Memo Re Unwatering Yam Creek

Yam Creek. In 1901 total development was 3757 feet.

In March 1900 the Main Shaft was down 186 feet, and McDonald stopped it and started lateral development. This development continued for the rest of the year, and in December was so far advanced, that the lode 500 feet West had been partly developed on 126 feet level, and the 255 lode had been opened up on the 186 feet level.

In 1902 "only slight progress" was made. The tonnages crushed from development in 1901 and 1902 were nearly equal, totalling an equivalent of 7000 feet or so.

I have assumed that a total of about 8000 feet are and waste was opened up. This is all below water level.

Allowing 6' x 4' openings this would hold - 1,200,000 gallons.

Pump capacity 80,000 gals. per day
Mine Making 56,000  " "  "
Pump gain 24,000  " "  "

\[
\frac{1,200,000}{24,000} = 50 \text{ Days.}
\]

During the "wet" the deciding factor will be the intake from old workings. We have no idea what this will be, because we do not know how old and new workings are connected.

There is a big catchment area on the western side of the Range from say 3000' N. to 6000' N., and a big area of Chinese workings in which intake openings are probably connected by underground stopes.

Estimated Running Costs, Per Week.

<table>
<thead>
<tr>
<th>Wages</th>
<th>£45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three men @ £15 weekly, including overtime</td>
<td></td>
</tr>
<tr>
<td>Fuel consumption 35 H.P. Diesel @ .35 pints per H.P. per hour. - 1.5 galls per hour. Working an average of 140 hours weekly fuel consumption would be - 210 galls.</td>
<td></td>
</tr>
<tr>
<td>Incidentals</td>
<td>35</td>
</tr>
<tr>
<td>Fuel &amp; oil on above figures</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>£90 Week</td>
</tr>
</tbody>
</table>
Yam Creek Gold Mines Preliminary Report.

G.J. Gray  B.E., B.Sc.

Accompanying Plans.

(1) General Sketch Plan of Area included in Leases and Lease applications, Scale 500' - 1".

(2) Sketch Plan of Princess Louise Lease. Scale 100' - 1"
Surveys of these plans were based on Compass and Tape traverses, and the area was examined in detail only enough to determine the general structure, the location of the main reef areas worked, and to assess the possibilities of the area, and of particular parts of it.

Closer examination will be necessary, especially of the northern half.

As most of the significant part of the area is covered with a litter of residual quartz, and with rejects from old surfacing, open cuts and shafts, examination is close and slow.

Location

The area extends from the railway line near Grove Hill Siding for 2½ miles southwards. Grove Hill Siding is on the Darwin to Birdum Railway line at 113 miles from Darwin.

There is a good dirt road from the siding to the central leases.

History.

Abstracted from Reports 9 and 10 of the Aerial, Geological and Geophysical Survey of Northern Australia March 1937, and from earlier Official Reports.

In 1872 gold was found on the Princess Louise Claim. No information is available about the area until 1891, when the Princess Louise was examined by Inspector Parkes for the Northern Territory Department. He stated that it had been worked off and on since its discovery, and gives a figure of 2379 tons crushed, for a yield of 33 dwts. per ton. The date of the yield is not given, but from the tenor of the report it may have been from work by the holder at that time.

During the seventies, and up till 1896, Chinese worked extensively over the area on alluvial and surfacing. Values from the latter they followed down in underground workings to water level, about 50 feet below base level.

I have no record of their production.

Report No. 10 records production from 1894 to 1910 from Battery and cyanidation of current tailings in 1902-3 as -
Yam Creek. Continued.

28,545 tons for 11,639 ounces.

No work has been done since then.

Gold

As to production records generally in the Northern Territory, Report No. 2 of the A.G. & N.A. on the Union Reefs, says that production on Union Reef's prior to 1881 was stated to have been large, but no connected records are to be found, and that from 1884 onwards records are very incomplete.

That was practically true of all the old fields.

Geology.

The rocks of the area can most simply be described as a mixture of slate and sandstone, with slate generally predominant.

Starting at the South end in the Princess Louise lease, these rocks swing in from S.S.W. and run a little West of North to about 3000' N. From there to about 6000' N. they are cross folded. Northward they resume the northerly strike as far as the railway line.

The cross folded area is the most important on the leases, with the widest development of surface workings from 4800' - 5500' N.

Dip of the beds is to the west averaging 50 - 60 Degrees, except on cross folds, and on minor anticlines and synclines.

Cleavage is around N.N.W. dipping very steeply.

Shear Zones.

The whole width of the leases is part of a great shear zone, which judging by the topography extends for a long distance South of the area.

In that shear zone, two component shears, the Western or Princess Louise shear, and the Middle shear carry for the whole length of the reef leases -- nearly 9000 feet.

The Eastern shears, the "Buck Reef" of McDonald and that in Marsh's Northern lease (43B) come into the area at about 5000' N. of a strong crossfold and continue to 8000' N. where the Eastern reef cuts across to join the "Buck Reef".

Over most of their length the shears follow the bedding strike although they cut through folds. They dip, however, at very high angles either East or west.

Ore-bodies.

All the ore bodies are associated with quartz, but all over the area are barren quartz veins and "Blows".
Yam Creek. Continued.

There may be more than one period of quartz deposition. That is usual in most fields.

Owing to the collapse of workings due to heavy rains and annual grass fires, very little of the old workings are visible.

Buck quartz outcrops are visible and their occurrence is probably similar to that of the ore bearing quartz.

In these the quartz spreads out from the shears along other planes, bedding and joints of various sorts.

In the narrow, simple ore bodies around 2000' N., the ore has been worked mostly along the bedding.

In the Princess Louise the main ore bodies follow a particular bed, but they are associated with shears and structural joints.

In the workings on the East line from 6000' N. to 6600'N. individual veins alternate from shear to bedding, both in strike and dip.

All the surface workings indicate a dip to the West below surface. McDonald in his report of May 1901 based on data from the 126 feet and 186 feet levels off the Main Shaft, says the rocks dip West at 50 degrees and the veins dip East nearly at right angles to the rock dip.

Corbett who spent a lot of time in the area and is an experienced observer, says of the West Lode (p.9) that it underlies West at 62 degrees, and consists of a sandstone line intersected by quartz veins dipping Easterly at 40-60 degrees.

The Princess Louise workings are more accessible than others. There most of the workings are on a folded sandstone bed, which has been sheared along N.-S. directions.

The shears dip West at 60 to 85 degrees, and the ore shoots occur at the intersection of N.-S. shears with NNW. - S.S.E. joints dipping East about 40 or 50 degrees. The joint strike is approximately parallel to the axis of the fold.

These intersection shoots dip West and pitch rather flatly North. Judging from the statements of McDonald and Corbett this may be the ore pattern throughout the field, and the west dip may be steeper than that indicated by the upper workings.

Pitch.

The only direct evidence as to pitch is in the Princess Louise and in workings at 3000' N., where the Pitch is North at 20 - 40 degrees.

In the workings at 6000' N., the shoots as seen on the surface would also pitch North.

All the evidence suggests a Northerly Pitch for the Main Shaft Working, but the amount is unknown.
Jam Creek. Continued.

Old Workings.

Princess Louise

A lot of development has been done on this lease, but production has been mostly from the Southern end, in a wide shear zone striking about North - South.

About the centre of the lease this shear zone narrows and continues so to the North end.

The Southern shoots are associated with a bed of sandstone folded into a broad anticline whose axis is N.N.W. - S.S.E. and pitch Northerly.

The shoots are on intersections of N.-S. elements of the shear zone with N.N.W. - S.S.E. Cross joints.

The strike of the latter is parallel to the anticlinal axis, but they dip East at medium angles 35-50 degrees. The shear planes dip West at 60-80 degrees.

Where visible the shoots are separate and pitch Northerly at 20-30 degrees, but those from the Main Shaft Southward are so close together, that they must make a nearly continuous ore body.

Further North they are more widely separated. Inspector Parkes in his 1891 report says, that the Main Shaft cut the lode at 80 feet and followed it down to bottom at 170 feet.

As the shaft appears to be vertical it could not have followed any individual flat shoot.

Parkes gives an output figure of 2379 tons, for an average yield of 33 dwts. Probably that is from the deeper workings on this Southern Section. He also states that the pyritic quartz vein stuff in the shaft bottom yielded 2 to 3 ounces per ton.

About 250 feet North of the Main Sandstone is another strong belt of sandy slate, also on the nose of the anticline.

We took loam samples for 60 feet across this nose, and had gold in all of them.

This area should be closely prospected.

If anything is found there, a shaft just South of it would also catch the pitch of the shoots from the old workings at shallow depths.

Passing North from the Princess Louise another shear component swings in to the leases from S.S.E.

About 2000’ N. the strike turns to N.S. and there is a short run of narrow, shallow workings on the turn. These worked ore on the bedding.
Yam Creek. Continued.

At 3100' N. the shear runs into a cross folded and faulted belt carrying strong quartz outcrops.

From here, there is a wide strong belt of workings extending for about 800 feet North. The openings have caved and been partly filled, but there is evidence of working parallel veins over a total width of 30 or 40 feet. One open cut is over 30 feet wide.

Stoping seems to have gone to water level 50 or 60 feet down.

To the west of these workings on the Princess Louise line in GML 45 B is an area of old surface workings about 850 feet long by 50 feet wide.

There is stoping under this because of prospecting shaft sunk by Teague at 2900' N. hit the back of an old stop at 40 feet. North of here the Louise line runs under an alluvial flat, but at about 4400' N. it is met in workings running N.N.E.

Main Shaft Area

Following the Eastern side of the leases, another strong folded area with abundant quartz comes in about 4700' N. and continues to near 5000' N.

From about 4300' N. northward, there is a wide belt of workings on both the Western (Princess Louise) and the middle shears.

This belt runs to about 5500' N. where is another Crossfold. The surface on the area is covered with detrital quartz and rejects from surfacing, old dumps and the Main Shaft dump.

This area was the one selected for prospecting by the Northern Territory Goldfields of Australia about 1900.

They sank a Main Shaft and did a lot of development from it at 126 feet and 186 feet.

126 feet would roughly correspond to water level on the flat below, where the old workings are.

No plans of the work are available, and the only report is one by Mr. John McDonald who examined and sampled the workings in 1900 and early 1901. He stopped shaft sinking, and started a crosscut at 136 feet level to intersect a North and South reef which cropped up about 500 feet away to the West. This is the Princess Louise or Western Line.

Later he sampled the mine as far as it was opened up at the time.

126 feet level.

The width of "the lode" is 75 feet for a distance of 100 feet. This block, tested by three crosscuts 50 feet apart, consists of a series of barren rock and gold bearing quartz alternately. The latter vary in width
Yam Creek. Continued.

from 2 inches to 8 feet and he estimated the total width of these veins at 15 feet.

Average assay of the ore is 7 dwts.

The country rock is slate and sandstone in nearly alternate layers, dipping to the West at 50 degrees from the horizontal.

The lode also consists mainly of slate and sandstone with quartz veins dipping East at 50 degrees nearly at right angles to the dip of the beds.

136 feet level.

A reef or vein 20 inches was cut in the West Crosscut at 255 feet from the Main Shaft.

This is the "Rich Reef" and averages 2 ounces per ton. The shoot on it was 130 feet long, continuing underfoot. (This is one of the veins in the Middle Shear.)

He says that other rich veins have been proved by Chinese Workings, to exist at distances from a few feet up to 250 feet East of the Main Lode, so that "the lode" on the 136 feet level is apparently the Main Lode or Western Lode 500 feet West of the Shaft.
A crushing of 1195 tons was put through the battery in March 1901, but was not cyanided.

McDonald estimated, that the total yield from battery and cyanide would be 7 dwts. per ton. He says also that a better grade could be got by selective mining.

That depends on the location of the quartz veins, but as he measured only 15 feet of quartz in 75 feet of lode, it sounds possible.

McDonald also pointed out that the Chinese workings on the "Main Lode" extended over a total length of 600 feet, and it may be surmised that his intention was to prospect that length.

Development continued through 1901, and footage for the year was 3374 feet of drives, crosscuts and winzes, plus 382 feet of Shafts. From evidence on the surface I think the shafts were for ventilation, and were deepened Chinese Shafts.

Taking 3374 feet of 6½' x 4½' openings would give 7600 tons of development dirt.

Report No. 10 of the Aerial, Geological and Geophysical Survey of Northern Australia (p.5), gives the following returns from Yam Creek 1901, 2, & 3.
Yam Creek. Continued.

<table>
<thead>
<tr>
<th>Battery</th>
<th>1901</th>
<th>7240 tons</th>
<th>1306 ozs.</th>
<th>3.6 dwts.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1902</td>
<td>6770 &quot;</td>
<td>1230 &quot;</td>
<td>(x) 3.6 &quot;</td>
</tr>
<tr>
<td>Cyanide</td>
<td>1902</td>
<td>3500 &quot;</td>
<td>375 &quot;</td>
<td>(x) 3.0 &quot;</td>
</tr>
<tr>
<td></td>
<td>1903</td>
<td>3315 &quot;</td>
<td>763 &quot;</td>
<td>4.0 &quot;</td>
</tr>
</tbody>
</table>

(x) On figures given should be 2.1 dwt. One of these figures in the Report must be wrong.

The total recoveries agree with those from McDonald’s trial crushing, and also agree with McDonald’s sampling.

Probably the 1901 output was from current production. If so, it agrees nearly with the tonnage from development, so that practically all the development dirt was milled.

Mr. Corbett asked the Mines Department about the 1902 output. Mr. Norman Bell, then Director of Mines, replied (17/9/37), inter alia.

"The 1902 reports mention 6770 tons crushed for 1230 ozs, but there is nothing to indicate where it came from, although I assume that it came from somewhere along the "Big Reef" above the 186 foot level. There seems to be no record of any work below that level -------"

Mr. McDonald originally planned to develop on the 186 foot level, and it is probable, that when ventilation and pumping were satisfactory most of the later development was on that level. If so, the averages from it are practically the same as those from the earlier 126 feet crushings.

There is only 60 feet between the levels, but the consistency is encouraging, because many of the Territory gold values seem to cut out Sharply at water level.

It is assumed that most of the development was done on the Main Lode, possibly because McDonald mentions only the "rich reef" in the Middle Lode. Judging from surface workings there was a wide series of veins in the Middle Lode, and more work may have been done on it than was thought.

Northern Area.

Eastern Line. From 6100' - 6600' N. are old Reef Workings over a width of 50 - 50 feet. Vein dips on the surface are to the East, but the deepest Shaft is on the West side, indicating a Westerly dip. That shaft is said to have te-have bottomed in rich ore, with heavy water at 70 or 80 feet down.

"Duck Lode" was worked in small, shallow areas at bends in the strike.
Yam Creek. Continued.

Main Lode & Middle Lode. From 6200 - 8000' N. are covered with a mass of old surfacing and turkey-bush scrub, and were not examined closely.

7800 - 8500' N. was examined. The survey is taken from Report 9 - 10 of A.G. & G.S. Survey of N.A.

Their assays show values of 11 - 18 dwts. over 2 - 3 feet width in two costeans about 200 feet apart. It is a favourable looking dark Vein.

Northward the shear system runs under old Chinese surfacing and alluvial.

Alluvial Application runs N.N.W. along this flat.

There are patches of old alluvial workings along the Eastern and Western sides of the area, towards the valley flanks, which are low ridges.

Conclusions.

The vital area along the line is that between about 3000' N. and 6500' N. Later work may show an extension of this area Northwards. Probably about 8000 feet of development has been done on it from the Main Shaft, but with the exception of a block West of the Shaft in the 126 feet level, the location of the development is unknown.

It is known that development was done on the 126 feet and 186 feet levels (at and 60 feet below water level). From the tonnages crushed, it is probable that most, if not all, of the development dirt was crushed and cyanided for a total recovery of 6½ or 7 dwts. per ton.

This result confirms the estimate of the value of a block, 100 feet long x 75 feet wide made by Mr. John McDonald, and indicated steady values over the length and depth of development.

The confirmation of the estimate must also strengthen confidence in the general tenor of Mr. McDonald's report. Apparently he had in mind testing the block of old Chinese workings about 600 feet long, on the Northern and Southern extensions of the block he sampled.

Whether this was done in later prospecting can only be determined by unwatering and examining the mine.

As to shallow prospecting, there is an area in the Southernmost Lease, the Princess Louise, which should be prospected on and from the surface.

It is North of existing workings, and is virgin ground.
Yam Creek. Continued.

Summary.

Yam Creek Goldfield was discovered in 1872, and was worked off and on until 1896, chiefly by Chinese.

It was then taken over by the Northern Territory Goldfields of Australia. This Company had large prospecting interests in the Territory, spent much money in establishment and spread its activities too widely.

Apparently it did little work at Yam Creek until late in its career, when most of its money had been spent on other ventures.

The Goldfield occupies a long, wide and strong zone of shearing, with extensive workings at several parts of its length. On the surface, the central area, from about 3000' N. to 6500' N. differs from the rest of the area, in that, it is strongly crossfolded.

The largest and most concentrated workings are in this area. Both shear and cross-structures are strong and will persist in depth.

Prospecting by the N.T. Goldfields Co. was done about the centre of the folded area, and the information available suggests that about 8000 feet of development was done from a main Shaft on levels at and about 60 feet below water level.

Unfortunately the record is very scanty, and there are no plans whatever to indicate the location of most of the work on the levels.

Mr. John McDonald, a leading English Mining Engineer, who directed the early stages of development estimated the value of a block on the 126 feet level, opposite the Main Shaft, measuring 100 feet long by 75 feet wide, as about 7 dwts.

His estimate of values was confirmed by subsequent crushing and cyanidation of the development ore from the block.

He also pointed out, that the Chinese Workings above water level extended for 600 feet along the strike of the block he had sampled.

After his inspection, development continued for a year or so, and the ore from development was crushed and cyanided in 1901, 2 & 3 for a recovery of 6½ - 7 dwts. gold.

In addition to this large area, another smaller crossfolded area occurs in the Princess Louise at the South end of the field.

Here indications are good enough to justify shallow prospecting from the surface, North of the workings.

G.J. Gray.
Our party arrived at Grove Hill on August 9th, 1949.

A rapid compass survey of the Yam Creek area was made to locate the leases, areas of old workings, and the general geological structure.

This showed that there are large areas of old Chinese workings and that these are located on four strong shear zones which themselves are components of a major shear zone extending over the width of the leases. The largest and widest workings are in the central length of the leases where the rocks are cross folded over the whole width of the main shear zone.

The fold was worked intermittently from 1872 till 1896, by Chinese mostly. It was then taken over by the Northern Territory Goldfields and prospected from about 1900 to 1903.

The only information I have about the company's operations is from a report by Mr. John McDonald, a well known British Mining Engineer in 1901, and from Government reports of output in 1902-3. There are no plans.

A main vertical shaft was sunk to 186' in the central area and development was done on two levels, at 126' and 186'. 126' would be about ground water level, McDonald sampled a block 100' long and 75' wide on 126' level West of the main shaft. It was cut by 3 crosscuts 50' apart and he estimated its value at 7 dwts.-bullion apparently.

Development continued for nearly 2 years after McDonald's report. During the whole period of development, some 8000' of work must have been done.

Most of the development dirt from drives and cross cuts seems to have been crushed. The returns are close to McDonald's estimate. There is no information as to where the work was done. McDonald's programme was for development only, mostly on the 186' level. If it was done it shows that values held for the 60' below water level.

All the surface workings show a strong pitch of the shoots to the North in depth. Until it is possible to co-ordinate the surface workings with those underground, useful prospecting cannot be set out. It is proposed to unwater the workings, etc. and to examine and sample them.

Pomona pump, Diesel Engine, and most of the necessary plant is on hand.

24.7.1950. (Sgd.) G. J. Gray. MANAGER.