 3 lode; the eastern one runs N. 30° W., and shows three feet of lode-matter. These very probably are two of the cross-courses shown on the plan which cut through the main lode at the adit level, but as they were found since my visit I have not seen them.

The workings on surface on the main reef are seen on the plan. The lode varies from two feet in width down to six inches. In its western part in the trenches where it has been exposed it is from 18 inches to two feet wide, but is poor in gold; coming eastward from these we find a shaft about 27 feet deep sunk on the reef, and showing it to be still poor, but between this shaft and the next one east of it the reef, though narrowed to six inches, is fairly rich, and from here onwards it has been stoped out to depths of from eight to 60 feet. A slide is next met with which heaves the stone to the north, but the faulted portion has been recovered and worked down to the tunnel level with very good results. Some of the quartz from the surface workings on the west side of the slide is stated to have yielded 3 oz. 18 dwts. of gold to the ton, and a crushing of 200 tons gave from 18 dwts. to an ounce. Going still further eastward the reef has not been certainly traced, it being doubtful whether some barren outcrops of quartz on about the same line belong to it or not.

The adit driven to intersect the reef at a lower level was unfortunate enough to strike it where broken by two or more slides, which seem to have puzzled and disheartened the operators. At 228½ feet from the entrance a cross-course was passed through, consisting of a vein 2 inches wide of white pulverulent quartz between well-defined plane walls, striking N. 30° W. and dipping N.E. 49°. This vein is seen again in the eastern drive on the course of the reef, and has been driven on for 62 feet. In this drive its course is much the same as before, but its dip is steeper, being 66° to the N.E., and the quartz in it, though generally soft and pulverulent, is in places hard and glassy. This vein does not appear to fault the lode at all, appearing rather to be slightly heaved itself by the latter. At 245 feet from the mouth of the adit a slide, which we shall call No. 1 slide, parallel to this cross-course is met with, which does fault the lode. This slide strikes N. 30° W. and dips N.E. 50° where cut in the adit, and N. 37° W., dip N.E. 65°, where it passes through the lode in the eastern drive. It generally shows two plain smooth walls separated by ¼ to 2 inches of clay. At 299 feet another slide, No. 2, nearly parallel to the last, is met with, striking N. 32° W., and dipping N.E. from 59½° to 65°. There are from 18 to 20 inches of clayey broken slate in this, where it goes into the east side of the adit, and from 6 to 10 inches on the west side. The tunnel has struck exactly the intersection of this slide and what has been supposed to be the main lode channel, along which a drive has been made to the eastward. At 313½ feet from the entrance the adit struck the reef, which was then driven on 102 feet to the westward and 48 feet eastward. In the western drive both hanging and foot walls of the lode are generally distinctly defined and smooth, and the channel between them is from 4 to 6 feet wide. Most of the filling is broken and slipped masses of the country rock, full of strings of quartz, but there is also a distinct quartz vein from 18 inches to 3½ feet thick in the wider portions, and dwindling down at times to only 2 or 3 inches. A rise has been put up 18 feet on the foot-wall, but no stoping has been done, the stone having been too poor to take out. The dip of the walls is from 56° to 64° southerly. In the drive east from the tunnel on this part of the lode the quartz vein is a mere string, increasing, however, to 6 inches in width in the face. The hanging-wall is smooth and well defined, and dips 56° to the southward. A few feet in from the adit a mass of veins of quartz, mixed through with broken country rock, is seen running off to the north-east through the footwall, which may be part of a north-easterly lode. This drive is not yet far enough to the eastward to be intersected by No. 2 slide, which, however, must be close at hand. The drive eastward from the intersection of No. 2 slide by the adit follows a smooth footwall running N. 58° to 60° W., and dipping to the southward 62°, but no quartz was got for the first 30 feet, when the wall made a sudden bend to the north-east, and broken quartz mixed with country rock made its appearance. This, however, appears to cross the drive on a course about S. 35° W., and is probably, therefore, the north-easterly lode seen in the inner eastern drive above described. The quartz is of the same broken character. On the bend in the wall there is from 8 to 18 inches of quartz, but no gold. About 49 feet from the side of the adit the No. 1 slide was struck, and a change in the reef-stuff was at once apparent. The broken quartz of the north-easterly lode is at once cut short off, and gold-bearing stone takes its place. This was followed up, and found to connect with the old surface workings. In the stopes from the tunnel upwards the slide may be clearly traced, forming their western end, and cutting off the quartz. A length of about 50 feet has been stoped on the reef above the level. At 95 feet from the adit a winze has been sunk on the lode to a depth of about 60 feet, but at 38 feet the slide was met with, and of course cut off the stone. This was of very good quality right down to the slide. Another winze has since been sunk 31 feet nearer the adit. Ten feet below the level the slide was struck, and the winze was then continued down in good stone on the intersection of the lode and slide until the first winze was broken into. There is now about 18 inches thick of quartz showing in the side of this later winze in the first 10 feet below the level, but lower down it is very thin, though a good body of stone was found all along the intersection. East of the main winze some 12 inches or so of quartz is seen going off into the hanging-wall. The drive, however, was turned more to the north-east, and soon passed through the lode altogether, the stone leaving it on the southern side 30 feet past the winze. It seems to me, therefore, that the stone going into the hanging-wall just past the winze should have been followed. A block of good quartz has been left unstoped above the winze to protect it, but this appears to be the eastern end of the shoot of gold, for no stoping has been done further in.

Not having been able to examine the old surface workings, I cannot say positively if slides Nos. 1 and 2 reappear in them. According to the ends of the workings seen on surface it would appear as if there was yet another slide running north-easterly, but I have seen no sign of such at the adit level, and it is possible that the old workings at the break extended further west underground than is seen on surface, in which case No. 1 slide would quite account for the heave. No. 2 slide does not appear to have dislocated

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the surface workings, and I do not think it will prove to be a fault of any importance. The smooth wall followed from the adit between this and No. 1 slide seems to me probably not to be the lode channel at all, but a parallel wall on its footwall side. It might carry quartz if followed in strike and depth.

Looking at the gold-bearing stone it is seen that the shoot is pitching eastward. The poor stone met with on surface in the western part of the lode corresponds with that portion got at the adit level past No. 2 slide. The rich stone has been cut through by the slide and heaved to the north, but in the adit is still to the east of its position on surface. The eastern pitch is also seen at the east end of the stopes from surface down to the adit. This being the case, it appears to me that the drive now being put in from the main shaft is running towards the poor ground, and that it would have been better to have driven a more northerly course to try to intercept the known shoot of gold. There would also have been a better chance of striking the lode away from the slides, but at present the cross-cut is going fair for the disturbed region.

Before stopping all work at the adit level I think it would be well to extend the drive further east along the lode channel in the workings south of No. 2 slide. This would very soon be met with, and it would be seen if it heaved the reef any distance, which I do not think it will, a piece of information valuable when searching for the lode at lower levels. This alone, however, would not be worth extending the level for, but there is a considerable chance that between it and No. 1 slide gold-bearing stone might be met with. The shoot is much longer at surface than at the tunnel level, and has been cut through by the slide subsequent to its formation. There may be a portion of the shoot still on the western side of the fault which would be worth looking for. The eastern being the most probable down-throw side of the fault, the corresponding cut-off portion of a patch of good stone found on its western side is, however, to be expected at a lower level on the eastern, and *vice versâ*.

In Section 569-87G, also belonging to the New Eldorado Company, some work has been done on another lode, known as No. 2 lode. A prospecting shaft has been sunk on the underlay 113 feet, and short drives have been put in at 19 feet, 30 feet, and 83 feet from surface. No work was being done at the time of my visit, and the bottom of the shaft was full of water. Mr. Clerke, the Manager of the mine, informed me that the quartz was a good deal broken up in the bottom, that there was a well defined foot-wall, but the hanging-wall was not seen, and that a good deal of gold was visible in the stone, which he estimated to be worth 14 or 15 dwts. to the ton. The 83-feet level (or 90 feet measured on the underlay) was, however, free of water, and was examined by me. A drive from the side of the shaft has been made 19 feet in direction S. 67° E., the last 10 feet along a well-defined footwall. This comes into the drive with a somewhat sudden bend, emerging from the country north of the shaft on a course S. 42° E. In the face there is about 12 inches of quartz carrying good gold, and a stope has been taken up above the level for 25 or 30 feet. The dip of the footwall in the stope is 75° to the southward and in the level 81°, so that the reef appears to here turn a little steeper. Below the level the dip continues about 81°. Round the shaft itself there is quite a large number of small veins of quartz running across the lode-channel towards the footwall and carrying gold, but so much mixed with country rock as hardly to be worth taking out. Very little has been done at the 30-feet level. At the 19-feet level a drive runs N. 85° E. for 8 feet and S. 80° W. for 27 feet from the shaft. The stone varies from eight to eighteen inches in width, and at this level carried very payable quantities of gold; much country rock would, however, require to be taken out and crushed along with the quartz. In sinking the shaft the hanging-wall of the lode was followed in the upper part, but it is badly defined and not always easy to trace. At the 90-feet level the footwall came in as already mentioned; in the upper levels it is not seen, the lode-channel being therefore of a considerable width between the walls. In all 77 tons of stuff were crushed from this shaft for the very good return of 105 ounces of gold. The lode is therefore well worth further exploration.

In Section 538-87G another reef has been exposed by trenches crossing the crown of a ridge. There is a great deal of loose quartz about the surface here, and a little gold has been obtained; no mining work has yet been done. The No. 2 lode should run into this one, and the junction of the two, being a likely place for gold, should be sought for. Three other small veins shown on the plan have been discovered, all carrying a little gold. The one in Section 524-87G occupies a very distinct fissure in the schist rock, and is said to have yielded several small rich specimens; it is, however, only ½ to 2 inches in width.

Mr. Henry Simpson, manager of the New Eldorado Company, has kindly supplied me with the following list of crushings from the mine for the last six years :—

1886	31st December	40	tons quartz gave	28	ozs. gold
1887	30th January	45	„	100	„
„	12th March	38	„	58¼	„
„	30th April	90	„	191	„
„	30th June	135	„	229	„
„	15th August	90	„	94	„
1891	14th November	30	„	64	„
1892	19th February	45	„	40½	„
„	8th August	22	„	5¼	„
	TOTAL	535	„	810	„

Mr. Clerke, mining manager, informs me that besides these crushings there were some others of older date, one of which yielded 100 ounces of gold from 29¼ tons of quartz. He estimates that quite 500 tons more have been crushed.

It will be seen that the value of the crushing-dirt has been exceedingly good, giving an average return of over an ounce and a half of gold to the ton. This should encourage the owners to go on with their main shaft and prospect the lode thoroughly. Other shoots of gold are very likely to be found, and as the reef appears to be a strong well-defined one there is every inducement to give it a fair test. The No. 2 lode is also well worth working on.

North Eldorado Mine.—Section 396-87G.—The reef worked in this section is nearly parallel to the Eldorado main reef, and is shown on the general plan, Plate 1: it has been traced on surface by trenches

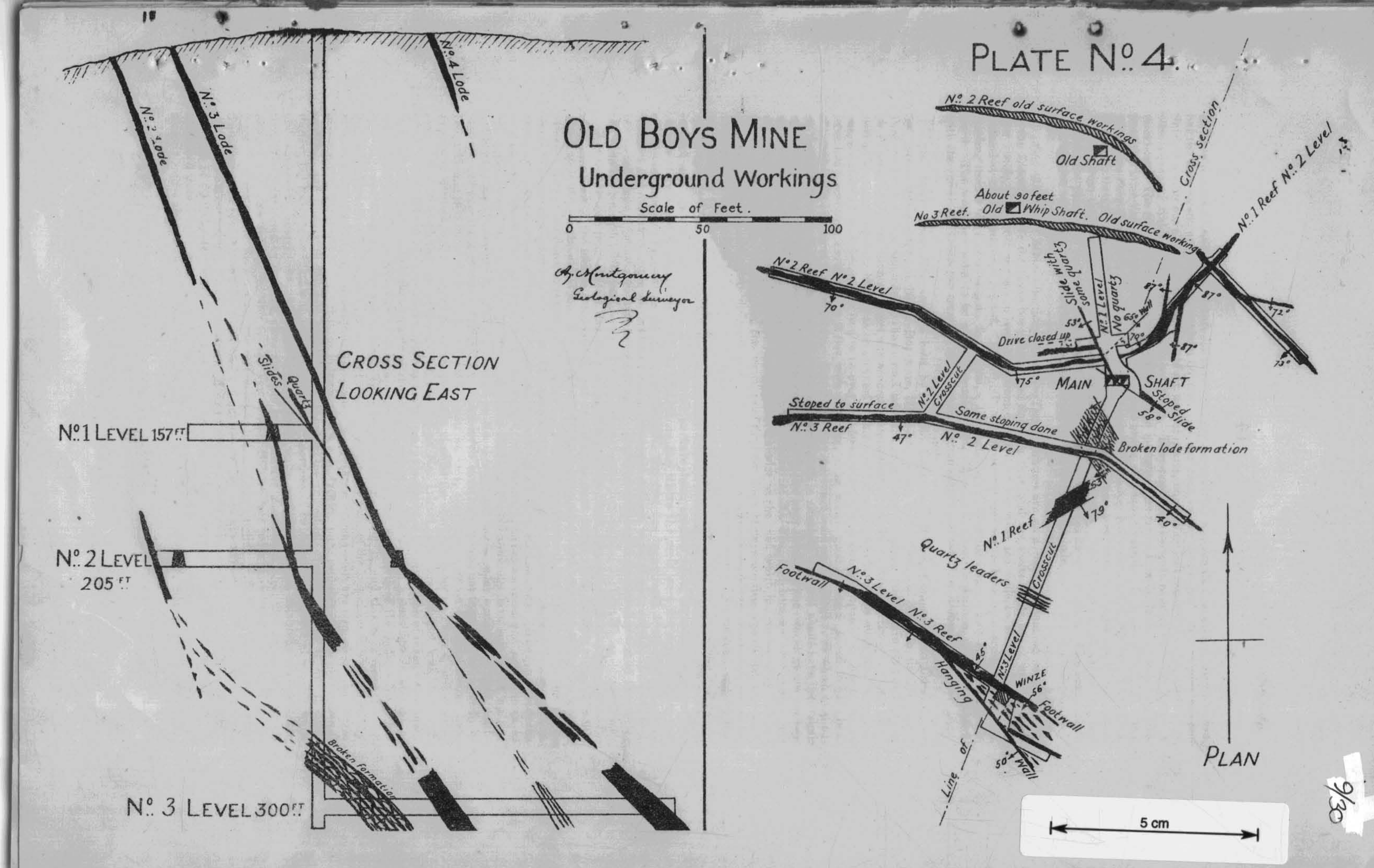
PLATE No. 4.
OLD BOYS MINE
Underground Workings
Scale of Feet.
0
50
100
A. Montgomery
Geological Surveyor
CROSS SECTION
LOOKING EAST
No. 2 Lode
No. 3 Lode
No. 4 Lode
Slides
Quartz
No. 1 LEVEL 157 FT
No. 2 LEVEL
205 FT
No. 3 LEVEL 300 FT
Broken formation
No. 2 Reef old surface workings
Old Shaft
About 90 feet
No 3 Reef. Old Whip Shaft. Old surface working
Cross section
No. 1 Reef No. 2 Level
No 2 Reef No 2 Level
Slide with some quartz
No. 1 Level
No quartz
Drive closed up
MAIN
SHAFT
Stoped Slide
No. 2 Level Crosscut
Stoped to surface
No. 3 Reef
Some stoping done
No. 2 Level
Broken lode formation
No. 1 Reef
Quartz leaders
Crosscut
Footwall
No. 3 Level No. 3 Reef
Hanging
No. 3 Level
WINZE
Footwall
Wall
Line of
PLAN

for over three chains. A small shaft has been sunk on the underlay to a depth, it is said, of over 110 feet, but the only recent workings are at about 60 feet. At the time of my visit a party of tributors had just finished taking out a small trial crushing of six tons of quartz, but as they had removed the top ladders and windlas-rope I did not get down into the workings. They report the stone to average about 18 inches in thickness. The reef underlays to the south about one in eight. As far as I could learn locally, the quartz from this mine has not been rich, and the workings are of very small extent. In order to cut the lode a tunnel has been driven at a level about 90 feet below the outcrop for a distance of 261 feet, but without finding it, though considerably past the point where it might have been expected to be met with. About 180 feet from the mouth of this adit a break in the country rock and a few strings of quartz may perhaps indicate the passage of the reef, being near the spot where it ought to have been cut. This break might be driven on with advantage towards the shaft to prove if it really is the lode.

Old Gladstone Mine.—Section 470-87G.—These workings are on a reef also running nearly parallel to the Eldorado reef: they have been abandoned for some time, and the shafts being full of water little is now visible. The reef appears to have been from two to three feet wide, the walls, as far as seen, showing themselves smooth and well defined. About 60 tons of quartz are said to have been crushed from here, yielding from 9 to 11 dwts. of gold to the ton. The underlay is about 18 inches in six feet to the southward. The workings seem to be of very small extent. This lode, from its position, might be identical with the one traced across the crown of the ridge on Section 530-87G of the New Eldorado ground.

Old Boys Mine.—The sections held by the Old Boys Gold Mining Company, No Liability, are 390-87G, comprising the old Black Boy mine, 394-87G, the old White Boy, and 393-87G, the old Yellow Boy. The position of the lodes is shown on Plate 1, and the more modern workings in plan and section on Plate 4. It is difficult now to get any accurate information as to the workings of the old mines, every statement concerning them having to be accepted with reservation. The Yellow Boy main shaft is a small one, about 5 feet by 3 feet, and is said to be over 100 feet deep. The stopes now open at surface appear to have had a reef from 18 inches to 3 feet wide in them, from which good quartz is stated to have been obtained: this lode runs north-easterly. The Black Boy workings were on two large reefs which crop out on the spur, towards the northern end of which the Boys shaft is situated. Several shafts have been sunk on these, and a good deal of stoping and surface trenching has been done, but the workings are not now accessible. The two reefs junction near the south boundary of 390-87G, and here a shaft was sunk to a depth of over 120 feet, the first 40 feet vertical, the remainder on the reef, which has an underlay of 1 in 2 to the westward. Mr. S. Richards, the manager of the Old Boys Mine, some time ago rigged a windlass over this shaft, and with great difficulty and risk got down into the old workings, and found that at the 120-feet level 80 feet had been driven on the lode south and 30 feet to the north. In the south end the lode had pinched; in the north it was 12 feet wide: the stone carried a little gold, but not enough to pay. In the surface trenches parts of the lode are still exposed, and the two reefs average each from two to six feet in thickness. A good deal of quartz is reported to have been crushed when the mine was at work for returns of from 4 to 10 dwts. of gold to the ton, but on the whole the reefs were not payable under then existing conditions. In Sections 435-87G and 434-87G the reef has been traced southward by several trenches and old shafts and much surface quartz, and would appear to be turning more to the south-east, but no workings of importance have been executed. The immense quantities of loose quartz on the surface testify to the strength of the reef.

It will be seen from Plate 1 that the western branch of the Black Boy reef is running directly for the new main shaft of the present company. It has not, however, been traced right through to it. The Old Boys' main shaft is the old White Boy shaft, which has been repaired and sunk deeper by the present owners. It was put down to cut two reefs which had been worked by small shafts from the surface downwards. These, now known as Nos. 2 and 3 reefs, are reported to have yielded quartz of value over an ounce to the ton from the old surface workings, some of which were 90 feet deep. They run between west and west-north-west, and underlay to the south. Another reef, parallel to these and now known as No. 4, lies under the engine-house, south of the main shaft, but the old workings have been filled up and can hardly now be seen at all. The lode known as No. 1 reef was not seen at surface; it runs north-easterly, and appears to junction with No. 2. Three levels have been opened out from the main shaft, at 157, 205, and 300 feet. At No. 1 level little can now be seen, the drive west on the lode having been filled with mullock. Two clayey slides are here seen close to the shaft, as shown on Plate 4, both dipping south-west. Though they apparently cut off the reef at No. 1 level, they are not met with at No. 2, which shows them to be of no consequence as faults. A little quartz is found on each of them, and a small stope has been taken out on the east side of the shaft on one. At No. 2 level a considerable amount of driving has been done. Nos. 1 and 2 lodes appear to join one another just north of the shaft. No. 1 has been followed 58 feet to the north-east. There is but little quartz in it, and this is in veins from 3 inches and less up to as much as one foot in thickness in different parts of the lode-channel, which is mainly filled with squeezed and much contorted lode-slate. Several smooth clean walls are seen along the course of the drive, and it seems to me that the lode-channel is a fairly wide one, probably not narrower than 6 or 8 feet, and filled with fallen-in country rock through the interstices of which veins of quartz have formed, but likely to be filled with solid quartz in other portions of its extent. The several smooth walls and strings of quartz, the clayey selvages on these walls, and the constant occurrence of lode-slate wonderfully contorted by pressure, show the lode to be of the fissure-vein type, and argue well for its permanency. As we shall see later on, the New Golden Gate reefs in parts show exactly similar features. 7 feet from the end of the drive on this reef another line of lode running N.W. and S.E. is met with. This appears to pass through the No. 1 reef without dislocating it to any extent, which may, perhaps, be due to the almost vertical dip of the latter. A drive has been made to the south-east along this new reef a distance of 50 feet. It winds about a good deal, but on the whole preserves an even course. At first it contained from 6 to 18 inches in thickness of quartz, but at 19 feet 6 inches of quartz run off on a more easterly course along a smooth wall, and from this point to the end of the drive there is hardly any quartz.

11/30

(No. 79.)

In the face the lode-stuff is 2 feet 9 inches wide, with only a little quartz on the hanging and foot walls. This reef has well-defined smooth walls dipping south-westerly 73°, but, like No. 1, is mostly filled with lode-slate at this level.

Westward of the shaft the drive has been carried 140 feet along No. 2 reef. There are only strings and bunches of quartz in a channel filled with broken and squeezed lode-slate along this drive. The channel is from 8 inches to over 6 feet in width, and has smooth walls with clayey selvages. As shown on the plan, a cross-cut has been driven at this level to cut No. 3 reef, and drives east and west have been made along this. The drive west is 53 feet in length, and above it the ground has been stoped up to or nearly to the surface, the shoot of stone having apparently a pitch to the south-west. In the face the lode is much broken, but appears to be a large mass of quartz, and to be making into a strong body of stone in the south-west corner. In the drive east, which is 109 feet long, there is little more than a mere string of quartz, the channel being from 6 to 8 inches only in width, and mostly filled with crumpled lode-slate. One or two small stopes have been taken out where patches of quartz have occurred.

At No. 3 level a cross-cut has been driven in a south-south-westerly direction a distance of 134 feet. From 13 to 30 feet from the shaft a lode, consisting of broken twisted lumps of country rock with a good deal of quartz through it carrying a little gold, was passed through. The walls were not at all distinct, and the course is consequently not well ascertainable, but it appears to be N.W. and S.E. The same lode was passed through in the shaft a short distance above the plat, and from its course and dip it is therefore very probably identical with the reef in the east end of the drive on No. 1 lode at No. 2 level. Between 44 and 54 feet from the shaft No. 1 reef is met with in the cross-cut. It was also cut in the shaft from 15 to 24 feet below No. 2 level, and though lying rather irregularly had at times as much as 3 feet of gold-bearing stone, which was saved for crushing. In the bottom level a little gold can be obtained all through the lode formation, but there is only a little quartz, and that much mixed with broken country rock. Towards the footwall some bluish quartz seems identical with a band of stone passed through in the shaft in which the best gold was got. At 89 feet the cross-cut went through several small veins carrying a few "colours" of gold. These have been taken to be No. 2 reef, but I think they are more likely droppers from No. 3, as shown on the section, and that No. 2 is not seen on account of its junctioning with No. 1 as in No. 2 level above, on the west side of the cross-cut. At 122 feet the footwall of No. 3 lode is struck, dipping here much flatter than in the level above; indeed all the reefs appear to run flatter below No. 2 level. From the cross-cut a drive has been extended west 80 feet, the footwall being followed for 33 feet, after which it veered round more to the south, and in the face is in the south-west angle of the drive. At 33 feet the hanging-wall came in on the south side, and in the face the two walls are close together, with 12 inches of lode-matter between them. The contents of the reef in this drive are load-slate, with but little quartz and very poor in gold. Seeing that the shoot of stone in No. 2 level pitched westward, however, and that this drive is not yet far enough west to be under where it might be expected, I think it would be advisable to continue driving another 50 feet in the hope of getting the same run of gold-bearing stone. It is to be noted that so far as this drive has been extended no sign has been yet seen of No. 1 reef running into it, though from its course both at No. 2 level and in the cross-cut it ought to have been met with, which leads me to think that it must turn round in the same way as in No. 2 level to join No. 2 reef. Possibly, we should not call Nos. 1 and 2 reefs separate lodes, but regard them as one and the same, though much bent. The cross-cut has been continued on to 134 feet from the shaft, and terminates against the smooth hard hanging-wall of No. 3 reef, dipping S.W. 50°. In the floor on the footwall a body of gold-bearing stone was cut, pitching west so as almost at once to disappear beneath the drive west on the reef. Had the cross-cut struck the latter four feet further west the stone would have been missed unless a drive had been put in to the eastward. Going east the stone is rising, but at the time of my visit it was not possible to estimate at what angle. A winze had been sunk on the underlay 24 feet, and a drive put in along the footwall 26 feet east from the winze, when I saw the mine. At the winze there were 18 inches of solid gold-bearing quartz, and in the face from 12 to 15 inches. The quartz contained a good many specks of arsenical pyrites and galena, which in this district, are generally associated with gold. This body of quartz was separated from the lode-slate in the reef channel on its west end by a distinct selvage and similarly from the broken lode-slate forming its hanging-wall: the true hanging-wall of the formation is seen in the chamber for the winze to lie twelve or more feet south of the footwall carrying the quartz. The lode formation seems to be getting wider at this point. It may be remarked that the occurrence of the gold-bearing quartz here in a body separated from the main lode-slate filling of the reef channel by selvages is exactly similar to the way in which several of the gold-bearing bodies of stone in the New Golden Gate mine have been found. A crushing of 67 tons of quartz from this place, including however, a few tons of stone from the No. 1 reef, were passed through in the shaft, yielded 43½ ounces of gold. Since my visit I understand that work has been continued on this stone, which has narrowed and widened again more than once, but continued to yield payable quartz. This shoot lies to the eastward of all the upper workings, and might perhaps be met with by extending them. The pitch of the ore to the westward recalls that the shoot on the same reef worked above No. 2 level was also pitching westward, and gives hope that this mine will show the feature so common in many others of several parallel shoots of ore. It is encouraging also to find good quartz in the east end of the lode, for it is in that direction to my mind that prospecting should be most vigorously carried on in the hope of reaching the intersection of these reefs and the main reef of the old Black Boy workings. This is more likely to come on the east side of the shaft than on the west, and the very frequent richness of junctions of lodes makes them always worth exploration.

This mine seems to me a very promising property. The lodes are of a considerable size, and have been proved persistent to a depth of 300 feet, and show stronger and better defined in the bottom than in the upper levels: though much filled with worthless lodeslate they have in two places shown shoots of payable stone; they doubtless join or intersect within a short distance the strong Black Boy line, which though poor where worked was nevertheless gold-bearing and consequently in other parts of its extent may be rich, and the country rock appears to be more settled at the lower levels. To predict success to a mining venture in the present state of this one would not be justifiable, and would be the assertion of a hope or

probability as a certainty, but there are undoubtedly good grounds for entertaining expectations of success and consequently for spending money freely in the vigorous development of the mine by sinking and driving,—sinking I regard as of the first importance.

In Section 394-87G, 184 feet from the south-east corner, a prospecting shaft has been sunk on a small gold-bearing lode which from its course and position may be part of the old Yellow Boy reef. The stone was followed down to 18 feet, when a slide came in dipping easterly and cut it off. The shaft was then carried down to 80 feet and cross-cutting commenced; when I visited this work a drive had been put in 11 feet on a course S. 45° E. Some quartz about 12 inches wide with a good deal of intermixed slate was cut 9 feet from the side of the shaft; course S. 77°, W., dip S.E. 71°. Should the Yellow Boy reef be found in this shaft it would be worth driving on to its junction with the Black Boy reef.

St. Patrick's Mine.—A small reef, which is very likely an offshoot from the main Black Boy line, but may be connected with the east and west reef of the Mathinna Company's holding, is found in Section 437-87G, and has been traced by trenches eastward into 465-87G. A prospecting shaft, six feet by three feet, has been sunk on the underlay to a depth of about 60 feet, and about 40 feet further east another small shaft, now fallen in, has been put down. No work had been done for some time in the mine, and the ladder way seemed very insecure, so I did not go down into the workings. Very little quartz was in the paddock, though none is said to have been taken away, and as far as I could see the vein is very small both in the shafts and the trenches.

The New Golden Gate Mine.—This mine has been the cause of a revival of mining in the district, and is by far the most important in it. It presents several very noteworthy features, and throws much light on the nature of the reefs of this locality and must therefore be described in considerable detail. The principal workings are in Section 13-87G; the shaft and surface workings are marked on Plate No. 1, and all the underground workings are shown in plan and sections in Plates Nos. 5, 6, 7, and 8. The ground has been held by three or more successive owners, the predecessors of the present company having been unfortunate enough to pass over the main auriferous bodies without finding them. Their operations were on what is now known as the western reef; this was worked down from surface at first, and then a long adit was put in to cut it about 50 feet below the surface. In the first half of this two lode-channels were passed through, now recognised to be those of what are termed the Main and Loane's reefs. At the time they were cut they were not thought anything of, as was indeed only natural, as there is very little in them to distinguish the lode-stuff from the country rock. From end to end of this adit the latter is much weathered and broken, and contains a great many veins and bunches of quartz, and the two lode-channels appear very little different from the rest of the country, being filled almost entirely with broken slate and clayey matter with but little quartz. About 210 feet in the adit passed through a mass 10 feet thick of quartz veins lying in irregular fashion in the country rock without defined walls, and 15 feet further in another lode was struck. This contains a good deal of quartz and much country rock, with strings of quartz running through it. The walls are not clearly defined, the most distinct being one which has a north-westerly course and north-easterly dip. This agrees fairly well with the position of the reef at the No. 2 cross-cut 146 feet lower. A little driving has been done on this lode as shown on the plan, almost entirely in lode-matter containing much quartz; these drives are utilised as a powder magazine. The name of the Central reef has been given to this lode. Between this and the Western reef at the adit level the country rock contains many bunches and veins of quartz, and though this feature is not seen at the lower level, I am disposed to believe that the Central and Western reefs are branches of one and the same lode, and that they will be found to unite going north and perhaps also to the south. The Western reef was reached in the adit 310 feet from the entrance, and has been driven on at this level as shown in plan. In the drives several smooth hard walls are seen, but these do not appear to be main walls in every case, there being several walls in the lode-channel, a feature also often exhibited by Loane's and the Main reefs. Some of these are marked on the plan. In the old workings the reef had a slight underlay westward, but the general dip of the walls and of the stone in a winze sunk on the footwall is to the east, and in the lower level the reef lies to the east of its position in the adit, so that on the whole it has an easterly underlay. The reef in the workings has varied very much in width, from only a few inches of quartz up to eight or nine feet. In the southern drive the lode is much broken, and a stope has been taken out underfoot to a depth of about 35 feet on a vein of stone that runs almost at right angles across the general course of the reef. The present owners have done very little in this part of this mine at the adit level, and it is difficult to get accurate information as to the old workings. Mr. James M'Murray, who was the last to work it (about 1881) on any considerable scale, states that his first crushing of 23 tons yielded 9 dwts. 12 grs. of gold per ton; his next of 124 tons gave 13 dwts. 12 grs. to the ton; and then a still larger crushing of between 200 and 300 tons only returned from 3 to 4 dwts. to the ton. Two parties had previously worked the reef and taken out more or less gold. It will be observed on the plan that both at adit and No. 2 levels the footwall runs off into the country on an almost southerly course, corresponding with that of the longest body of old workings, and it may therefore be possible that going south this reef branches, one part going south-east to join the Main and Loane's reefs, and the other keeping a southerly course. Against this may be urged that the reef must turn to the west of north going northwards or it would have been cut sooner in the western cross-cut of the North Golden Gate mine, unless perchance its underlay changed. At No. 2 level both Central and Western reefs have again been cut, as marked on plan. The Central reef is still badly defined, but a little gold has been got in it in a winze sunk about 18 feet. The Western reef, where first struck, is composed of from 3 to 4 feet of solid quartz containing a little gold, but 30 feet from the cross-cut it gets small and in the face there is only a little quartz, the lode-channel being 4 feet 6 inches wide, filled with lode-slate. As this reef has been payably gold-bearing in parts it should not be neglected altogether, but a certain amount of prospecting should be steadily carried on upon it. It will be easier to do this from the shaft at the 600 or 700 feet levels, however, than higher up, as there will not be so far to drive to reach the reef. (See cross-section, Plate No. 6.)

The discovery of gold which has given the New Golden Gate mine its present prominence was first made in the adit level, a little gold-bearing quartz having been found by A. Loane while picking into the

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floor of the drive where the lode-channel of the reef which now bears his name had been passed through. This led to his sinking a winze in which more gold-bearing stone was got, the quartz yielding 1 oz. 8 dwts. to the ton. About 40 feet below the adit the weathered yellowish slate country changed to blue slate, this depth being apparently the limit of superficial oxidation by the atmospheric influences, and the reef almost at once became a solid body of quartz from 2 to 4 feet in thickness; down to this level it had been rubbly and broken. The main shaft was then sunk, and about 100 feet down struck a till then unknown reef carrying gold, now know as the Main reef. Since then the development of the mine has been vigorously and skilfully prosecuted, with highly remunerative results. The shaft is now 510 feet deep, and the No. 6 or 500 feet level is being opened out, while there are large reserves of crushing stuff still in the upper levels to be stoped.

The Main reef and Loane's reef both alter their course pretty frequently, but on the whole are fairly parallel in the northern portion of the mine. South of the shaft they junction, as shown on plan, the junction getting further and further south at each successive lower level. Towards the north end the reefs must either diverge pretty widely or else Loane's reef splits into two branches, the western one of which diverges rapidly from the eastern, otherwise the Main reef could not be missed by the cross-cut from the North Golden Gate shaft, which appears, however, only to have cut Loane's reef or a western branch from it. In the fact of the workings being at the junction of the Main and Loane's reefs with one another, and also not far from that with the Central, and perhaps, Western reefs, lies the explanation of a number of the unusual features presented by this mine, and a possible key to the question, of much interest to the district, as to where to look for the extensions of the New Golden Gate lines of reef.

On the plan the portions of the reefs carrying payable gold-bearing quartz have been dotted, the parts left white being "dead ground" generally filled with broken and twisted lode-slate carrying but little quartz, and not payable to take out. There is very often a distinct selvage between the body of auriferous quartz and the "dead ground." The dotted portions on the sections, plates 7 and 8, also indicate the auriferous quartz. The size of the reefs, as might be expected, varies very much, from quite small to as much as 30 feet. At No. 4 level Loane's reef was 22 feet wide, all payable stone. On the Main reef above No. 4 level one of the stopes was 18 feet wide, the quartz being a solid white mass from side to side. Widths of from 6 to 8 feet of stone have been common in various parts of the mine, and probably to say that the quartz averages 4 feet in width throughout the ore-bodies would be a conservative estimate. Some of the quartz is remarkabty white and like loaf-sugar in appearance; some laminated, the layers of quartz being separated by thin seams of greasy black polished slate; in other parts it frequently contains angular fragments of the wall-rock, and shows brecciated structure; and not uncommonly it exhibits smooth highly polished slickensides or friction surfaces. In both reefs the number of smooth planes or "walls" coated with clay, often exhibiting striæ and other evidences of motion of the walls one upon another is very noteworthy. These may often be taken for the true walls of the reef, when they are in fact a very considerable distance from it. In some instances in breaking into these apparent walls, other bodies of quartz, or "splices," as they are often called by the miners, are found behind them, and there may be several such splices separated by smooth plane surfaces between the walls of the lode-channel. This feature makes it necessary to frequently cross-cut in order to be sure of not missing bodies of stone. Even after cutting through all the quartz bodies, however, it would not seem that the true walls of the lode-channel are always reached, for the country rock seems to be much broken and often full of strings of quartz,—has, in fact, the character of the "horses" of slate met with in lodes. Between Loane's and the main reef this is particularly noticeable, and while it is evidently to be expected in the country lying between two contiguous reefs, it also points to the possible explanation that these two are really one reef separated by a large "horse," the lode-channel extending from the hanging-wall of the Main reef to the footwall of Loane's. Both these walls appear to be better defined and more persistent than any of the numerous others met with between them, and the water traversing the rock appears to drain along them in preference to other channels. The "main hanging-wall," as it is called, is a particularly well-defined fissure. It was first struck at 70 feet from the surface in the main shaft. It is again met with in a small cross-cut to the east of the shaft at No. 1 level, also along the northern part of the drive on the main reef at No. 1 level, and again in the cross-cut east from the junction of Loane's and the Main reef at the same level. It has therefore on the whole a north-north-westerly course. It is again well seen in No. 3 level in the north drive on the Main reef, and is perhaps also seen in No. 5 level, but had not been bared enough to make certain when I saw it. It is generally very hard and smooth, and affords passage to a good deal of water, which deposits brown oxide of iron as it oozes out. The main footwall of Loane's reef is not so well-defined as this hanging-wall, but shows distinctly in several parts of the mine as marked on the plan. It is significant that the main hanging-wall has not been met with in the drive at No. 4 level east from the junction of the two reefs, and probably it lies still further east.

At No. 1 level there are some features of the mine to be noted. On the plan a drive is seen running to the westward in continuation of the cross-cut from the shaft to Loane's reef. This reef was met with sooner than was expected when being driven for, and the cross-cut was therefore extended through it to make sure that it was really the one looked for. A reef-channel was followed, from six inches to two feet wide filled with clayey lode-slate containing a little quartz. At about the distance where Loane's reef was expected a clayey head was cut through, which appears to be really the footwall of the reef. The cross-course followed runs right through this to the quartz portion of the reef, between which and the shaft it was no longer seen. After passing through the footwall the cross-cut still followed along the cross-course, the footwall of which makes a decided bend round to the north-west in the end of the drive. Nothing corresponding to it has been found in the cross-cut at No. 2 level below. It seems to me most likely to be simply a fracture of the country, extending probably from the Central to Loane's reef and formed at the same time as the main set of lode-channels. In the drive north on Loane's at this level the reef suddenly took a bend to the north-west, and while on this course carried neither quartz nor gold, but was filled with lode-slate. On bending to the east of north again the quartz was once more found. The break was at first taken to be a slide, but as no similar fault occurs in the Main reef nor in this one at the next level below, this cannot be so. The reef has a large "horse" in it at this point between the quartz and the footwall

met with in driving westward, and the blank ground lies along the north side of this mass, which has wedged out by the time No. 2 level is reached. A very similar piece of dead ground is seen at the south junction of Loane's and the Main reef at No. 1 level, the channel of the former breaking suddenly across to join the latter, and being filled with lode-slate instead of quartz. The drive from this junction eastward to the main hanging-wall is worth noticing: it has followed a smooth wall carrying a little quartz and dipping to the southward. The country is pretty solid, but yet does not seem altogether undistributed, and in parts close to the smooth wall it is much contorted or puckered in minute folds of the thin layers of slate. The wall has every appearance of being a slide, but the Main reef passes through it without being heaved. What is clearly the same wall is met with again in No. 4 level, where, however, it is Loane's reef that goes on through it without dislocation. If the break had been a slide it might have been possible for it, under some circumstances, to have faulted the one lode and not the other, but it could not fault the one lode at one level and the other at a lower one: hence we see that it is not a slide at all, but only a break through the block of country lying between the reef-channels and the main hanging-wall. It is therefore probable that south of this break there is a large "horse" of country lying between the reef-channel and the hanging-wall, and there is a considerable likelihood of quartz being found in some parts along the latter if followed. To test this a cross-cut is being put in at the No. 4 level. The country in it, so far as had been driven at the time of my visit, was hard solid slate, apparently undisturbed. Should the hanging-wall be found as anticipated, but not carrying quartz, it will be advisable after following the reef-channel further south some considerable distance to again cross-cut for it, unless the reef turns more to the south-east and runs back towards the wall. The present workings may be merely the south end of a similar large "horse" which widens going northwards, and it is possible therefore that the south point of this new wedge of country may also be rich.

The southern extension of No. 1 level from the junction and that of the No. 4 are both in dead ground, the reef-channel being filled with lode-slate carrying but little quartz. The general parellelism of these two levels in their southern portions is very marked, as seen on the plan. The No. 1 level, however, does not show a feature which is well seen in Nos. 3 and 4 levels—namely, the junction of the lode-channel with another one coming in from the north-west. This is likely to be the Central reef coming in to join the Main line, and so probably connecting it with the Western reef. When this lode was struck at No. 3 level the winze on the Central reef at No. 2 level, which was standing full of water, was almost immediately drained.

In the north end of the mine the drives on Loane's reef have been generally short, not having been pushed any distance into the dead ground. The forking of this reef at No. 4 level is to be remarked. One branch runs about due north and underlays eastwards, the other runs nearly straight towards the workings of the North Golden Gate mine on what is nearly certainly a continuation of it. This western branch has a slight westerly underlay, as has also the North Golden Gate reef. (It is to be borne in mind that the No. 4 level of the New Golden Gate mine is nearly 100 feet above the level of the North Golden Gate cross-cut.) It does not seem that the east branch of Loane's reef continues its northerly course very far, as it would have been cut if so in the northern extension of the drive on the Main reef at the same (No. 4 level), which, as seen on the plan, runs considerably west of north. And if it turns west of north to any extent it is hard to see how it could fail to have been cut in the eastern North Golden Gate cross-cut, even allowing for the easting due to the underlay and difference of level of the two drives. Two possibilities therefore present themselves,—either the eastern branch of Loane's reef bends round to the north-west rapidly and rejoins the Western one before reaching the boundary between the New Golden Gate and North Golden Gate mines, or else it has only swerved a little to the westward, enough to make it still lie ahead of the drive on the Main reef. The former supposition implies an entire change of underlay of the northern part of Loane's reef, and I therefore think it much more likely that the latter is the true one, and that the eastern North Gate cross-cut would have to be extended still more to the east before it would reach the east branch. With regard to the western bend of the north part of the drive on the Main reef at No. 4 level, it is to be noticed that a footwall runs off to the east at the beginning of the bend (at the winze from No. 3 to No. 5 level), and that the quartz almost immediately gives out and is succeeded by lode-slate when the lode begins to turn, so that I incline to believe that the drive has left the main reef at the winze and followed a break in the country between the two lodes which connects their two channels, and consequently that if the drive were extended a very little further it would strike Loane's reef. The wall at the winze, if followed, might then lead on to a continuation of the Main reef stone.

The longitudinal sections, Plates 7 and 8, show that the body of auriferous quartz has been fairly continuous in both reefs from about 70 feet below surface downwards, and that it has a certain amount of pitch towards the south. In the Main reef, below No. 4 level, there was blank ground, as shown on the section down to No. 5, but at this level a new body of auriferous stone was encountered, which appears likely to be of great importance. In the way in which it was divided from the lode-slate filling of the dead ground by a clayey selvage, this quartz body closely resembled the one met with in the Old Boys mine at No. 3 level in No. 3 reef previously described. In the north end, at the time of my visit, two horses of country were causing this stone to branch, the best gold-bearing quartz being on the foot-wall. This "new make" of stone, as it is called, is a fine strong body of quartz, and will probably continue good in depth. It will be soon tested by the works from the 500-feet level now in progress.

It has been noticed by the mining manager, Mr. Thomas Andrews, as a general rule throughout the mine, that when the lodes bear towards the east of north they carry gold-bearing quartz, and when they veer round to the west of north to any considerable extent the quartz is replaced by barren lode-slate. There are a few minor exceptions to this rule, the most notable being the north part of the Main reef at No. 5 level, but on the whole, as may be seen by an examination of the plan, it holds good substantially all through the mine. In the Western reef, too, the gold-bearing stone was mostly obtained where it had a course a little east of north. While not disposed to agree that a rule may be founded upon this fact that the portions of the reef still unexplored running east of north are likely to be the gold-bearing ones, while such as bear west of north will be poor, still there are certainly grounds for such an opinion, and it will be of much interest to observe if the future workings prove the rule to hold good. Extension of the drive north at No. 4 level on the Main reef would be a convenient and rapid way of testing it practically. If this lode continued on its north-westerly course it must have been cut ere now in the North Gate cross-cut,

15/30

but as it has not been so cut it must turn again to the north or north east, and, consequently, by following it, it should soon be got again on the strike favourable for gold. As already mentioned, however, I am inclined to regard the apparent turn of the reef to the north-west as a break through the country to join Loane's reef, and to suspect that the Main reef has been left in the eastern wall of the drive; in which case the test of the hypothesis would be unsatisfactory.

In the New Golden Gate Company's section, 32-87G, and in the south-east part of 13-87G, a number of trenches and pits have been from time to time sunk on leaders and strings of quartz, more or less gold-bearing, marked on Plate No. 1, which appear to indicate a large lode channel or run of lodes going in a south-easterly direction from the main workings. Almost on the south boundary of Section 32-87G yet another reef has been got in some old workings from what is known as the Snake shaft, also running a south-easterly course. None of these have been worked at all recently. They seem to agree with the workings at the No. 4 level south in the mine itself, and with the course of the main hanging-wall, that the reef runs south-south-easterly from the main shaft. The main lode-channel appears therefore to be that of the Western reef, the north and south reefs (Loane's and the Main) being branches from it. It is not impossible, however, that these are faulted at the junction, and some cross-cutting might well be done south of it to try if this is the case, but there do not appear to be any signs on surface to indicate that it is so.

The exploratory work in this mine has been kept well ahead of the stoping, and there are large reserves of good stone above No. 4 level, while between Nos. 4 and 5 the ground is practically untouched, though proved by the levels and winzes to contain good ore. The stone in the bottom level is strong and good, and winzes are showing it to be continuing downwards equally well. In sinking from No. 5 level to No. 6 a gold-bearing leader was passed through in the shaft, two feet thick in the bottom, which may be the top part of a new make of stone on the footwall of Loane's reef, or, more probably, a dropper to the Central reef, in which case the latter is likely to be gold-bearing where it comes in. There is, therefore, an unusual amount of certainty that the mine will be remunerative for many years to come. I understand that it is intended to keep on sinking the shaft as fast as levels can be opened out, a policy which will prove the mine well in advance of the exploitation, and do much to render its shares a calculably safe investment. I do not think, however, that the exploratory work should be limited to sinking and opening up the present known ore-bodies, for driving through the dead ground on the course of the lodes ought also to be persistently carried on. The Company owns likely ground both north and south of the present workings, and there is every probability that, by driving along the reefs new ore-bodies will be struck. Driving north on the Main and Loane's reefs is specially to be recommended as most likely to be quickly followed by the discovery of payable stone. Both the Central and Western reefs also are worth further exploration, and while the mine is in a prosperous condition is the proper time to prospect them. Besides driving, a great deal of cross-cutting should be done from side to side of the reef-channels, and occasionally through from Main reef to the Western reef, for the experience of the mine has been that there are very numerous parallel lode-channels, and that these ramify so that it is only by constant cross-cutting that they can all be kept sight of.

The New Golden Gate Company possess what is certainly the most complete gold-saving plant in the Colony, having, in addition to the ordinary stamper battery, two Watson & Denny pans for crushing blanket sand and coarse tailings, and an installation of Frue vanners for saving pyrites. Moreover, in order to get the best results from the vanners these are not required to deal with the tailings just as they come from the battery, but have them classified into coarse and fine sands and slimes by a series of spitz-butten. Excellent work is thus secured in concentration of the pyrites. The battery is lighted with electric light.

From June, 1888, up to 31st July, 1892, 24,175 tons of quartz have been raised and crushed, yielding 27,009 ounces of gold, or an average yield of 1 oz. 2 dwts. 8 grs. to the ton, which realised £102,220 8*s.* 3*d.* For the six months ending 31st July, 1892, 96 tons of pyrites were saved by the Frue vanners from 7210 tons of quartz, or equal to 1⅓ per cent. The net profit resulting from the saving of pyrites amounted to £555 15*s.* 2*d.* The cost for the last half year of working the mine, including raising and crushing quartz, progressive and surface works, and all other expenses incidental to working the mine and managing the Company, is equivalent to £1 9*s.* 1½*d.* or 7 dwts. 17 grains of gold per ton of quartz crushed. The preceding half year the cost was £1 11*s.* 9*d.* per ton. The total amount paid in dividends now amounts to £36,000 and in dividend tax £1350.

North Golden Gate Mine.—Section 70-87G.—The workings of this mine are shown in plan and cross-section in plates 5 and 6. The main shaft is 7ft. 10in. by 3ft 10in., an awkward size for working, not permitting of two cages and a ladder-way as it should, and is 405 feet deep. Levels have been opened out at 150 feet and 392 feet. The upper one is almost on the same level as the No. 2 of the New Golden Gate, and the lower is a little below the No. 5 of the latter mine. A broken mullocky reef formation is said to have been got in the upper part of the shaft, and about 55 feet down some leaders were got carrying a little gold. At the 150-feet level a cross-cut has been driven east and west from the shaft. In the eastern cross-cut, which is 47 feet long, the end is in a broken mass of slate and quartz, the footwall of which is seen at 40 feet from the shaft striking N. 21° W. and underlaying to the east; this wall has been driven on north and south about 10 feet each way; it carries about 2½ feet in width of mixed slate and quartz, but no gold. The western cross-cut is driven 31 feet, and at 20 feet from the shaft passed through a body of quartz 3½ feet wide, carrying traces of gold. An almost vertical wall is exposed 12 feet from the shaft, with 8 feet of slate between it and the quartz vein. At the 392-feet level the eastern cross-cut is driven 82 feet from the shaft, cutting a few quartz veins, as seen in plan, but nothing of any consequence. The western cross-cut is 253 feet in length, and has cut near its west end a number of veins of quartz and clayey lodestuff, shown on the plan, which probably indicates that the Central and Western reefs of the New Golden Gate mine are close at hand. At 30 and 53 feet from the shaft two lode-channels have been passed through, and driven on as shown in the plan. These have smooth well-defined walls with clay selvages, but are filled with lode-slate and contain very little quartz so far as followed. Towards the south they probably soon join one another. Close to the New Golden Gate boundary a winze has been sunk to a depth of 64 feet, and in this some gold-bearing quartz was obtained. It was not in a well-formed body, but in lumps and veins,

NEW GOLDEN GATE G.M.Co

PLATE No 5

16/30

old prospecting shaft

13
87G 10 ac:

NEW GOLDEN GATE G M C.o No 1 LIA.y

PLAN

Showing Workings of the

NEW GOLDEN GATE & NORTH GOLDEN GATE

Scale of Feet

Scale of Links

A. Montgomery
Geological Surveyor

No 1 Level	116	Feet
No 2	176	,,
No 3	236	,,
No 4	316	,,
No 5	400	,,

5 cm

NORTH GOLDEN GATE Co N.L.

87G 10 AC:

17/30

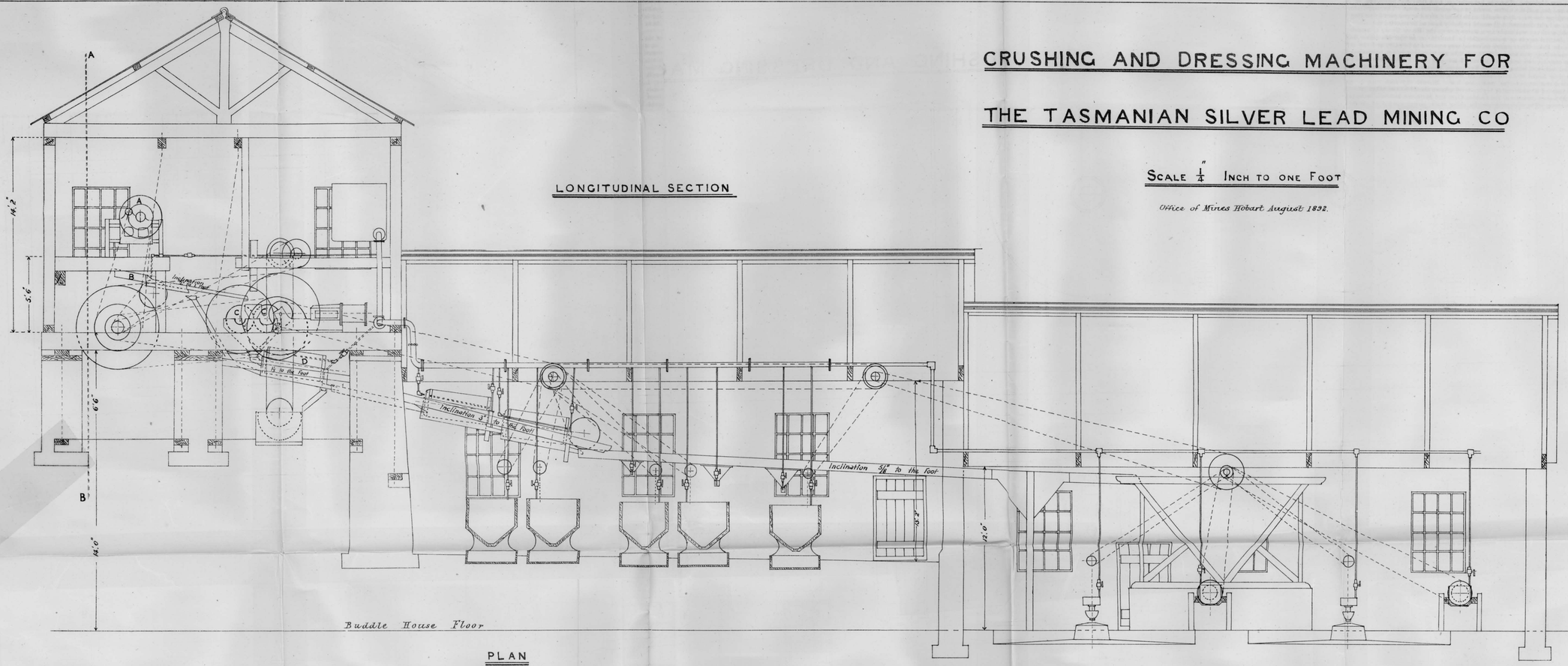
CRUSHING AND DRESSING MACHINERY FOR

THE TASMANIAN SILVER LEAD MINING CO

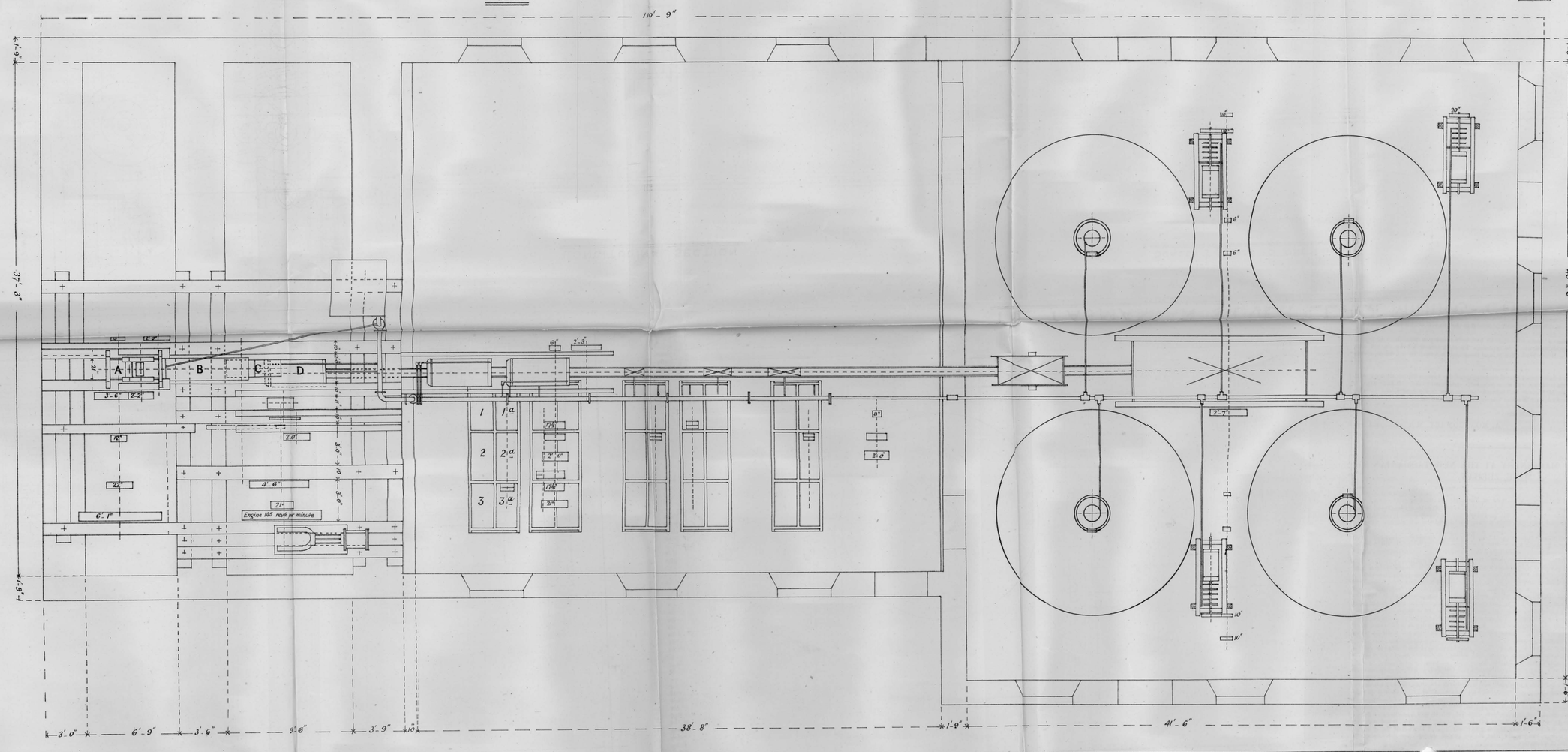
SCALE $\frac{1}{4}$ INCH TO ONE FOOT

Office of Mines Hobart August 1892.

LONGITUDINAL SECTION



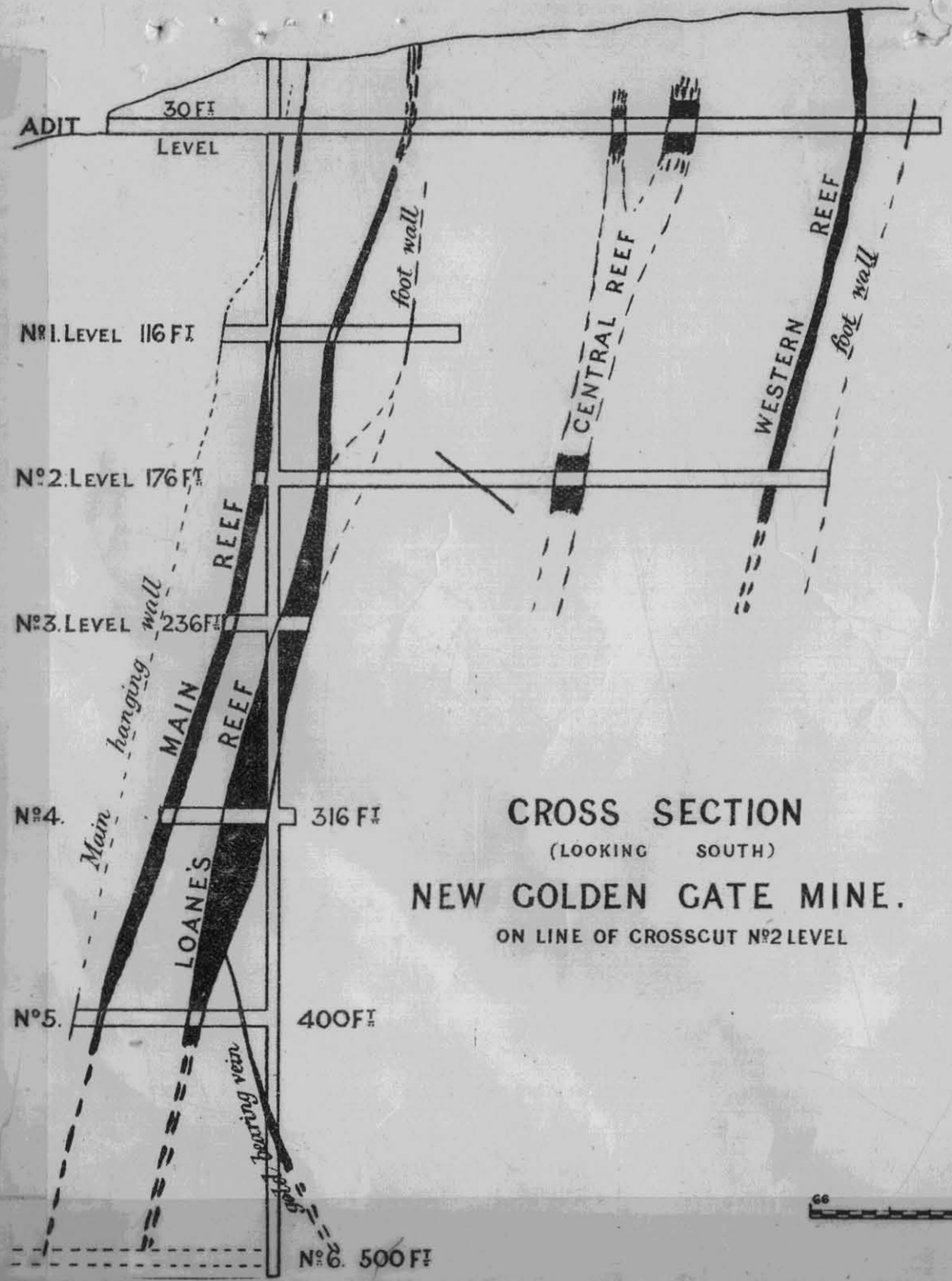
PLAN



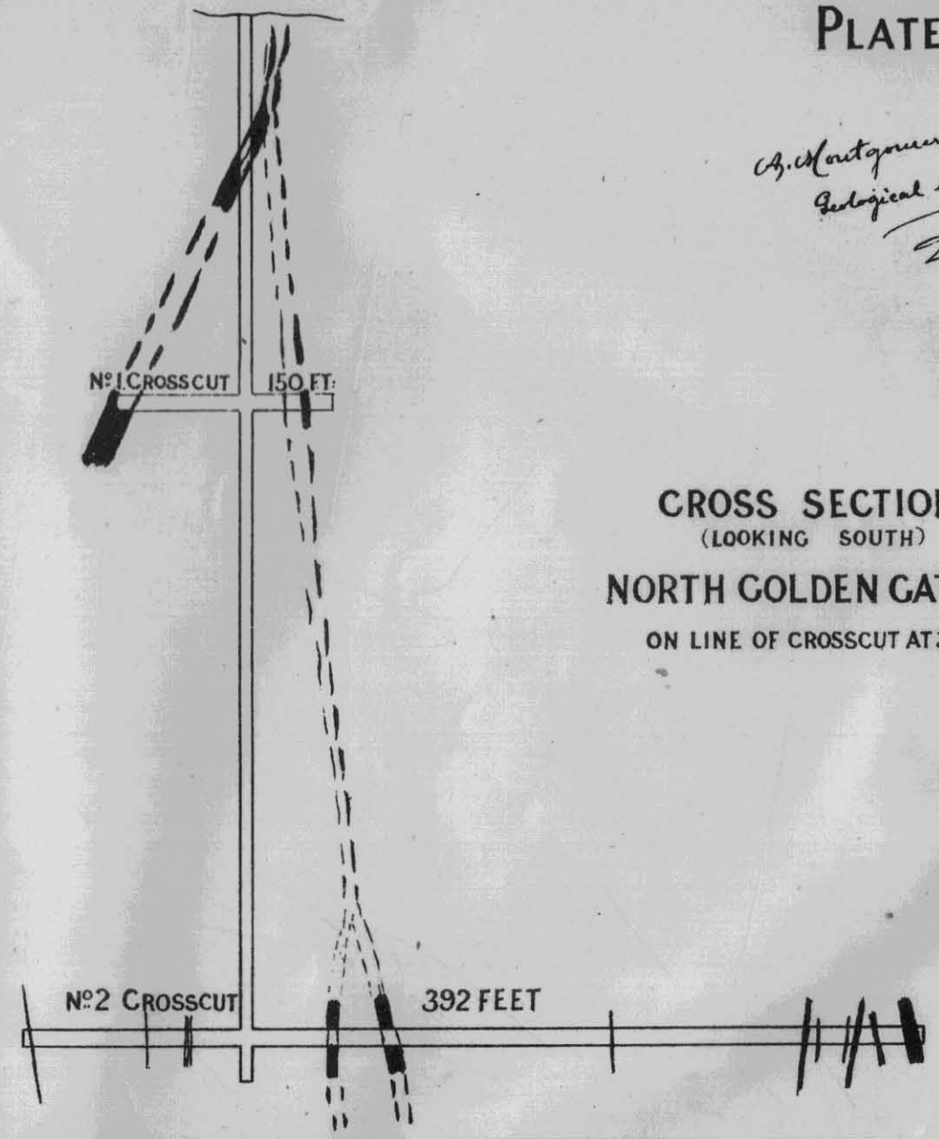
5 cm

PLATE 6.

A. Montgomery
Geological Surveyor



CROSS SECTION
(LOOKING SOUTH)
NEW GOLDEN GATE MINE.
ON LINE OF CROSSCUT No 2 LEVEL



CROSS SECTION.
(LOOKING SOUTH)
NORTH GOLDEN GATE MINE
ON LINE OF CROSSCUT AT 392 FT LEVEL

Scale of Feet
66 0 66 132 ft

5 cm

18/30

19/30

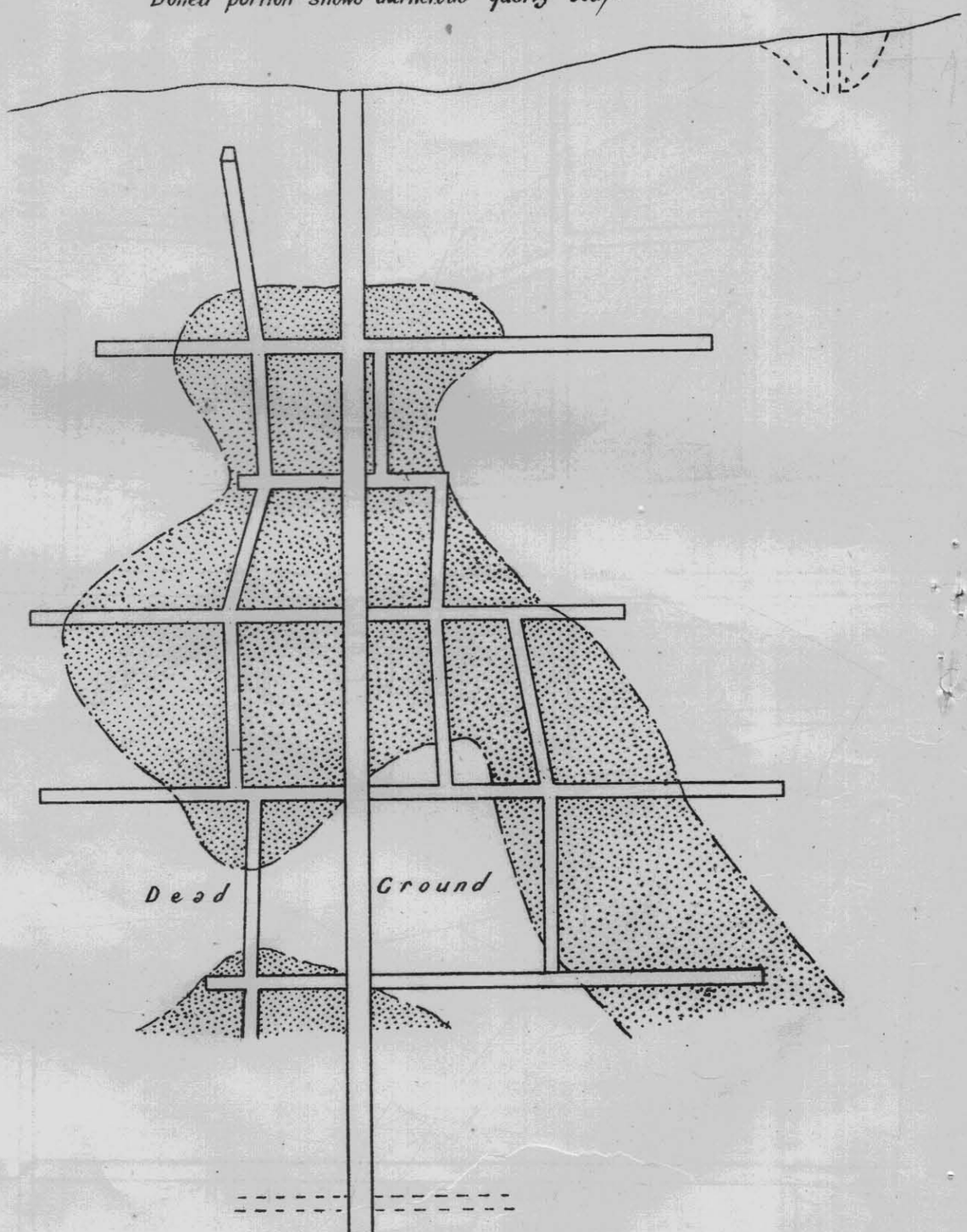
PLATE 7.

NEW GOLDEN GATE MINE

(LONGITUDINAL SECTION LOOKING EAST.)

MAIN REEF.

Dotted portion shows auriferous quartz body.



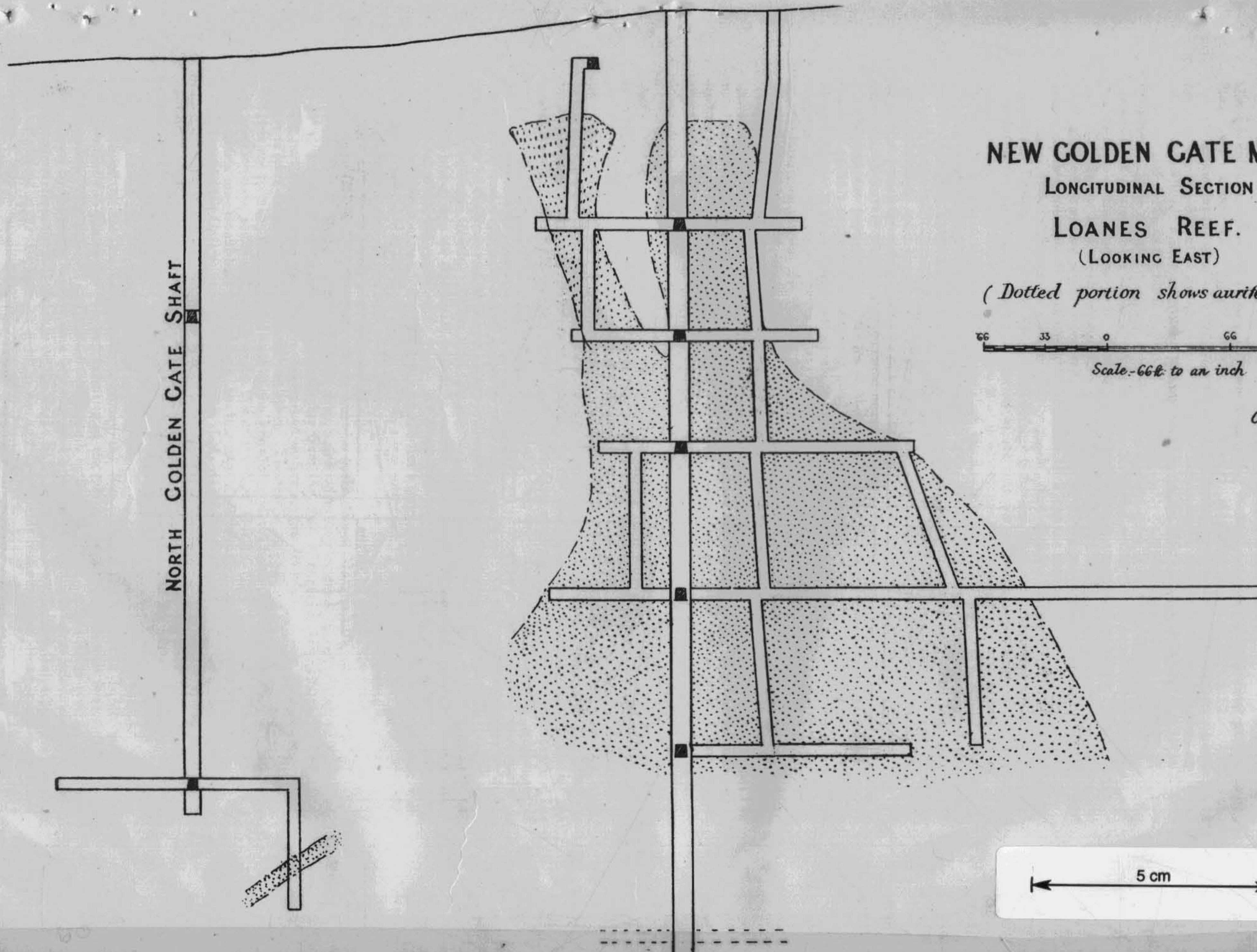
5 cm

66 33 0 66 132 198 ft.

Scale 66 Feet to one inch

A. M. Montgomery
Geological Surveyor

PLATE 8.



NEW GOLDEN GATE MINE

LONGITUDINAL SECTION

LOANES REEF.

(LOOKING EAST)

(Dotted portion shows auriferous quartz)

66 33 0 66 132 ft.

Scale:- 66 ft. to an inch

A. Montgomery
Geological Surveyor

through much polished and twisted lode-slate of the same character as much of the dead ground in the New Golden Gate reef.

On looking at the plan, and remembering that the 392-feet level of the North Gate corresponds pretty nearly to the No. 5 level of the adjacent mine, it will be seen that if the New Golden Gate Main reef keeps its course it will run a little east of the eastern boundary of the North Gate section, and if it turns a little to the west of north, as the north ends of No. 3 and No. 5 levels render likely enough, it might come into the section. The end of the eastern cross-cut at the 392-feet level is 30 feet from the boundary, and the possibility of getting either Loane's reef or even the Main reef within this 30 feet seems to me to warrant the extension of the cross-cut to it. Should gold-bearing stone be struck even on or outside the boundary the reef above the level would underlay back into the North Golden Gate property, and a considerable block of valuable ground might be secured. The possibility of the reefs turning more to the west of north should also be contemplated, as this would bring them back into the section.

I have already discussed, when dealing with the New Golden Gate mine, the probability of the branches of Loane's reef seen at No. 4 level diverging further from one another or again reuniting. I have therefore only to say now that it appears to me that the following explanation of the various reef channels cut in the North Gate mine seems most in accordance with the facts we have knowledge of. The mullocky formation in the upper part of the shaft was Loane's reef, which is seen in a similar condition in the open workings on surface round the mullock shaft of the New Golden Gate. Going downwards this divides into two branches, one underlaying a little to the west, the other to to the east. The latter was passed through in the eastern cross-cut at the 150-feet level, which, however, was not extended far enough to cut the parallel Main reef; the former was also seen at the 150-feet level in the Western cross-cut, and is no doubt that passed through in the Western cross-cut at the bottom level, where it has again divided into two branches, which very probably will be found to reunite when followed.

Though the prospecting operations of this mine have so far been unsuccessful in finding payable quartz, it appears to me that there is very good inducement to continue the search for some time yet. The eastern crosscut at the 150-feet level should be extended to the boundary to try if possible to cut the Main reef, and that at the bottom level also to cut the eastern branch of Loane's reef. The cross-cut west should go still further to intersect the Western reef, and this should be followed by driving. The best hope of getting returns however, lies, I think, in following the western branch of Loane's reef seen in the bottom level, as the barren filling may at any moment give place to gold-bearing quartz. It would also be advisable to sink the shaft deeper, say another 200 feet, and again cross-cut to this reef. The gold found on the winze at the boundary may very possibly be a string from the ore-body in the New Golden Gate mine leading to another one at a greater depth in this mine. There is very good reason to hope for ultimate success if working is perseveringly carried on.

South Golden Gate Mine.—Two shafts known as the South Golden Gate and Pride of Mathinna shafts have been sunk in the Sections held by the South Golden Gate Gold Mining Company, the former on Section 295-87G and the latter on Section 361-87G. Both have been laid out to the south-south-east of the New Golden Gate mine in consequence of the various veins of quartz found on surface from time to time indicating a general trend of the reef in that direction, as above remarked in dealing with the latter. When I visited the field these shafts were not in work and had water in them, consequently I have not been able to get below, and the following particulars of the work done have been supplied to me by the mining manager, Mr. S. Richards. The South Golden Gate shaft is 10 feet by 4 feet in the clear, and has been sunk 205 feet. A level has been opened out at 200 feet, and driven about N. 65° E. a distance of 242 feet. At 153 feet in the shaft a reef was struck, and passed through at 166 feet, dipping easterly: it consisted of from six to eight feet of lode-slate with some quartz on the foot and hanging-walls, and is supposed to be the same reef as is seen close by on surface in the Snake shaft of the New Golden Gate Company's Section 32-87G. In the level this reef was struck again at 18 feet from the shaft, about 6 feet wide, and was driven on 32 feet 6 inches on course N. 25° W. It consisted of quartz and polished squeezed lode-slate, but contained no gold. At about 138 feet a slide was passed through, underlaying towards the shaft about seven feet in three. At 178 feet a large lode formation 25 feet wide was met with, underlaying westward about three feet in five; this was succeeded by 10 feet of country rock, and then another lode formation 13 feet wide and underlaying the same as the first was cut through. These lodes were filled with black greasy slickensided slate with occasional bunches of quartz, similar to that obtained in the North Golden Gate Company's winze and also in the Star of Mathinna Company's Mine.

The Pride of Mathinna shaft is 70 feet deep, and a drive has been made from the bottom in direction N. 73° E. for over a hundred feet. About 50 feet from the shaft a small reef 12 inches wide was cut, running north-north-westerly. This is also seen on surface in two trenches, in the southern of which it appears to have formed two branches 16 feet apart. The reef is underlaying eastward.

It is not possible, in the present state of our knowledge of the field, to form an opinion of much value as to whether these shafts are on or near the line of the New Golden Gate reef. As already stated, the surface indications would lead us to believe that this takes a south-south-easterly course from the junction in the New Golden Gate mine. If so, these two shafts would not be far from the line, and their getting load-stuff in about the position where it might be expected according to this theory is strong evidence of its truth. On the contrary, however, it may be urged that the underlay of the slaty lodes in the South Gate mine is to the westward, while the New Golden Gate reef has an eastern underlay. More work will have to done before there will be any certainty as to their identity. The South Gate cross-cut has only been driven some 242 feet, and the ground has therefore not yet been at all adequately prospected. From the position of the Sections held by this company the New Golden Gate reef can hardly fail to pass through either 295-87G or 360-87G, and extension of the cross-cut both east and west is accordingly to be recommended. The possibility of the north and south reefs of the New Golden Gate passing through or being faulted by the north-westerly ones is not altogether remote, though not, to my mind, very probable.

The stone from the old workings on the Snake Shaft reef in the New Golden Gate ground is reported to have yielded some 10 dwts. of gold to the ton, and as this reef continues strong in the South Gate workings it may at any time again become gold-bearing, and should therefore be driven on. The mullocky

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reefs ought also to be followed, far enough at any rate to give a good idea of their general strike. It is possible that they may be cross-courses and have nothing to do with the New Golden Gate reef. I should have preferred to have seen the shaft 200 feet deeper before any cross-cutting was done, and think that when the mine goes to work again it would be best to sink to 400 feet before opening out. The prospects of the mine seem to me good enough to put it in the category of legitimate mining ventures, in which it is often necessary to risk considerable capital for a problematical reward. Without such ventures mining would be at a standstill. This company has made a good beginning with its prospecting work, and it is to be hoped in the interests of the district that the shareholders will not lose heart on account of the want of immediate success, but determine not to abandon their undertaking without giving the ground a thorough trial.

New Golden Gate Extended, Golden Ladder, East Golden Gate, and *Star of Mathinna Mines.* (See Plate 9.)—It is most convenient to deal with this group of properties together, as their lodes are more or less related to one another. They are all on the slopes of the most easterly of the three main spurs on which the mines of this gold-field are situated. On the general plan (Plate 1) several shafts will be seen lying more or less in a line north from the New Golden Gate and North Gate shafts. The one in the south-west corner of 204-83 is a small prospecting shaft sunk to a depth of 60 feet in search of the New Golden Gate lode, but without any success. In the north-west corner of the same section is an old shaft, now full of water, said to be 120 feet deep. Quartz is reported to have been in former years obtained from this yielding (18 dwts. to the ton), and the lode is stated to have run about north and south. Near the eastern boundary of 209-87G is the new main shaft of the New Golden Gate Extended Gold Mining Company, 11 feet by 4½ feet in the clear, and 159 feet deep. This was shut down, and could not be got into for water at the time of my visit. The last 8 feet in the bottom was stated by the Mining Manager (Mr. W. M. Glass) to be mullocky lode-stuff. Two and a-half chains north from this shaft is a small old shaft sunk by the old Glencoe Company on a north-and-south reef, which may be the same as that worked in the old shaft in 204-83, but is more probably identical with a vein of quartz cut in the excavation for the New Golden Gate Extended Company's engine-house. A small adit, now used as a powder magazine, has been driven to cut this lode, and a little driving has been done along its course in the old shaft. The reef shows 3 feet or more of rubbly quartz, and has a slight underlay westward. A crushing taken out many years ago is said to have yielded 10 dwts. to the ton. The Star of Mathinna shaft is in Section 469-87G; its dimensions are 11 feet by 4 feet, and depth 157 feet. At 50 and 60 feet two gold-bearing leaders were passed through dipping westerly. A cross-cut has been opened out at 150 feet and driven S. 78° W. 63 feet. At 21 feet from the shaft a reef was cut 3 feet wide and driven on 21 feet S. 30° E., underlaying to eastward about 4 in 6. This consisted of fairly solid quartz with well-marked clayey walls. It contained no gold, and became small in the end of the drive and split up into leaders. At 44 feet from the shaft a lode two feet wide underlying west was cut, from which there was a considerable flow of water: no driving was done on this, as it contained no gold, and the formation was much broken. These particulars were given to me by Mr. S. Richards, the manager of the mine, as work had ceased for some time, and this shaft also was full of water. On the surface a reef of quartz is seen in three trenches, as shown on Plate 9, and an old shaft 30 feet deep has been sunk upon it. In the bottom of this the quartz divides into two branches, going downwards, one underlying east, the other west, something after the fashion of a saddle-reef. The quartz saved and lying at the main shaft is much mixed withh polished black slikensided slate, and several pieces of the white quartz are themselves rubbed quite smooth and bright by pressure and friction of one piece on another. The lode-matter was exceedingly like that from the winze on the North Golden Gate Reef.

It would appear, therefore, that there are veins of quartz running a more or less north-and south course, between the Star of Mathinna shaft and the New Golden Gate shaft. Taking this fact together with the evidence in the New Golden Gate and North Gate mines, it seems pretty clear that the Main reef of the former, if not Loane's reef as well, continues on a more or less north-and-south course. The various veins are probably similar to those met with in the surface strata of the New Golden Gate ground, which, it will be remembered, became solid reef at a lower level. Cross-cuts ought most certainly to be driven from the Gate Extended and Star shafts right across the line of these surface veins. It would be safer not to open out however above, say, the 200-feet level. It would be advisable also to cross-cut north-east from the Gate Extended shaft to cut the lodes seen in the old Caledonian adit to be mentioned presently.

A great many quartz veins have been found on the spur shown in Plate 9, and it is evident that it will be necessary to do a lot of work before it can be seen whether there are two or more main lines of reef, or simply numerous disconnected veins. The largest masses of quartz are those formerly worked by the old Caledonian Company on Sections 204-83 and 11-87G, now held by the New Golden Gate Extended and Golden Ladder Companies respectively. The adit put in by the old Caledonian Company and extended more recently is shown in Plate 9, and deserves considerable attention. What appear to be three closely parallel reefs have been exposed on surface by trenches, composed of from 18 inches to 5 feet wide of quartz. Old stopes 18 inches to 5 feet wide are still to be seen from which the quartz was extracted and crushed. The most distinct of these gives a course N. 75°W., and dip northerly of 73° for the reef, but, as shown on the plan, stone runs rather irregularly, though on the whole about N.W. and S.E. The quartz is said to have yielded payable returns for a time. In the adit country slate is passed through for 89½ feet, when we come to a wall crossing the drive on a N. and S. course, and dipping westerly 70°. Six feet further on there is another striking S. 30°E., and dipping westerly 68°. At 135 feet another wall is met with striking S. 20°E., and dipping the opposite way to the others, namely to the N.E. at an angle of 64°. In the roof of the drive the lode-stuff, broken clayey matter, and quartz, is pretty continuous between the first and last of these walls, but in the floor between them there is a mass of pretty solid-looking country rock. The lode-matter seems to form a sort of saddle reef over this piece of country. I take it all to be one formation from 89½ to 135 feet. This reef does not appear to have come to surface at all, and I am therefore inclined to regard it as portion of the flat reef seen further in. At 143 feet a large reef is met with consisting mostly of broken clayey country rock on the footwall side, but nearly all quartz towards the hanging-wall. The footwall strikes N. 20°W., dipping N.E. 70°, and the hanging-wall has strike N. 18°W., dip N.E. 72°: the

PLATE 9.

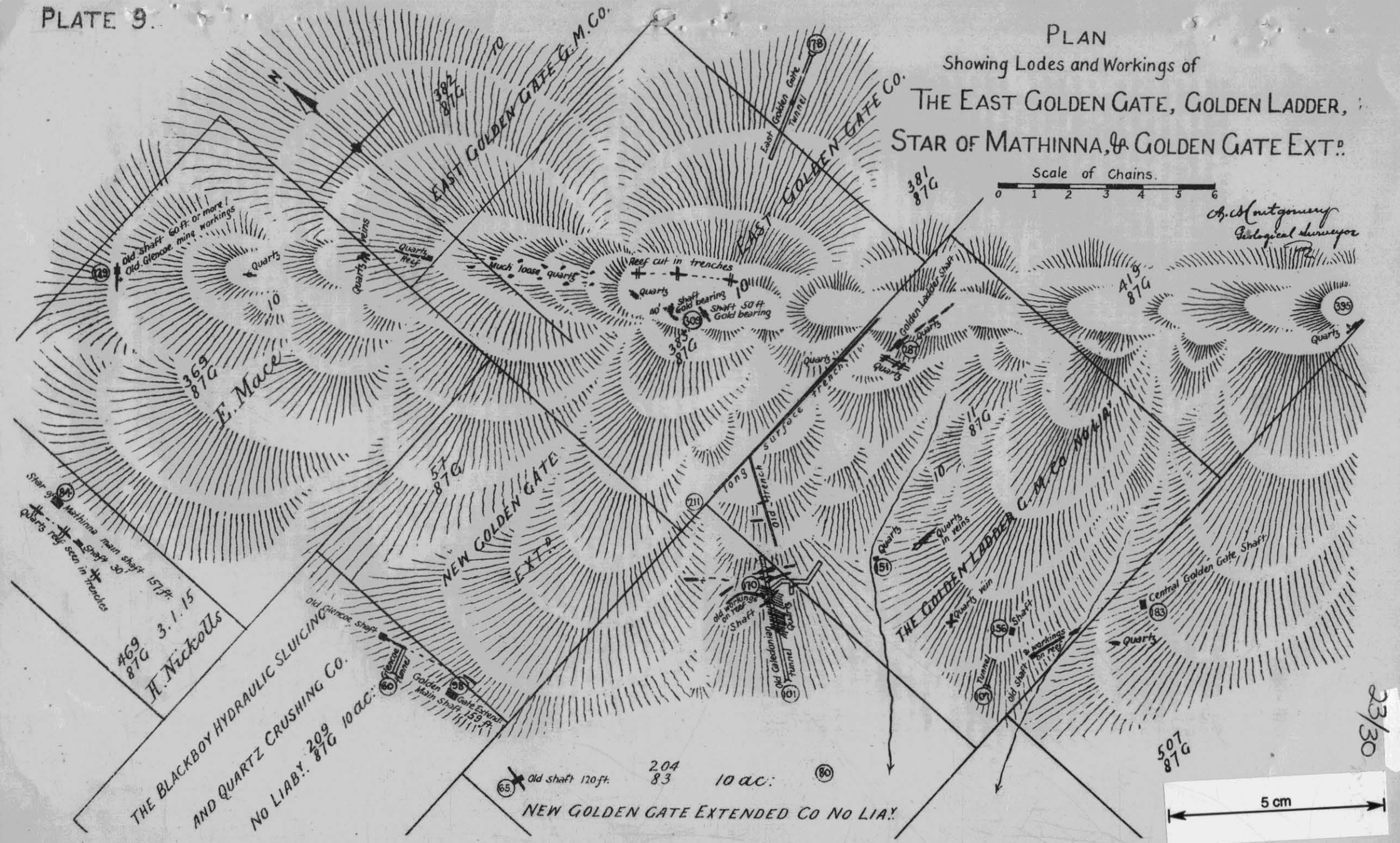
PLAN

Showing Lodes and Workings of

THE EAST GOLDEN GATE, GOLDEN LADDER, STAR OF MATHINNA, & GOLDEN GATE EXT.ⁿ

Scale of Chains. 0 1 2 3 4 5 6

A. Montgomery
Geological Surveyor



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latter was cut at 169 feet from the entrance to the adit. A shaft had been sunk from the surface workings on this lode, but is now walled up, and I cannot therefore say if it went deeper than the adit, or if there were any workings from it. At 191 feet in another reef is cut, striking N. 45°W., and dipping S.W. 78°. It consists of from 12 to 18 inches of quartz, and appears to be one of the reefs seen in the trenches on surface: from its underlay it should join the shaft reef at no great depth. Between the latter and it, and apparently cut short off by both of them, there may be followed along the sides of the drive a flat vein of quartz from two feet to four feet in thickness, which sends off numerous stringers into the country. This flat vein waves about very much, being now in the roof and again in the floor. The saddle-shaped reef first met with in the adit is probably a part of it where it makes a more sudden bend than usual. Between the reef cut at 191 feet and another at 203 feet the flat vein is not seen, being most probably either above the roof or below the floor of the drive, but it is seen again past the latter in the end of the adit. Between these two reefs the country rock appears but little disturbed, and the beds of slate are well marked and strike N. 30° W. dipping N.E. 86°, thus conforming to the general strike and dip noticed in other parts of the district. The lode at 203 feet strikes N. 55° W. and dips N.E. 70°, or in the opposite direction to the one preceding it: it has been driven on six feet to the north-west and 14 feet to the S.E. The lode-channel is from three to four feet wide, and is mostly filled with mullock containing strings of quartz: on the east side of the drive, however, there is about four feet of quartz on the hanging-wall. The footwall portion consists of two smooth greasy black walls from eight to sixteen inches apart, with soft clayey mullock between them. Both this and the preceding lode if they keep their course must shortly run into the main lode, and the turn of the surface workings towards the west very likely indicates the point of junction.

Leaving the adit at the hanging-wall of the shaft reef, a drive has been extended a little south of east into the Golden Ladder Company's Section. This has followed the flat vein, which is very much crumpled and irregular along its course. It appears in places to be sending a more or less vertical offshoot up into the roof, and is generally from a foot to 18 inches in thickness. At 76½ feet from the adit a quartz vein two to six inches in thickness runs north-easterly across the drive: it dips S.E. about 83°, and at 94 feet a winze has been sunk 60 feet on it by the Golden Ladder Company. At 82 feet a clayey head running N. 25° W. and dipping N.E. 83°, apparently a bedding plane of the slate country, cuts off the flat vein, but traces of it reappear further along the drive. If this were extended a little further it would cut the two lode formations met with at 191 and 203 feet in the adit. The flat vein, or blanket vein as such are often called, is a feature in these workings not very commonly met with. It must be older than the more vertical lodes as these cut distinctly through it and fault it. It has been a very troublesome vein to follow, and appears to have diverted attention from the more promising true lodes. A somewhat similar flat vein has been found in the Jubilee mine, as will be described further on.

The shaft reef is a strong body of quartz, and was auriferous in the upper portions; the other two lodes further north-east in the adit also appear to be well defined fissure veins; there seems to me, therefore, every reason for following them downwards. Their appearance is quite as promising as is that of Loane's reef or the Main reef of the New Golden Gate mine at much about the same level in the surface adit. Cross-cutting to the north-east from the New Golden Gate Extended shaft would probably cut the line of reef in not more than 360 feet, but I think it would also be well to sink a deep winze on the stone itself from the adit. With a good shaft already in existence not more than 600 feet away in a direct line from the old workings, it would not be worth while to sink a fresh one near the mouth of the adit to prospect these reefs, as the work could be better done by cross-cutting them from the main shaft and then driving along the lode-channel at not much greater cost. This appears to me to be work which has a very fair chance of a successful issue, for all over this spur veins of auriferous quartz have been obtained from time to time, and there cannot be the least doubt therefore that the country is favourable for gold.

In the Golden Ladder Company's Section 11-87G some quartz veins have been cut on surface very much on the line of the outcrop of the above reefs, but no work except very shallow trenching has yet been done on them. It may be remarked that there is a considerable likelihood that there is a junction of a north-north-westerly lode, with one or more running north-westerly at the old working, as a short drive S.W. from the drive on the flat vein, shown on plan, has proved that the main reef on which the shaft is sunk, has not turned back to a south-easterly course inside of 40 feet from the adit, at any rate, and is therefore likely to continue on much the same bearing, S. 18° to 20° E., as where passed through by the adit. The veins of quartz in the S.W. corner of 11-87G are not unlikely to be leaders from this main reef. The old shaft and workings shown here on the plan were also made by the old Caledonian Company, and are said to have yielded some very fair quartz, but are not now accessible. The workings were about 40 feet deep near the old shaft, but got shallower going towards the little creek. Where the line of reef crosses the latter there is a great deal of barren quartz exposed for a width of about 18 feet. A shaft has been sunk on the line of this reef, known as the Central Golden Gate shaft (not working at the time of my visit), but no quartz appears to have been yet got in it. Lower down the hill, however, in an old trench can be seen a lode about 5 feet wide of broken slate and rubbly quartz underlaying to the north-east, which is probably a branch from the same line of lode. A small prospecting shaft has been lately sunk by the Golden Ladder Company, and a short tunnel driven as shown on plan, but work on these had been abandoned without any discoveries of value having been made so far as could be seen. The tunnel is probably to the north of the line of reef worked in former times, and therefore will not cut it at all.

On the top of the spur, about the middle of the south boundary of Section 419-87G a lode has been cut in a shallow pit, which contains some gold, and has a very kindly appearance. As far as can be judged from the very poor exposure presented, it runs about W.N.W., and may, therefore, be connected with the north-western line of reef seen in the Old Caledonian adit. Some work will have to be done, however, before its course can be even approximately made sure of.

Along the crown of the ridge running through the centre of Section 383-87G, several gold-bearing veins of quartz have been discovered, and a little desultory work has been done. The Golden Ladder Company have sunk a shaft (full of water when I saw it), and made several trenches on some quartz veins shown on the plan. These do not appear to form a well-defined reef at the present elevation, but may come together when solid unaltered country is met with at a depth. In the shaft from 2½ to 3 feet in

width of rubbly quartz may be seen, running nearly E. and W., and dipping northerly. Very good prospects of gold are reported to have been obtained while sinking. The direction of the veins on surface is a little to the north of west, but they have not been cut in a long trench run from the N.W. corner of 11-87G to the crown of the ridge, except in one spot, which would give north-west as their general direction if the stone cut in it were the same as that in the shaft. In this long trench the country rock has been thoroughly laid bare, and there is very little chance of any veins of quartz worth mentioning having escaped notice.

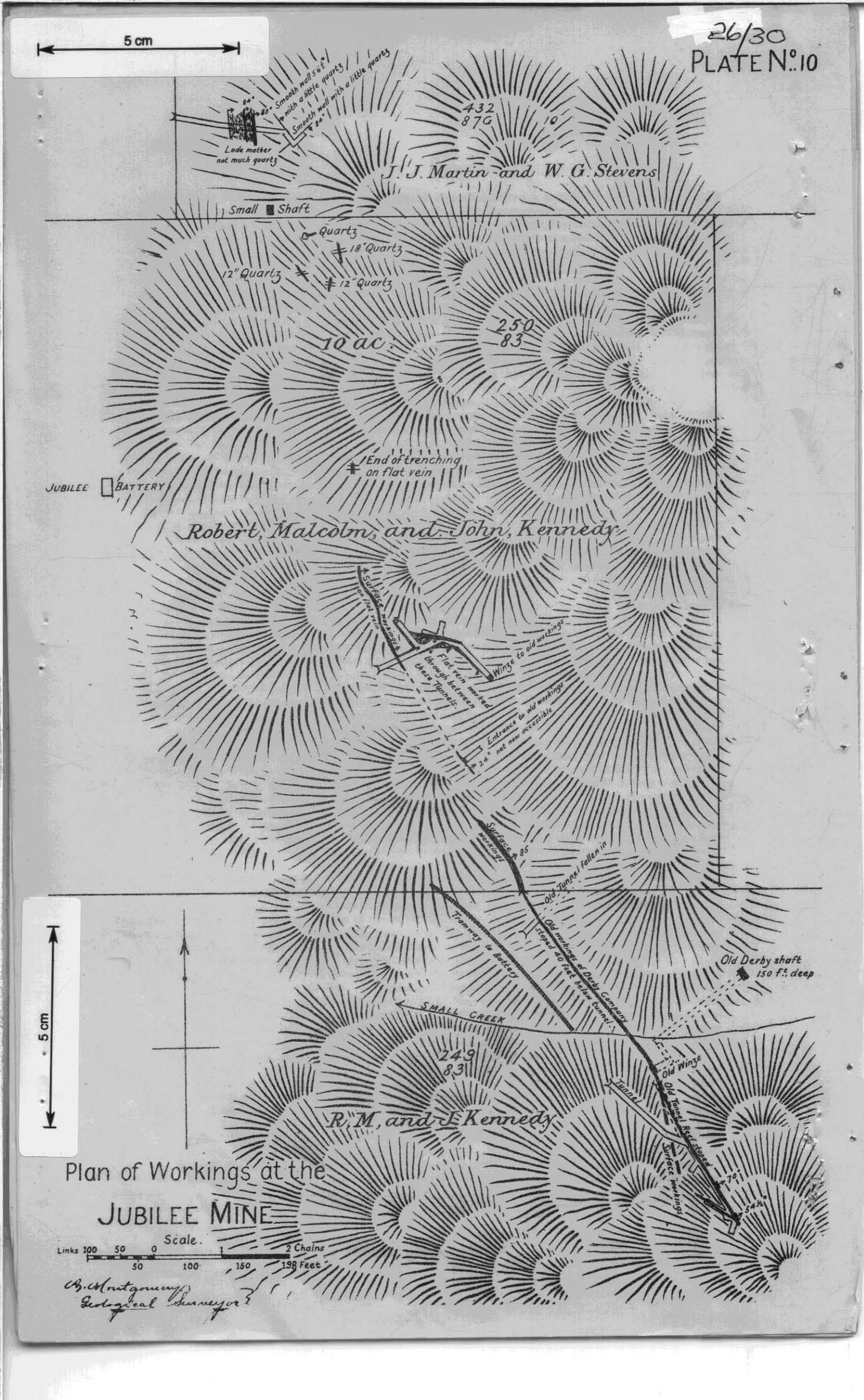
Section 383-87G is one of several held by the East Golden Gate Gold Mining Company. Two small shafts have been sunk in it right on the top of the ridge, on gold-bearing veins; but the course and underlay of these is not at all well defined as yet. There appears to be a line of reef running along the spur, nearly N.W. and S.E., for a great deal of loose quartz is strewn all along this line, and veins of quartz have been cut in several trenches all running more or less along it. It is probable enough that the Golden Ladder veins last mentioned also belong to this lode system. Remembering that the outcrop of Loane's Reef is a very similar mass of irregular leaders interspersed through country rock, there is a considerable chance of there being a strong reef below here also. To test this an adit has been begun by the East Gate Company, but will have to be carried 200 or 300 feet further before it will reach the probable line of lode. It is very doubtful if this adit will be of any use when put in, as it appears necessary in this district to attain depth before the lodes can be found solid and undisturbed, and instead of continuing it I think it would be better to sink a shaft and cross-cut to the reef channel. A deep cross-cut, from side to side of the hill, from such a new shaft to the New Golden Gate Extended shaft, would not be a very heavy undertaking for the two companies concerned, the distance being very little over 1000 feet, and would be a most valuable prospecting work. By arranging to begin driving from the East Gate shaft to cut the supposed lode under the ridge, and from the Golden Gate Extended shaft to cut the reefs seen in the Caledonian adit, at the same level in both cases and along the line connecting the shafts, each company would perform a piece of prospecting very necessary to be done in its own ground in any case in such a way that the unknown piece of country lying between the two lines of reef could be rapidly and easily prospected afterwards by extending the drives.

Near the north boundary of Section 369-87G a small cross-lode running N.E. and S.W. was formerly worked by the old Glencoe Company, but I have not been able to learn with what success. The old underlay shaft appears to be over 60 feet in depth, and the stone seems to have been from 18 inches to 3 feet in thickness, according to the width of the old stopes. If this lode continues it should join the Star of Mathinna reef near the main shaft.

Golden Stairs Mine.—This is another of the old mines formerly worked in small way near the surface which has been lately reopened. The reefs are found in Sections 253-87G and 386-87G as shown on the General Plan, Plate 1. A main shaft has been sunk to work the reef on which the old Royal Standard Company formerly operated. The old workings consisted of two shafts, 53 and 30 feet deep respectively, sunk on the reef, and between these the ground was stoped to surface, it is said with very good results. Another old shaft 2½ chains further north appears to be a shallow one, and to have had no stoping done from it. To the northward from this the reef has been traced by trenches for several chains, till the covering of superficial alluvial matter became so deep as to interfere with its being traced further. The outcrop is generally rubbly and rusty quartz with much clayey matter. South of the old workings 1½ chains the reef has been traced to a point where it junctions with another smaller one running more to the north-west, which has been found again in a trench 5 or 6 chains away; south of this junction it does not appear that any sign of the reef has been seen. It is said that £1500 worth of gold was got in the shallow alluvial workings north of the shaft, much of which was little water-worn, and may have come from these reefs. While the alluvial work was in progress, another reef running east and west was discovered, and worked for over a chain along the surface, yielding good gold in the capping. This was known as the Welcome Stranger reef. Specks of gold are even now to be seen in occasional pieces of the rubbly outcrop. A small shaft was sunk some 45 or 50 feet, and a drive put in to cut the reef, but was unsuccessful in finding gold, whereupon further search was promptly abandoned and the shaft allowed to fall together.

The main shaft of the Golden Stairs mine is east of the old workings, and has been sunk 165 feet; it is 11 feet by 4 feet in the clear. At 150 feet a cross-cut has been driven S. 72° W. to cut the reef; this had only been advanced 58 feet at the time I saw it. The shaft was sunk in slate country, but the cross-cut at 28 feet struck sandstone, and from there onwards the rock was alternate bands of slate and sandstone underlaying 1 in 4 towards the shaft or north-easterly, and striking N. 35° W., thus having the general strike and dip of the district. Since my visit the reef has been struck, and the manager, Mr. W. G. Stevens, has kindly sent me the following particulars:—"Since your visit here we have extended the cross-cut west a distance of 40 feet, the last eight feet of which passed through a formation 8 feet wide, gold-bearing from wall to wall. Where passed through in cross-cut the formation was composed of one foot of stone on footwall, 4 feet of sandstone and quartz leaders in centre, and two feet of quartz and one foot of flucan on hanging wall. We have driven 40 feet north on lode, and the footwall portion of lode has varied from 1 foot to over 4 feet in thickness. The mixture of sandstone and quartz, and the hanging wall quartz have cut out. The lode seems to be composed of makes or splices of stone. The lode so far has proved far wider and richer near bottom of drive than elsewhere, which leads me to think we are near the cap of a large payable body of stone, consequently I have recommended the sinking of shaft another 100 feet, which ought to test it.....I may state the lode is trending nearly north and south, and has an underlay of 2½ feet in 6 feet west."

It may be worth noting that this lode is on much the same course, underlay, and line as the western branch of Loane's reef passing through the North Golden Gate mine, and that this line, if continued southward, passes a little east of the South Gate shaft near where the mullocky lodes were cut, and still further south comes fairly upon the line of the Jubilee main reef. These need not necessarily be connected, but all the same this line should be well prospected in case the reef is continuous right along it. Even if not altogether continuous it is probable that lodes will be found off and on along this line.


5 cm
26/30
PLATE No. 10
Smooth wall 5 ft
with a little quartz
Smooth wall with a little quartz
Lode matter not much quartz
432
87G
10
J. J. Martin and W. G. Stevens
Small Shaft
Quartz
18" Quartz
12" Quartz
12" Quartz
250
83
10 ac
End of trenching on flat vein
JUBILEE BATTERY
Robert, Malcolm, and John Kennedy
Surface workings on flat vein
Flat vein worked through between these Tunnels
Winze to old workings
Entrance to old workings 24 not now accessible
Surface workings
85
Old Tunnel fallen in
Tramway to Battery
Old workings of Derby Company stoped 40 feet below Tunnel
Old Derby shaft 150 ft. deep
SMALL CREEK
249
83
Old Winze
Tunnel
Old Tunnel Reef stoped
Surface workings
70
54½
R. M. and J. Kennedy
5 cm
Plan of Workings at the
JUBILEE MINE
Scale.
Links 100 50 0 1 2 Chains
50 100 150 198 Feet
R. Montgomery
Geological Surveyor

Golden Spur Mine.—This had been shut down for some time when I visited the District, and I could not examine the workings in consequence of their being full of water. Very little is to be seen on the surface. The main shaft, over 100 feet deep, 10½ feet by 4 feet in the clear, is situated in Section 333-87G. It was sunk on a vein of gold-bearing stone from which fair prospects were obtained. The same vein has been traced to the south-east into Section 404-87G, where, however, it is very small, only ½ to 2 inches wide. The walls are pretty well defined nevertheless, and dip S.W. 64°. It seems very possible that this is a leader from a main reef further east. On Section 356-87G a prospecting shaft has been sunk close to the cemetery, about 100 feet, to further test the reef seen in an old shaft known as Moore's, which is close beside it. This old shaft was some 60 feet deep, and some stoping was done from it, the quartz being said to have been payable. The strike of the reef, as far as ascertainable from the old stopes, is S. 30° to 35° E., and it has a very slight underlay eastward. The old stopes are about 2 feet wide, and the walls are well defined. I am not aware if any driving was done from the new prospecting shaft to cut this reef below the old workings; if not, it seems worth doing. If the reef continues on its course it will run into the New Golden Gate ground at the western reef, and it is therefore not unlikely that these two are identical. The line joining them is worth a trial.

Jubilee Mine.—The lodes and workings of this mine are shown on Plate 10 as far as I was able to enter them, several old drives being now fallen in. The workings are on Sections 249-83 and 250-83. The ground was formerly worked by the old Derby Co., who were successful in obtaining some very rich quartz in their main reef in the north part of 249-83. They worked from the surface downwards and drove south into the high hill in the southern Section, and later on sunk a main shaft to a depth of 150 feet, and drove from it to the reef and along the latter to connect with a winze sunk from the workings above. The reef was, however, poor and much broken at this part, and work was soon abandoned. The timber was unfortunately drawn from the upper part of the old shaft, and it would probably now be rather difficult to repair for the purpose of further exploring the reef as ought to be done, the former trial having been a very insufficient one. The old stopes went about 40 feet below the tunnel shown on the plan; the stone was small, about 7 or 8 inches wide only, but often very rich, but got too small and too much broken to work, and was therefore abandoned. In the end of the tunnel a vein of quartz comes in from the north-west 12 to 15 inches wide, but very poor in gold, dipping 82° to the south-west. At its junction with the main reef a winze has been sunk in which a large and strong body of quartz 5 feet wide is visible. In another winze further back along the drive the main reef is from 8 to 12 inches wide; in both it is very poor. Seeing that this reef has been a rich gold-bearing one in parts, and appears to be making into a strong mass of quartz in the south end, it deserves further prospecting. This would now be best done at some depth, from a main shaft. The possibility of this reef being part of a line of reef running through the South Golden Gate, New Golden Gate, and North Golden Gate mines and on to the Golden Stairs has already been referred to above.

A party of tributors have lately traced this reef a little further north by means of a deep trench and shallow drive along its course, but it is both narrow and poor in gold. These appear to be the last workings north on the true Derby reef, which, I take it, has nothing to do with the flat reef found a little further to the northward. As will be seen from the Plan, the main reef probably lies to the west of the two tunnels put in on the flat reef, and therefore has not been intersected by them. The outcrop of the flat reef happens to be almost on the same line as that of the Main reef, but I do not think there is any other connection between them. The flat reef has been a good deal worked; it is very much like that found in the old Caledonian tunnel previously described, dipping and rising into very irregular hollows and hills, and sending off strings of quartz into the country in much the same way. It has been gold-bearing, but not rich, and a good deal of quartz has been crushed from it. The difficulty of extracting the stone from so undulating and flat-lying a body, and of knowing where to look for it if lost sight of for an instant, are greatly against much mining being done upon it. In my opinion the best work for this property to take in hand is to try to trace the main lode north and south, and sink a main shaft to test it at lower levels.

There is a small battery on this mine, the crusher used being a Huntingdon mill. The tributors had been burning the quartz to render it more friable, a fact which confirms the local opinion that this mill is not altogether successful in dealing with hard quartz. The plant is sufficient for testing purposes, which is all that is required in the present position of the mine.

Section 432-87G.—The work done on this section is also shown on Plate 10. A good many veins of quartz are seen about the surface, and a small shaft has been sunk a few feet where shown on plan, but the only work of any consequence that has been done has been the driving of an adit, known as the City P.A. tunnel, from the western boundary of the section. At 53½ feet from the entrance a soft mullocky lode was met with and driven through for 26 feet. Two distinct smooth walls, one of them the hanging-wall, are seen, which agree in giving the strike of the lode as N. 5° W., and its dip as 83° or 84° to the eastward. There is a good deal of quartz mixed with the mullock and pug, but no gold was found in it, though it contained a good deal of pyrites of favourable appearance. I think it would be worth while doing some more work on this lode to see what it would lead to, for it is not unlike some of the softer portions of the New Golden Gate reefs, and also answers the description of the mullocky lodes passed through in the South Golden Gate cross-cut, and its position is very nearly on the line connecting the Golden Stairs reef with the Jubilee main reef, so that it may prove to be a part of a main line of lode. It would be interesting to trace it southwards and see if it had any connection with the Jubilee reef.

In the end of the tunnel two smooth hard walls, carrying a little quartz and flucan upon them, were encountered, cutting each other nearly at right angles, but apparently not faulting one another. One dips north-westerly 56½°, the other south-easterly 84°. It is very possible that either or both of these may fault the mullocky lode or be thrown by it. The north-easterly one in the face shows about four feet of broken curly slate and soft mullock, and water depositing iron oxide oozes out along the footwall. It therefore closely resembles portions of the Boys and New Golden Gate reefs that are filled with lode-slate. Further developments in this tunnel are likely to be interesting.

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(No. 79.)

Telegraph Mine.—Almost due west from the City P.A. tunnel, on the other side of Long Gully, is an adit known by this name: it has been put in to cut some gold-bearing veins found on the top of the ridge along the boundary between Sections 418-87G and 417-87G, and has been driven 161 feet through hard slate and schist country. No lodes have been cut in it, though several irregular veins and bunches of quartz have been seen, and it will have to go another 260 or 270 feet before reaching the shaft for which it has been driven. This is 55 feet deep, and has been sunk on a vein of rubbly quartz 12 to 18 inches thick, which is stated to have yielded fair prospects when sinking. The vein appears to run N.W. and S.E., and has been traced S.E. some little distance by trenches. All along the spur for some distance north of this there is a great deal of loose surface quartz, and it is rather probable that a considerable northerly reef is yet to be found. No work was being done in this mine at the time of my visit, the failure of the Bank of Van Diemen's Land having been the cause of stopping operations in it, as in several other cases in the district.

Lady Mary Mine.—Sections 411-87G and 408-87G. This mine is situated north-west from Mathinna township and on the opposite side of the South Esk, being in what is called the Dan's Rivulet Gold-field. By road it is about four miles distant from Mathinna. The mine was worked some years ago and abandoned after a very short trial, and is now being again re-opened. A new shaft has been sunk 105 feet, and is to be put down still further before driving for the reef. The workings are near the eastern boundary of Section 408-87G, and about half way from the north and south boundaries. The reef runs N. 53° E. and dips S.E., but there also appears to be a branch dipping away to the north. The old workings consist of an underlay shaft 45 feet deep, from which stoping has been done N.E. and S.W. for a total distance of about 150 feet. At the N.E. end, 57 feet from the old underlay shaft, there is a small shaft about 20 feet deep, in which the reef appears to be bending round to an east and west course, and a little south of east from this, at a distance of 78 feet, a reef has been cut in a prospecting shaft 25 feet deep recently sunk. In this there are about 18 inches of quartz carrying a little gold, but I do not think it is more than a branch of the main reef. In the south-west end of the old workings the stone appears to have got very small. On the north-west side of the workings opposite the old underlay shaft, some quartz running parallel to the main reef at a distance of some 20 or 30 feet has been worked and a few tons of quartz extracted: this shows that the entire lode formation is probably considerably wider than the veins of stone worked, and points to the necessity of frequently cross-cutting from wall to wall. In the underlay shaft the reef is about three feet wide in the south-east end, and underlaying S.E. 1 in 3; in the opposite end there is also quartz underlaying the opposite way which has not been followed. According to the information I received the stone obtained by the former owners from the underlay shaft yielded about eight dwts. of gold to the ton; and in the stopes S.W. from it better quartz was found, some of it yielding over two ounces to the ton when crushed. A good deal of black oxide of manganese is contained in the stone, which interfered considerably with the amalgamation. The amount of work done by the old company was quite inadequate to give a fair trial to the reef, and the results obtained, if correctly reported, are in my opinion quite sufficient encouragement to justify the present owners in re-opening the mine. The country rock in the new main shaft is a soft yellowish sandstone, the solid unaltered country not yet having been reached.

South of the workings there is found over a large area of the surface a great deal of oxide of iron carrying angular pieces, and occasionally distinct veins of quartz which appears to be of a lode character. Owing to very wet weather setting in I was not able to trace this out satisfactorily. It appears to have a trend N.W. and S.E., and will cross the line of lode a short distance S.W. from the end of the old workings. No gold has been found in it. In the main shaft occasional veins of ferruginous matter similar to this have been passed through, which confirm my idea that it is of lode character. When intersected by the new workings it will probably be more clearly visible, and it will better appear if it is worth doing any work on it.

On Section 151-87G a soft lode 4 feet wide of rubbly quartz containing a little gold has been cut to the south west of, and very much on the line of, the Lady Mary reef. A few feet north of this hard quartz with much contained oxides of iron and manganese is seen, but does not appear to be gold-bearing.

On the road from the old Lady Mary battery (removed long ago), to the mine we pass over some alluvial ground which must be an old terrace of gravel deposited when the South Esk had not cut its bed down to the present level. There is a good deal of this alluvial matter about the lower slopes of the spurs, and it is very probable that in parts there will be more or less gold in it.

Very wet weather coming on I was obliged to defer further examination of this portion of the gold-field. A good deal of prospecting is going on, and there are several old claims which in former days gave more or less gold, so there is a probability of good reefs being discovered any day. As in the Mathinna field proper, however, I think that it will be necessary to sink well below the oxidised superficial strata before the lodes will be found to be well defined and permanent.

Some general conclusions may now be drawn as a result of this examination of the Mathinna gold-field. The country rock is highly auriferous, gold having been found in it in every direction, not only in defined reefs but also very commonly in innumerable small veins. The number of well defined reefs is very considerable, and though no line has been traced with certainty over any very long distance, there is reason to believe that this will yet be done in more than one instance. The New Golden Gate, Black Boy, and City of Hobart lines all appear to be fairly persistent in strike. The very commonly heard statement that there are two sets of reefs at Mathinna, one north and south, the other east and west, is seen by a glance at the plan to be very far from accurate, most of the reefs diverging so considerably from the cardinal points as to make it quite misleading. The strike of the reefs does not appear sensibly to affect their gold value, good stone having been found in the New Golden Gate, New Eldorado, Old Boys, Jubilee, City of Hobart, and Lady Mary mines on widely divergent courses, showing that the direction of a reef is no criterion of its gold-bearing capacity. (I may remark here that the belief once very commonly held that reefs running north and south were likely to be richer than those on other courses has long been exploded by facts, though it lingers in existence still along with such curiosities as the notion that all good reefs live on the sunny side of hills.) The observed fact that in the New Golden Gate mine the gold is found almost invariably on a

course east of north, and hardly ever when the reef turns to the west of north, may prove to be a reliable rule in that particular mine, but I do not think is likely to be a general one throughout the district. No one class of country rock, as, for example, sandstone, hard or soft slate, or schist, has yet been proved to be more favourable for gold than any other in this district. In the auriferous quartz, iron, and arsenical pyrites and galena, also sometimes blende, are commonly associated with the gold, and these sulphides appear themselves to be auriferous and well worth saving by concentration. Sufficient development has not been done to establish any rule as to whether the junctions of reefs are here richer than other parts, but there is considerable evidence that such is the case, and as this feature is one very commonly found in lodes elsewhere, it seems advisable to find and well prospect all junctions. The New Golden Gate rich stone is at the junction of the Main and Loane's reefs and not far from the junction of both with the Central reef. The Black Boy mine gave its best gold at the junction of its two reefs, and the gold now being got in the Old Boys' mine is probably not far from the junction with the Black Boy line. The City of Hobart rich stone was also at the junction of two reefs. The New Eldorado and Jubilee rich quartz does not, however, appear to have been near any junction, and the above instances may be only coincidences. The workings of all the mines have shown that in the higher levels the reefs are very generally considerably disturbed, the quartz being of a rubbly nature and liable to be very patchy in gold. It is seen at the same time that the country rock has been subjected to atmospheric influences which have effected a good deal of chemical change, oxidising iron compounds, removing soluble constituents, and softening and changing to clayey matter rocks which at greater depths appear as hard blue slates and schists. There can be little doubt that this chemical change is accompanied by more or less change of volume leading to swelling or contraction of the ground, and resulting in the disturbance of the superficial strata which is sought to be explained. In the New Golden Gate mine the change from the yellowish country to the blue unaltered rock takes place at about 70 feet from the surface in the shaft, and it was not till this level was reached that the reefs became solid masses of quartz. The connection between the superficial alteration of the country and the fragmentary and unreliable nature of the reef in this instance is so marked that it seems justifiable to consider that the same change will take place in other cases also. For this reason I take it that prospecting to be of much value must in this district be at a depth well below the level of atmospheric influence. The success of the New Golden Gate mine in finding solid rich quartz at a depth below a reef formation, which on the surface consists merely of leaders and strings of quartz mixed with clay and country rock, should encourage the owners of such properties as the East Golden Gate, Telegraph, and others, which show large quantities of loose rubbly quartz on surface, to sink deep upon them. A fortunate fact which makes mining from shafts very much easier at Mathinna than in many other districts is that so far as experience has gone there is but little water in the country rock. Neither the old City of Hobart, New Golden Gate, North Golden Gate, or Old Boys' mines have had any trouble with it, and it seems generally easily kept down by baling without requiring special pumps.

The Mathinna gold-field until lately had only been tested in a desultory way by picking out the good stone from the outcrops to a shallow depth. Later experience shows this to have been a very poor trial, as it has shown the outcrops not to be a fair sample of the reefs underneath. With the exception of the old City of Hobart mine, which was worked simply to extract a patch of gold without any exploratory work being done along the line of reef, and so courted disaster, no mine on the field had been tested in a practical way to a depth sufficient to found an opinion upon as to the permanency or otherwise of the gold-bearing stone until the New Golden Gate mine was opened. The work of the Golden Stairs and Old Boys' mines is tending to confirm the favourable opinion of the field given by the New Golden Gate's operations, and I do not doubt that if other mines on the field were opened in a miner-like fashion, the district would become a steady gold-producer. What is most required is that a good working capital should be subscribed to be spent in underground work in each mine, and that the shareholders in the companies should realise their responsibilities as mining adventurers and be prepared to go through with the enterprises they undertake.

Alluvial Mining.—In the lower part of Black Horse Gully and in parts of Long Gully a great deal of alluvial mining was done in the earlier days of the field. I have not been able to get any estimate of the amount of gold raised, or the average earnings per man. The amount of ground turned over is, however, very considerable, and must have occupied a large number of men for more than a short period. Local report says that the gravels were on the whole poor, barely giving average wages to the men engaged. The alluvial stuff is not deep as a rule, few of the shafts being over 25 feet in depth, and most of them much less. The gravel was mined out and washed mostly in cradles, no sluicing having been done. As hydraulic sluicing, if water were brought in, could probably be done for not more than one-tenth of the cost of mining and cradling, it seems possible that the ground, which was too poor to work by the old process, could be profitably dealt with if attacked on a larger scale. This has been done over and over again on old goldfields, so that it may be almost said to be a rule that gravels that have been worked over in a primitive way may generally be treated profitably afterwards by hydraulic sluicing. The question appears to me to be well worth serious consideration, taking into account the cost of bringing in water at high pressure, the disposal of tailings, the area and depth of the ground to be sluiced, the average value of the stuff from surface down to bed-rock, and the cost of working. The quantity of available gravel seems to me to warrant the expense of making the preliminary tests which ought to precede setting to work on a large scale. It would be necessary to sink series of shafts all over the ground to be worked in order to find the quantity and value of the stuff that could be obtained, everything raised from each shaft being carefull measured and washed. It could then be readily calculated whether it could be made to pay for hydraulic working.

On the private land (Talbot's estate) between the Mathinna township and the South Esk, I understand that no mining was allowed, and from the boundary line northward is therefore virgin ground. There is every reason to think that the gravel in this portion of the valley of the Esk, at the mouth of the two auriferous gullies of the Black Horse and Long Gully creeks, would contain a good deal of gold, and perhaps enough to pay for hydraulic sluicing. There must be a good deal of gold in the valley of the South Esk also brought down by that river and Dan's Rivulet, as both of these streams run through proved auriferous country,

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but it is very doubtful if there would be enough to pay for working, the gravel not having been yet sufficiently concentrated by natural causes. There is, nevertheless, a considerable possibility of payable ground being discovered if looked for, and the matter seems to me worth attention. The large amount of water to be encountered in working the river flats would make them difficult to prospect by sinking shafts, and boring with a water-auger or light diamond drill would probably have to be resorted to.

Some years ago, I am told, a survey was made for a water-race to the River Tyne, a branch of the Esk, and it was found that a plentiful supply of water could be brought on to the Mathinna field at a height of over 100 feet above the Esk. The country traversed was reported to be easy, and the estimated cost for a race, from 8 to 10 miles long, was some £3000. I have not been able to get particulars of this scheme, and the above figures may be, and probably are, very inaccurate ; but I believe the main fact, that it is possible to bring in a good supply of water from the Tyne at an elevation sufficient for the hydraulic working of the alluvial ground by means of a race about 10 miles long, through fairly easy country, is correct. The reported estimated cost seems to me much too low. Should any such race be seriously contemplated, the great advantage of a considerably higher-level scheme should be also taken into account, one which should give say 120 feet of pressure at the Golden Gate and Mathinna batteries, so as to enable them to be worked by water-power. The saving of cost by using water-power instead of steam for the battery at the New Golden Gate would be so considerable as to make this matter worth consideration by that company in their own interests alone, without any regard to the alluvial workings.

A strong argument in favour of treating the flats by hydraulic sluicing is that there is a very great probability that by doing so payable reefs would be exposed. Those at present known do not sufficiently account for the gold found in the Black Horse Gully, and there may very well be a reef or several reefs still undiscovered in it.

In concluding this Report, I have to say that the managers of the various mines all took very great trouble to afford me all help in their power, and were personally most kind to me. I have also to thank Messrs. Peter Irvine and James M'Murray for valuable information freely contributed by them, and Messrs. H. J. Wise, Henry Simpson, and William Cundy, for reports and plans.

I have, &c.

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