BURRA'S MONSTER MINE



Morphett's Engine-house 2009

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BURRA'S

MONSTER

MINE

1845-1981

BURRA

SOUTH AUSTRALIA

INTRODUCTION

This is a story of a great success in the early years of the struggling British colony of South Australia. It is a story that celebrates the lives of those who left their homeland in difficult times to come halfway round the world to a great unknown land, one that had already earned a shameful reputation. Australia was the place chosen by Great Britain to send its undesirables, its convicts in chains, to serve out their lives in penal colonies ruled over by severe troopers. However, this new colony established in 1836, was not a penal colony like the ones at Sydney Cove, Port Phillip, Fremantle and Port Arthur. It was to be populated by those who had chosen of their own free will to come seeking a new life, where one was free of religious persecution; a place that would attract not only Cornishmen, Englishmen, Welshmen, Scotsmen, and Irishmen but also German-speaking Prussians, Silesians and Hanoverians. This high-minded venture almost failed, for want of any useful produce to trade with Britain.

The discovery of copper at Kapunda in 1842 and then along the Burra Burra Creek in 1845 would save this struggling colony. The copper ore from the mines established here would be much sought after resulting in an inflow of capital, technology and labour. The towns of Kapunda and Kooringa would grow to become important centres of employment, to which miners, sawyers, carpenters, stonemasons, blacksmiths, engineers, shopkeepers and caters would migrate. They came from their green homeland and found themselves in a land unlike anything they had ever experienced before; a harsh land of hot waterless summers, a land of dust storms and snow-less winters; a miserable land with few indigenous people and strange antipodean flora and fauna. They left because of poor prospects in their homeland. They came realising there was to be no returning. They came seeking a new prosperity. They brought their skills, their hopes and dreams of a better life. It turned out to be a very hard life in those early years. This was a time when miners and other skilled workers like carpenters, mechanics and blacksmiths were paid £2 a week, carters and labourers 25/-, whim boys 12/- and ore dressing boys 8/-; bread was 1½ pence a loaf, butter 1/4 a pound, boots 13/6 a pair and single-room cottages could be rented for 6/- to 8/- a week.

For the moneyed classes it was a different story. There were some who always had been insulated from the deprivations of the working classes. It was from these came those who would take advantage of the opportunities offered and it would make them very rich men.

The story of the Burra Mine is one of great hardship, of triumph over adversity and of wealth and prosperity to be won. It is one of pride and achievement. The Cornish miners and the Welsh smelters thought themselves to be the best in the world. The handlers of the horses, the wood carters and stonemasons all made their contribution to the working of the mine and left their indelible mark on the landscape. Many would ultimately leave Burra for other mines throughout the colony or move further a field to places like Ballarat, Bendigo, Kalgoorlie and Broken Hill.

May this brief history of the Burra Mine be a tribute to the lives and aspirations of those who went before us and made Australia their home.

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The Early Days

The Discovery

In August 1845, just nine years after the proclamation of the Colony of South Australia, shepherds William Streair and Thomas Pickett discovered outcrops of copper ore in two separate places along the Burra Burra Creek. On reporting their finds to authorities in Adelaide two parties showed an interest and approached the Surveyor General to conduct a special survey of 20,000 acres of land in the vicinity. The Princess Royal Mining Company, the owners of the Kapunda Mine[1], known as the 'Nobs' and the newly formed South Australian Mining Association (SAMA), the 'Snobs' drew lots for their separate claims.

The Mining Gets Underway

SAMA was fortunate in acquiring the half of the survey to the north of Stein Hill, which became the successful 'Monster Mine' commencing operations with a blast of gunpowder in September 1845. The Princess Royal Mine by comparison was slower to get underway and a failure, operations ceasing in 1851.

With Henry Ayers as its Secretary, the Mining Association appointed a relatively inexperienced Samuel Stocks the Resident Director of the mine and Thomas Roberts, an experienced Cornish miner, as the first Mine Captain.

At the outset miners were urgently sought and free passage was given by the government of the new colony for experienced workers to emigrate from Cornwall and later Wales, where employment was scarce. Some of these emigrants were already on the seas at the time of the discoveries seeking a new life half a world away.

Of course, a mine requires far more than miners. A force of supporting workers like carpenters, blacksmiths, engineers, masons and carters came in considerable numbers seeking work and the population swelled. The Mining Company ('Sammie') built offices, a mine store and some houses for mine captains but housing for its workers was in short supply. This was overcome in a rather inventive but predictable way by the miners who dug their homes into the clay banks of the Burra Burra Creek and its tributaries. The first dugout was thought to have been dug by brothers, John and Robert Collins, in the summer of 1845-46 and when others followed soon after, they proved perfect for the conditions, being close to a source of water and providing shelter from the cold in winter and the heat in the hot summers. Being rent-free and easily constructed, they became a popular way of housing the burgeoning population. In 1851 about 1800 people out of a total population of 4000 lived in almost 600 of these dugouts that extended along the creek for about 2 miles.

Creek Street

"The Register", the Adelaide newspaper, reported in 1851 *"this creek with its habitation in the banks on both sides forms one of the most singular spectacles ever beheld. The miners have excavated dwellings like rabbit holes, in lines as thickly under the banks of the creek as they could be placed, a foot or two intervening between them, sometimes merely a mud bank as a division wall."*

These dwellings were often single roomed with chimneys, formed on the bank top, with beer barrels cemented in mud that looked like tree trunks alongside a roadway running along the banks and over the housetops. Some of these creek dwellings were home to as many as three or four families. These 'rabbit burrows' being variously constructed, some with mere holes for doors and windows: some with substantial doors and even glazed windows: a few have shingled verandahs and many were whitewashed inside and out, with some papered or carpeted within. Many of the inhabitants had animals like fowls, pigs and goats housed in pens at their front door. This creek, in which they lived, that may have flowed during the winter and spring, became just a series of rather stagnant pools in summer. The inhabitants relied on the water from the creek for their household needs, damming it in several places. It soon became a repository for the debris of the Mine; night-soil and wash water was emptied there; pigs and goats roamed wild leaving filth in their wake. As can be imagined the sanitary conditions along the creek rapidly deteriorated with many cases of "fever" being reported. All in all it became a most unhealthy place, hardly the place to rear children. In fact the living conditions were, quite frankly, appalling.

[1]The owners of the Great Kapunda Mine were the principal shareholders in the new Princess Royal Mining Co.

Fever

Fever took many different forms here, several proving fatal, as did inflammation of the lungs, inflammation of the brain and the winter damp of the dugouts occasioning congestion of the lungs and croup. As a result the infant mortality rate was unacceptably high, with 153 deaths and 300 births in 1851. Some causes of death recorded at this time are; accidental, apoplexy, bowel complaint, brain fever, breathing difficulties (asthma or pneumonia), burns, childbirth, consumption (tuberculosis), convulsions, cramp, croup, decline (tuberculosis), disease of the heart, dropsy, drowning, dysentery, fever (typhus, smallpox and typhoid fever), low fever, milk fever, hydrocephalus, inflammation, inflammation of the lungs, the bowels, the brain, liver complaint, natural, phthisis (tuberculosis), scalds, spasms, typhoid, typhus, teething, 'visitation of God', whooping cough.

Because there were few vegetables to be had in early Burra, constitutions already weakened by illness would have been further affected by poor diet. The crowded living conditions and poor hygiene exacerbating the situation.

Early Explorations

At the mine during 1845 and 1846, costeaning operations, whereby tributers dug trenches to determine where the ore body lay, yielded rich ore in large pieces, some weighing as much as 2 hundredweight (100kg). It was loaded onto bullock drays and carted via Kapunda to Port Adelaide for shipment to smelters in Wales. This ore was greatly sought after in Swansea because of its purity and the fact that it was easier to smelt than other ores and to begin with it fetched a high price.

The ore body, consisting of rich deposits of mainly blue azurite and green malachite, hydrated copper carbonates, in dolomite host rock, was 70 metres wide and 55 metres deep in a strip between two fault lines, the Kingston and Tinline faults. In places there were also pockets of native copper associated with red copper oxide, which was highly prized.

Initially the copper ore in veins, blebs and nodules was mined with simple implements, a pick and gad, from near the surface by 'tributers' paid a percentage of the value of the ore they recovered from their pitches. At this time the going was relatively easy and the success enjoyed because of the richness of the ore, drew the attention of the young colony with Governor Robe visiting the mine in 1846. This same interest led to two Scotsmen, Robert Morehead and Matthew Young buying land immediately to the north of the special survey with the hope of winning similar copper ore from their 'Bon Accord' Mine. They reasoned that the lode would extend northward and thought that they might ride on the coattails of what was proving to be a very successful mine. Unfortunately for them, this was to be a rather frustratingly fruitless venture. Eventually they sold their mine and surrounding land, having laid out the township of Aberdeen with streets named after them.

Captain Roach

Mining operations also need to be continuously planned and managed. The erection of buildings, the installation of whims, the harnessing and stabling of horses, the keeping of records and the day to day supervision and organisation of such a large enterprise all require good leadership for a mine to function.

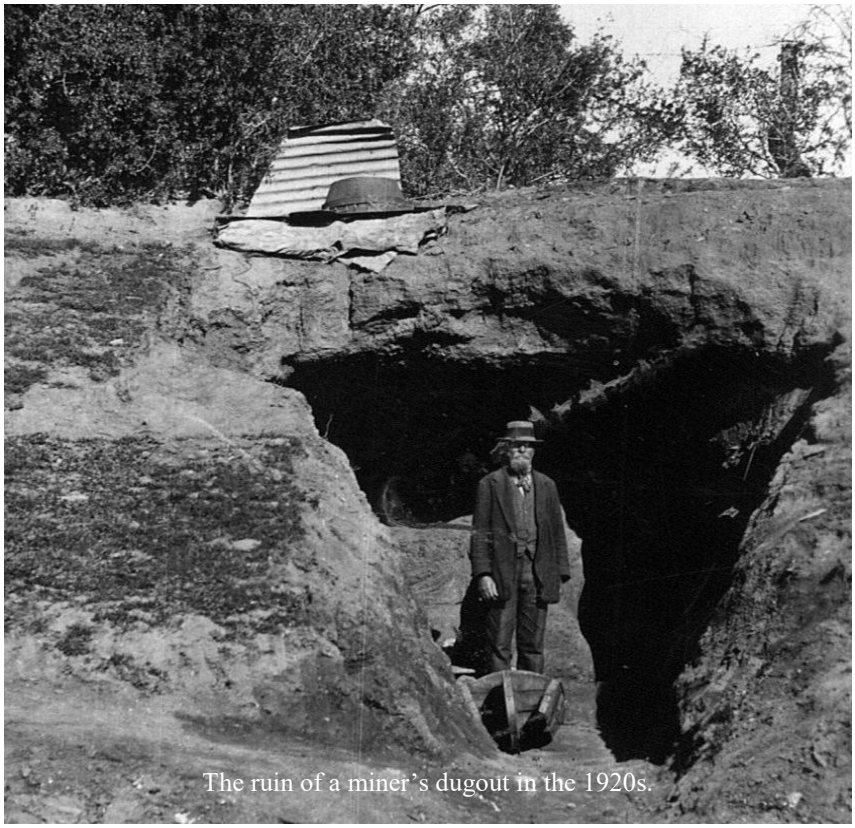
Samuel Stocks, the Resident Director of the Mine resigned his position in 1846 and in 1847, shortly after arriving at the mine, following dismissals of two Superintendents, Henry Roach, an experienced Cornish mine captain, was appointed to the position of General Superintendent of the Mine. Forever known as Captain Roach he was instrumental in the early success of the Mine. He was noted for his mild manner and courtesy and his appreciation of the difficulties of the miners, often representing their concerns to the Mine Board. He was also a good organiser and hard working. He lived on the mine site and was continually inspecting the workings with his Mine Captains.

The mine was worked around the clock with three eight hour shifts one of which was a night shift for six days of the week, with operations ceasing on Sundays. The men were issued with their wages each Saturday when the tributers bid for their underground pitches, much like at an auction, conducted by the mine captains. Up until the arrival of the National Bank in Kooringa in 1859, payment was with promissory notes that were accepted by the local businesses, who in return issued their own notes as small change. At that time, so much money, mainly as promissory notes, and other valuables such as silver, gold and precious ore was stored by miners in their dugouts that the banks of the Burra Creek were referred to as the 'Savings Bank.' Solomon Williams, who at

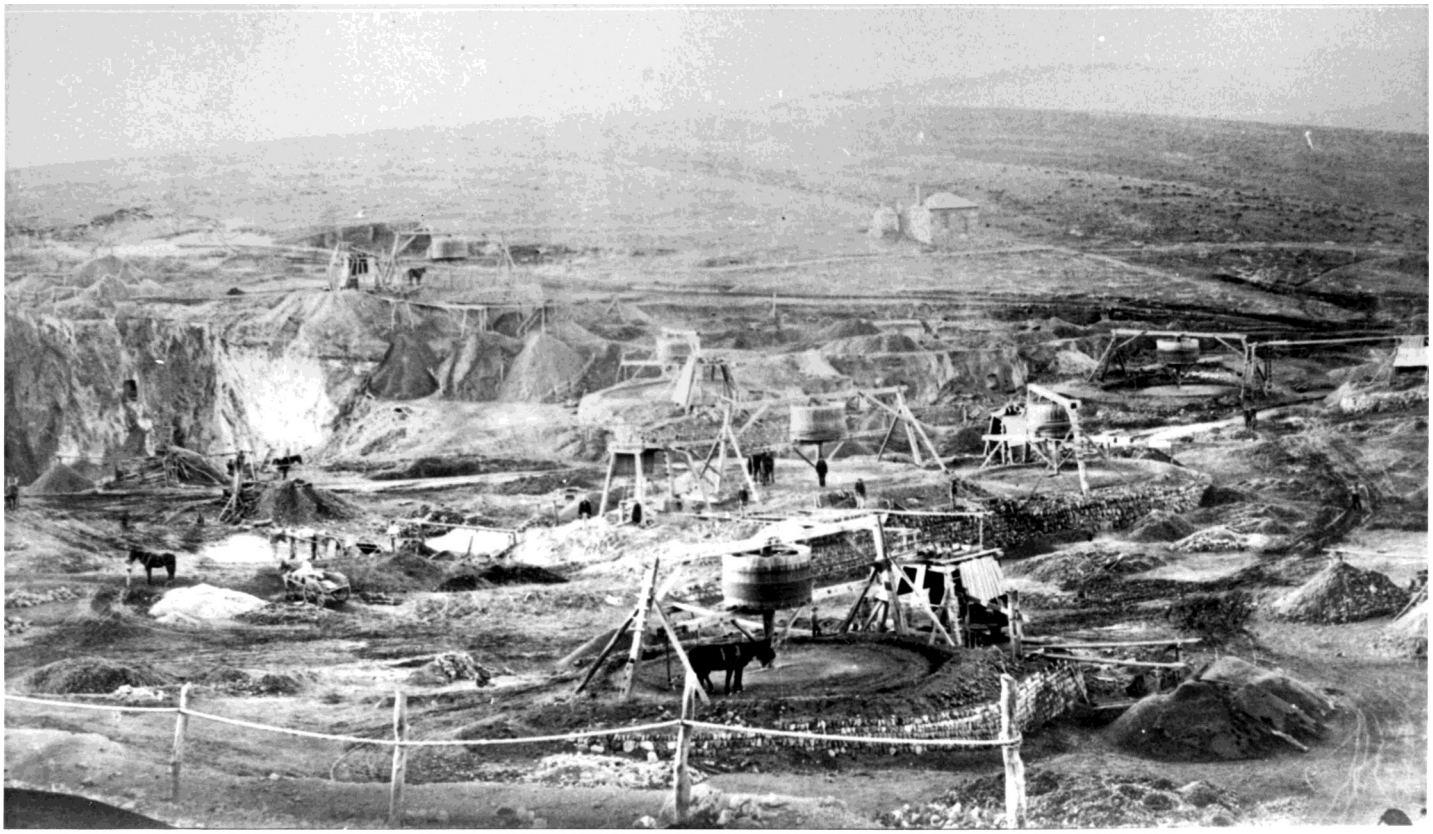
age 6 months arrived in Burra in 1847, recalled a ‘safe’ in his parents’ dugout. *‘There was a hole high up in the side of the chimney breast….that was plastered up with clay and lime washed over so as to appear the same as the rest of the wall and would be hard to find by any burglar.’*
With no freehold property being available within Kooringa, the Government of the Colony was encouraged to layout a new township to the northeast of the mining property, making freehold title available. This new township that was surveyed in 1849 grew from a collection of government buildings like the police station, lockup cells and stables (1847) and the courthouse, to become the centre of government activity. The Cornish miners were pleased with it being named Redruth, a name that derives from the Cornish ‘ridruth’ meaning red ford. Few mine workers took up property here as the prices had been forced up as a result of Sammie purchasing the best land on offer. In 1856 the government built a gaol here on the outskirts of the town that accommodated prisoners from all over the area.

A Handsome Dividend

1848 was the year that the mine paid a dividend of 600% to its shareholders and the total number of mine workers totaled 567 men and boys. It was also the year aggrieved miners also went on strike on two occasions over disputes about the assay results for their ore and the inadequate wages paid by the Company. There was also some unease about the fact that workers were paid with promissory notes issued by the Company. On both occasions, despite Captain Roach’s qualified support, these strikes were unsuccessful and some of the ‘ring leaders’ were sacked. Sadly for the SAMA shareholders this resulted in the Company paying two dividends of 100% for the year 1849.



The ruin of a miner’s dugout in the 1920s.



The photograph above, shows the Mine Flat with a series of seven horse whims hauling ore to the surface. Each horse-whim served a mine shaft with boys controlling the horses and a lander catching and landing the ore from the kibbles as they reached the surface. This entire operation called for great coordination between tributers, below ground and those above. One foul-up could result in ore crashing back down the shaft and the possibility of serious injuries or loss of life. The feeding and stabling of mine horses was of the utmost importance to the smooth operation of the mine. The Company Secretary, Henry Ayers at one stage issued a directive about the care of these horses, which clearly indicated he had more concern for their welfare than that of the miners. With the installation of Peacock's Winding engine, which became known as a 'fire-whim', larger kibbles could be hauled from four shafts independently.



A Cottage Row in Truro Street, Redruth, Burra
This is the type of housing that was provided for mine workers during the mining era 1845-1877. These two-room cottages had shingled roofs, and their interior walls and earthen floors were whitewashed.

The Burra Smelter

World Copper Smelting

At the time of the emergence of the Burra Burra Mine, Swansea in Wales was the centre of world copper smelting, not because it had copper mines, but because it was rich in coal. About 4 tons of coal was required to produce 1 ton of copper, so it was more profitable to ship Cornish copper ore to the coal for smelting. To begin with, South Australia's copper mines followed suit, its ore being treated at Schneider and Co.'s Spitty Smelter at Llwchwr (now known as Loughor).

The Promise of a Local Smelter

The Burra Mine's distance from Port Adelaide cut into potential profits, as enormous amounts of money, an estimated £53,000 in 1848, were outlaid on carting the ore by bullock drays. Taking as long as three weeks for the round trip for a bullock dray to cart 2 tons of ore, the pressure was on to establish a local smelter. In 1847, in an attempt to cut costs, trials for the smelting of the ore from the mine were commenced in April at the mine but were abandoned by October proving to be too costly. Frank Treloar, a Burra historian, described it this way:-

Some months before the visit of the Directors, arrangements were entered into with a Mr. George Ludwig Dreyer, who claimed to have had experience in smelting in Germany, to go to Burra, erect a small furnace there and carry out trial runs to prove if smelting could be carried out in Burra on more extensive lines. The structure was well advanced when Mr. Burr took office. On its completion it was a small furnace which held the charge and a large pair of bellows supplied the blast and driven by a whim worked by either bullocks or horses and when working smoothly and satisfactorily it was supposed to put through eight hundred weight of copper a day.

When Mr. Dreyer declared it ready for a start plenty of hands were standing nearby either ready to help or out of curiosity. Horses were used on the whim and after a run of 22 hours; about four hundred weight (4cwt.) of rough copper was produced. It was then found necessary to withdraw the charge and repair the bellows and fixings, which had suffered, badly by the trial. Several days later repairs being effected, another start was made with much the same results except that the horses were very distressed. More time passed in repairs and still another trial was made but the effort to keep up a constant blast was absolute cruelty to the horses besides shaking the bellows to pieces. This ended any further attempts at smelting under those conditions and just what the experiment cost would be hard to say, but from first to last could be classed a costly failure.

The Burra Smelter

The foundation stone of the smelting works first furnace house was laid by the Patent Copper Co. in December 1848, on land leased from the S.A. Mining Association. Its first furnace was lit less than four months later. When completed in May 1849, this furnace house held a row of eight furnaces each with its own chimney. These furnaces were coal-fuelled reverberatory furnaces that were supplied with imported coal and flux materials transported from Port Wakefield, along the Gulf Road. From 1850 onwards, supplies of ironstone found locally, at Black Springs, were used as the flux material. Local timber was used to produce charcoal to supplement the coal reserves necessary for smelting. The refining house with its three furnaces was completed in 1850.

The Smelting Season

Smelting operations could only proceed during the summer months because during the winter the Gulf Road, which was constructed and maintained by the Patent Copper Co. was subject to flooding, bridges were damaged and the bullock drays often became bogged. Even in summer, flash floods or waterholes drying up hampered cartage operations. The Gulf Road was a series of waterholes found at Gum creek, Kadlunga, Skillogalee Creek, near Clare, Hoyleton, and Dunn's Bridge at Balaklava for the bullock teams that hauled the smelted copper to the nearest seaport, Port Wakefield. On the return trip, bituminous coal, from Wales and later Newcastle was carried back to the smelter. Later another method of using mules imported from Chile to carry their loads in panniers on their backs was tried, with limited success, and later carts were designed for them so that they could move supplies in all seasons.

The Apoinga Smelter

In 1847, as an ever-increasing stream of ore-laden bullock drays from the Burra and Kapunda Mines wound their way to Port Adelaide where the ore was auctioned, most of it going to the Swansea smelters, it became obvious the mines were not receiving a fair price for their ore. Two

South Australians with overseas experience with their own patented copper smelting process, Charles Penny and William Owen, a chemist, began planning a smelter near a forest of peppermint gums known as Tothill's Scrub 20 miles south of the Burra Mine. Here they found an ideal source of fuel for their hungry smelting and refining furnaces, which at their peak consumed 150 loads of wood per week. This became the site of the new Apoinga Smelter. Batches of high grade Burra ore were bought from the S.A. Mining Association and in January 1849 the furnaces produced their first lot of molten copper. This, the newspapers of the day hailed as a 'new era in metallurgy'. In one single process, it was claimed, copper was turned out 'as tough and as fine as any overseas smelter, using up to seven processes.' Later in that year smelting works at Burra and Yatala, near Port Adelaide, came into operation.

At Apoinga, initial production difficulties were soon overcome and by March 1849, a steady rate of one ton per day was achieved. Production increased to 50 tons per week by 1851, with four furnaces in constant use. This operation by then supported a population of 100 living in a village of about 30 houses with a Post Office, hotel, blacksmith, shoemaker and a general store. Apoinga was a prosperous, growing town with a rosy future.

Changing Fortunes

Suddenly, in 1852, the tide of fortune turned. Gold discoveries in Victoria dealt the South Australian mining industry a staggering blow. Miners, farmers, and blacksmiths – practically every able-bodied South Australian man packed his swag and hurried off to make his fortune at the Victorian diggings. Production at the Mine fell and the Burra Smelter closed down. Burra became something of a ghost town.

However, the reduced amount of ore coming from the Burra Mine was enough to keep Penny's Apoinga Smelter in business. His men wanted to leave for the goldfields, but were under contract and he held them to it! Day by day they saw others pass the smelter on their way to seek a fortune. Unrest grew to an alarming degree. At last the men could bear it no longer and dealt with it in a cunning way. When the slag was taken from the furnaces they made sure generous amounts of good copper went to the dump with it. As a result smelting expenses remained high but receipts dropped to a point where poor Mr. Penny was in financial difficulties. The smelter closed and the triumphant workers rushed off to the goldfields.

Some years later when the smelter was re-opened for a short period at Apoinga, a huge lump of copper was found at the bottom of one furnace. It took 18 bullocks to drag it out!



Ruins of the Burra Smelting Works 1890s

The boiler-house is on the far left of the picture with the ruins of stonework housing the furnaces running from left to right. The 80 foot brick chimney is in the distance. The smelting equipment was removed from the buildings shortly after its closure in 1869. All the ore was then taken via Kapunda to Port Adelaide to be smelted there. The stone was removed over the next twenty five years and used for other buildings throughout Burra.



The Mine Store and Residence

This building, which is depicted in one of S.T. Gill's paintings of 1850, dates from about 1848 when the ore was transported from the mine to the Burra Smelter just across the creek from here.



Ruins of the boiler-house at the Burra Smelter 1890s
The boiler supplied steam for a small engine that powered the stamps and a sawmill.



Burra Smelter Ruins 1890s

The brick chimney that served the crusher boilerhouse of the Burra Smelter up until its closure in 1869 dominates this scene. The remains of the flues for the first smelting retorts are shown on the right. These retorts or reverberatory furnaces used charcoal or bituminous coal* burning in a firebox with air drawn through the fuel producing hot gases that passed over the ore held in a separate chamber or hearth, reducing it to molten copper. The waste gases passed up these flues. An even larger 80 foot brick smelts chimney can just be seen on the right-hand edge of this photo.
The black, glassy slag waste that had accumulated in a huge mound over the years was sold off as road building material but much of it was still left, until in 1891 the Burra Slag Extraction Co. contracted to crush the slag and recover any copper residues. Although initial attempts failed, in 1900 with the aid of better crushers, a stamp battery and a small ore reduction plant over the next seven years, 450 tons of copper were extracted. These crushing operations were eventually wound-up in 1902. In 1907, another attempt was made, this time by the Burra Slag Smelting Co. which erected a small furnace on the site, to recover copper from the slag heap. This operation only lasted a few months as a result of the highly siliceous nature of the slag and the plummeting world price of copper.
*At first this coal came from Wales or other British coal mines, but in 1854 it was decided to use coal from Newcastle in NSW.

A Futile Power Struggle

Strike at the Mine

On Thursday 15th September 1848, after miners had repeatedly expressed dissatisfaction with the assayer's determinations of the copper content of their ore and with the wages paid at the mine, the miners imposed a general strike by taking control of the mine and ceasing operations. This act was illegal at the time. The Directors sent to Adelaide for police assistance which resulted in a full-scale party of armed mounted police in the company of the Police Commissioner being dispatched to the Burra Burra. Although the miners were serious enough about their complaints they treated the occasion like a holiday and on discovering eight tributers still working their pitches a group of striking miners were sent below to 'arrest' these 'delinquents'. These obstinate 'blacklegs', as they were called, were trussed back to back on hand-barrows and paraded around the town in a procession of strikers much to the amusement of all who came out for the sport. In fact it was all done in good humour without quarrelling, rioting or any violation of the law. By the time the police arrived three days later, from Adelaide the town was quiet and the miners went back to work two days later. The Directors spoke to a deputation of miners and after agreeing to appoint an assayer to work at the Burra Burra they left for Adelaide. Much to the joy of the miners, soon after leaving the Burra hotel, the Directors' coach overturned throwing them all out onto the road, with some sustaining bruises.

What followed a week later, led to a second more serious strike of the miners. The Directors sent a letter to Captain Roach informing him that all wages were to be cut[1]. This was in a year when the Company had paid its shareholders three quarterly dividends of 200%!

The miners were at a serious disadvantage as there were many miners arriving in the colony at this time and there was a considerable amount of ore at grass around the mine which would enable the Company to continue for some time without the need for more mining underground. The Directors maintained their right to set the wages as well as insisting miners pay for candles, gunpowder and for sharpening their picks.

The Secretary of SAMA, Henry Ayers, was particularly ruthless throughout the whole incident getting agreement of the smelter not to employ men discharged from the mine. And when he issued a directive that those not in the employ of the Mining Association be evicted from their rented cottages in Kooringa, with notices to be served at the premises, many men with families were forced to leave the town. The 400 unemployed miners were being replaced by new arrivals to the Burra and by mid-November men were straggling back to work. Ayers had twenty seven 'ring leaders' tracked down and gave instructions that none of them were to be employed again. This was Australia's first industrial dispute, and the miners were not well organised, but it took until January 1849 for the mine to return to normal with a declaration that the strike was over. The one concession the miners won was to have an assayer employed on site at the mine and not in far off Adelaide. What is significant, however, is the dividend paid at the end of 1849 had been reduced to 100% and left considerable resentment among the miners.

[1]Miners wages from £2 to 30/- a week, carters and labourers from 25/- to 21/-, whim boys from 12/- to 10/- and carpenters, mechanics and blacksmiths from £2 to 38/- a week.
£1 = 20 shillings (20/-) 1 shilling = 12 pence = 10 cents

Steam Power

A 'Wet' Mine and Roach's Engine-house

In 1848 when at the 20 fathom level ground water began seeping into the mine, Captain Roach ordered the first atmospheric beam engine to be installed to dewater the mine. It was a 50 inch engine installed in a stone engine house, with its adjacent boiler house, atop Roach's shaft and began operation in October 1849. Working at full capacity of 4 strokes per minute, it raised 120 gallons of water per minute. It was the first and last Cornish beam pumping engine erected in South Australia, having been transferred to the Bon Accord Mine in 1859 and finally to the Bird in Hand Mine in 1886. The water from the mine was sent along wooden launders to a mine pool and used for the steam boilers and later to drive a huge 22 foot water wheel that powered a sawmill and an ore crusher. This same water was used to wash the ore in the buddle pits and eventually ran into the Burra Burra Creek.

When Roach's pumping engine failed to keep pace with the water in the mine, and the engine-house began to fall down as its foundations subsided, a new larger engine was ordered.

An Outstandingly Successful Year

1850 proved to be an outstandingly successful year for the Mine's shareholders as the dividend paid reached a staggering 800%. It was to be followed by a year in which other events began to exert a significant influence.

A Visit to the Burra Burra Mine

When Thomas Fisher of the Sydney Morning Herald visited the mine in May 1851, he was struck by the amount of activity and the orderliness of the operation. *'You observe an area of from 80 to 100 acres, crowded with stone buildings, covered shafts leading underground, machinery and engine works, engine-houses, store-houses, tanks and dams of water, innumerable sheds of all sizes and countless piles of copper ore of various assorted qualities, in different stages of dressing, lying in almost every direction. If you arrive after six o'clock in the evening, expecting to find all quiet and the business of the day all over, great will be your surprise at the bustling animated appearance of the place.'* On this occasion he counted 11 shafts.

A Burgeoning Mine

By 1851, the tributers had moved well below ground level in their pursuit of fresh veins of copper, digging deep shafts, the deepest being Morphett's shaft reaching 100 fathoms† shortly before the mine closed in 1877. The names of these shafts Stocks', Graham's, Waterhouse's, Ayers', Peacock's, Roach's were those of Company Directors or Mine Officials. The ore was being hauled to the surface in kibbles* using horse whims or capstans. The mine workforce exceeded 1,000 that included tributers, tutworkers employed to shore up the mine with timber and remove the mullock and ton workers, who were paid a fixed rate per ton of ore picked out, separating the ore from the mullock. A further 378 were employed at the smelter, now re-organised as the English and Australian Copper Co. Wood carters were fully employed gathering on average 150 tons of wood daily to feed the boiler furnaces coming mainly from the scrubland to the east of Kooringa.

The mine was a hive of activity with men and boys carrying out their assigned tasks in a kind of vibrant rhythmic cycle. The sheer number of people occupied in this purposeful fashion would have been a most impressive sight to see.

Continuing Fisher recounts; *The first striking object is the gigantic white chimney towering from the summit of the middle hill and carrying the smoke from the different engine flues which run under the surface of the ground towards the middle hill. At the summit of this same hill, also, you will observe a large well-finished stone warehouse, used as a powder magazine. The eye is next caught by a fine lofty stone building, situated about the centre of the ground – the three stories pumping engine house, with the great beam in front steadily working up and down.*

The white chimney on that middle hill is somewhat puzzling because this can only be a description of the flue for Schneider's Engine-house which was completed in 1852. It was of similar construction to the other Cornish chimneys built at the mine except that in order to provide a better draught through the boiler fires, instead of erecting it alongside the engine-house, as was the case with the first pumping engine at the mine, they were erecting the chimney high up on the hill. This

* an egg-shaped steel bucket used to raise the ore † 1 fathom = 1.83 metres

chimney would not have been in use at this stage, but clearly preparations were being made for the new engine on order from Cornwall.
A powder magazine set atop the hill in 1847, well away from the mining activity was essential for safety. Gunpowder was a vital part of the miners' operations as hard rock below ground needed to be blasted away to get at the ore. Tributers were forced to buy gunpowder at 2/6 a flask.
The 'fine lofty stone building' is Roach's Pump engine-house erected in 1849. Its purpose was to dewater the mine from the twenty fathom level and below, being supplied with steam from boilers housed in the adjoining boiler house. These boilers required tons of wood that was gathered by teams of men who foraged the district cutting down the scrub and carting it back with bullock teams to the mine. It was a full time operation as the pumping continued round the clock. This pumping engine ceased operation in 1852 and was removed from its engine-house in 1853 after a new larger 80 inch pumping engine had been installed. This had become necessary for two reasons. Roach's pump engine could not keep pace with the amount of water in the mine and the engine-house was in danger of collapsing as its foundations were subsiding.
The Mine engine-houses were built of stone dug from local quarries and roofed with slate. Burra was fortunate to have excellent stone for this purpose coming from quarries as close as the little township of Hampton and slate from nearby Mintaro, one of the watering places on Gulf Road. Freshly smelted copper was transported along this road to the nearest seaport, Port Henry (now Port Wakefield) on Gulf St. Vincent. What was a lot more difficult to come by, were suitable heavy bed stones on which the beam engines were mounted. Each engine-house was accompanied by a set of timber shears used for the installation and maintenance of the engines and the equipment in the shafts they pumped from.
Thomas Fisher was seeing the mine at one of its high points. Had he come two years later he would have seen a mine left almost idle and unattended because the miners had flocked to the Victorian goldfields in search of new riches.

Schneider's Pumping Engine

Schneider's Engine-house was commenced in 1851 at the top of Schneider's Shaft. Its engine, an 80 inch beam engine, imported from the Perran Foundry in Cornwall, was transported to Burra and installed early in 1852 only to be shut down, in October, that year, flooding the mine. The mine fell idle as miners deserted Burra to go to the Victorian Goldfields. This had been an urgent installation as the water level in the mine was proving difficult to keep in check below the 60 fathom level. When it was restarted in December 1854 it was supplied with steam from three Cornish boilers and pumped almost continuously until 1860 when it was replaced by an even larger pumping engine. During its working life this pump engine raised 9,682,656 gallons of water each week until it was shut down in October 1862. It was demolished in 1867 and its stone was used for the construction of Graves' Engine-house.

One early reminiscence of the Burra Mine described the pumping engines.

"The most important machine on the mine was the pumping engine. When I was only a small boy I was taken in the boiler-house of Schneider's engine and was awe-stricken to see the three great boilers with their terrible fires into which they were cramming still more wood. But I got a proper scare when the firemen suddenly turned on the steam and water taps, they made such a noise. Morphett's engine was erected later and I was older when I was shown over it. The mighty balance "bob" seemed to have irresistible force behind it and the big cylinder encased in wood and packing impressed one as being wonderfully powerful. I liked seeing the bright ironwork with moving rods, up and down movements of handles, the turning of other parts which I cannot name, all seemed perfect in their rhythm and time. And I was told all these movements were necessary to control the valves for steam or control the ingress or egress of steam to the cylinder. It was a marvel of ingenuity and force.

Folk Lore

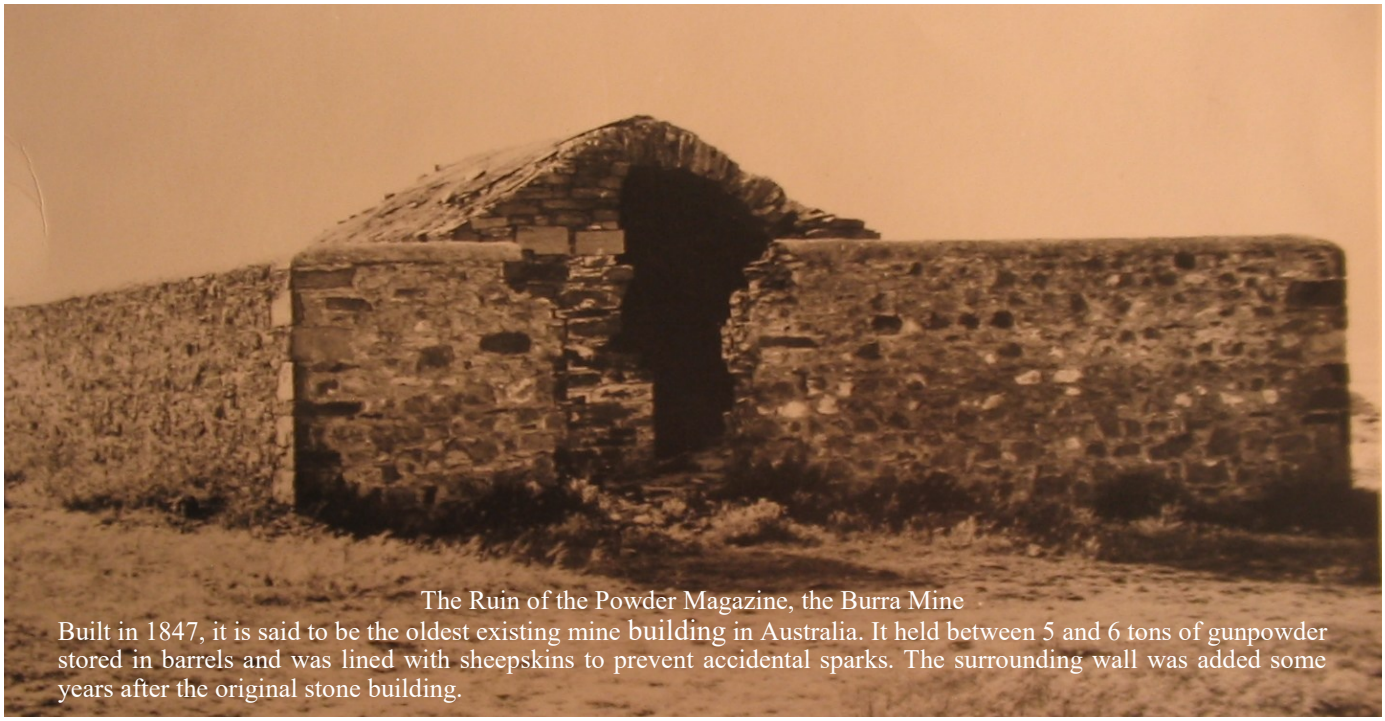
Johnny Green

S.T. Gill's painting entitled the *Surface Operations of the Burra Mine* painted in 1850, shows a figure mounted on the shears in front of Roach's Engine-house. This figure was a life-size effigy

Then we went upstairs and here we saw the top of the encased cylinder with the immense piston rod being forced up and moving the great bob up and down. The bearings and axles on which the bob moved were of great size and strength. Watched from outside the bob came down steadily but rose more rapidly bringing up a great quantity of water, which ran through wooden flumes or launders, as they were called, into the engine pool, filling it up during the night and by a sluice gate it was run out during the day for dressing purposes.
During the summer this pool was used for swimming, but the water was very cold. Nevertheless I have seen many bathers there on a hot evening. I did not like this pool as much as I did the smaller one near the engineer's workshop. This was a warm pool from the engine condensing water. This warm pool was not so deep either and it swarmed with boys who played about for hours with planks and rafts floating therein." Solomon Williams



This very early callotype photograph of the Burra Mine, taken in 1850, shows the first engine house at the site. Roach's engine was installed to pump ground water, discovered at the 20 fathom level, from the drives so that mining could continue. As the mine went deeper to 30 fathoms it soon became obvious that this pump engine could not keep on top of the flow of water into the mine and it was replaced with the more powerful Schneider's pump engine in 1852.



The Ruin of the Powder Magazine, the Burra Mine
Built in 1847, it is said to be the oldest existing mine building in Australia. It held between 5 and 6 tons of gunpowder stored in barrels and was lined with sheepskins to prevent accidental sparks. The surrounding wall was added some years after the original stone building.

The Principle of an Atmospheric Engine

Atmospheric engines worked on the principle that when steam condensed it contracted causing a low pressure inside the cylinder of the engine. When steam was admitted to the cylinder, slightly above atmospheric pressure an injection of cold water into the cylinder caused the steam to condense, lowering the pressure in the cylinder. Atmospheric pressure then forced the piston down to the bottom of its stroke, drawing the beam down. This was the working stroke of the engine, which raised the pump rod connected to the other end of the beam. Because the pump rod was heavier than the piston, it would then drop under gravity, causing the piston to rise to its original position in the recovery stroke. This resulted in steam entering the cylinder again.

The beam was usually made of cast iron and weighed up to 32 tons. The cylinder was also an iron casting encased in a steel steam jacket, insulated by timber cladding. A system of valves enabled an operator to control the number of strokes per minute the engine made.



This panorama of the Burra Mine taken in about 1863, shows some of the many sheds, in the foreground, where the ore was sorted by ton workers before it was taken to the smelter. What is particularly significant, because it dates the photograph, is one of the few images of Schneider's Engine-house at the centre of the picture. It is shown here without its shears and roof and its engine removed. Alongside is its boiler-house and on the skyline behind is its flue. In the background on the far left are Morphett's Engine-houses and to the right is Peacock's Winding Engine-house with a row of poles carrying the hauling cable to two shafts at the far right-hand side of the picture.

of a Cornish miner, holding a miner's pick and gad aloft. It appears that this figure was placed there as part of the celebration of the erection of the mine's first engine house. Whilst such a celebration was common in Cornwall, this figure seems to have been an original idea. In Cornwall there was a tradition of hoisting a small tree to the highest point of a pump-house in celebration of its completion but there is no record of a *'Johnny Green'* in Cornish engine-houses. Known as 'Johnny Green', he became the mine mascot and a legend among the children of the Burra Mine townships. Various claims have been made as to the originator and creator of 'Johnny Green', one such claim being the Green family of Narrogin W.A. The family claims that the effigy is of Henry ('Johnny') Green a Cornish stonemason who helped build the first engine house. The miner's pick and gad in Johnny Green's hands suggests he was a miner. He was, after all, the mascot of the miners.

In March 1855 a visitor to the Burra Mine, writing in the Adelaide '*Observer'* noted: '*The shears above Roach's shaft are standing although the engine has been removed and the figure with its pick and gad still occupies its old place.'*

'Johnny Green' was shifted to the shears of each new engine house on its completion. The first figure being made of wood was short-lived.

The second 'Johnny Green' was made of sheet-iron and proved more enduring having been fashioned by a Burra Mine blacksmith. This new 'Johnny Green' took up his position high up on the 'bob platform' of Schneider's Engine-house soon after its 80 inch beam engine imported from Cornwall had been installed in 1852. William Bentley's painting of 1857 shows him there. '*On approaching the mine, the first object that strikes the eye is Schneider's Engine-house with its immense beam displaying its giant strength from the summit of the building. The engine works at 7 strokes a minute raising each time 136 gallons of water,'* a visitor wrote.

Celebrations for the completion of an engine-house sometimes involved a 'christening' with the drinking of a barrel of ale atop the structure. Schneider's Engine-house was certainly 'christened' with the breaking of a bottle of Champagne over the huge steel beam by one of the Directors of the Company.

The Legend of Johnny Green

Old Burraites, like John Beal, always retained an affection for the miners' mascot, with him achieving legendary status particularly among the young children of Burra. Every small boy knew that at midnight when their house clock struck twelve Johnny came down from his tower and ran around the town checking on children to see if they were asleep. Time, then, to hide under the blankets before he peeped in at the window.

In 1858 the miners shifted their mascot for the last time. It was set atop the shears of Morphett's Engine-house on its completion in 1858, where it stayed for the next 67 years, well beyond the closure of the Mine in 1877.

The Fall of Johnny Green

A spectacular fire in December 1925 resulted in the fall of Johnny Green. At about 11am on Saturday the twelfth smoke was seen issuing from Morphett's Winding house and later residents beat out a small grass fire around Morphett's shaft. However the fire proved to be more serious than was realised and they tried to put it out themselves, before raising the alarm. By 2pm the fire was out of control and fighting the fire became out of the question as both of Morphett's engine houses were in flames. The woodwork of enormous dimensions burned like matches and as there was an immense amount, it took some time to burn. Towards midnight quite a crowd had collected to watch the blazing poppets fall, which supported the platform on which the big pulley wheel was

Events Take a Downturn

Disastrous Floods

1851 was the year in which three floods in the Burra Creek drove the creek dwellers from their homes.

The '*Observer'* Newspaper described these events in this way: '*There were three major floods in 1851, one in May followed by a second greater flood in June and a third a fortnight later. The first of these destructive floods washed through the township of Kooringa, overflowing a tributary creek in the main street and flooding the town's stores.*

In less than two minutes the streets were full of water carrying everything before it, horses, carts, pigs, fences, empty casks, large logs of wood and even a dray floated down the street.

fixed, used when the mine was working drawing stuff up and down the shaft.
On this platform 50 feet high stood a life-sized figure of a miner holding a pick and miner's gad that always attracted much attention and was looked upon with feelings amounting to veneration from Burraites. Many sincere regrets were expressed when in company with the white-hot 5ft. diameter wheel it crashed to the ground. The wheel broke but the figure was not badly damaged.

The Resurrection of Johnny Green

One of Johnny's champions Frank Treloar wrote a letter to the local newspaper in 1933 urging the Council to bring him back to life by erecting his figure somewhere suitable at the mine. Johnny Green had been rescued from the ashes of the fire, one that had destroyed the timbers of Morphett's Engine-house and shaft and eventually he was raised up on a pole at the entrance to the disused mine. Here he stood until 1967 when vandals cut him down. He was too badly damaged by now and he was put into storage.
In the 1970s when Samin Ltd. began its modern open-cut mining operations at the mine, it became necessary to demolish Peacock's Engine-house and its smoke stack. It was decided to dismantle the stack stone by stone and resite it at the mine entrance. A third Johnny Green was made and now he stands proud, silhouetted against the sky, atop Peacock's resited chimney at the entrance to the Burra Burra Mine.
So who was Johnny Green? The best we can say is that he was the Burra Mine mascot that made the miners' chests swell with pride.

Death of a Shepherd

When Thomas Pickett, the discoverer of the Burra Burra ore body, died in November 1851, he died a pauper. He was paid £10 by the South Australian Mining Association for revealing its location and another £10 when the 'Monster Lode' was opened. He died at a deserted shepherd's hut on Diprose Creek, not far from Burra, as a result of falling into a fire whilst in a drunken stupor. Although the full extent of his discovery had not yet been fully realised, he made the shareholders of the Company very rich men. Shepherds, like Pickett, led solitary lives following their flocks over large distances as they grazed, corralling them at night to protect them from wild dogs and the aborigines. They were employed by squatters who held leases on unfenced sheep runs across the region. Pickett was not a young man, in 1845, when he discovered the cuprite outcrop that led to the opening of the Burra Burra Mine and the hard life was taking its toll on him.
In October 1847, a letter appeared in the Adelaide *Register*, entitled *The Fortunate (?) Shepherd-Gentlemen: Can you inform me what remuneration has been received by the discoverer of the celebrated Burra Burra Mine?* It continued in provocative fashion condemning the proprietors of the Mine for their miserly recognition of its discoverer. After drawing no response, letters were sent on behalf of Pickett, who was illiterate, respectfully requesting the Company provide Pickett with a small annuity. All were ignored. Samuel Stocks, one of the proprietors of 'Sammie,' had suggested, earlier on, that Pickett receive some shares, but this was dismissed as 'unwarranted expenditure'. By now Pickett was employed carting wood from the Murray scrub for the Burra Smelter. Another letter published in the *Register,* in August 1848, similarly drew no response. On his death, however, the Company was shamed into contributing £5/5/- towards his funeral expenses. He was buried in an unmarked grave in the old Kooringa Cemetery on the opposite bank of the Burra Creek to today's cemetery. The locals had been quite vocal in proclaiming that Pickett had been roughly treated by the Board of 'Sammie' and with the words 'Remember Pickett' his name passed into the folklore of 'the Burra'.
The Burra Branch of the National Trust of S.A. erected a monument to Thomas Pickett opposite the site of his hut on Diprose Creek, on 29th September 1971, exactly 126 years after his original discovery of the lode.



Johnny Green still atop the massive wooden shears of Morphett's Pumping Engine-house in about 1900, well after the closure of the mine. There are three other engine-houses in this picture; Morphett's Winding Engine-house on the far left, Peacock's Engine-house with its flue and to the far right Graves' Engine-house. Note all the roofs are still intact, even the roof of the boiler-house abutting its engine-house. The small building immediately to the right of Morphett's engine-house is an engineer's workshop with a forge. The stone wall of Morphett's engine pool is seen on the hillside to the right of Morphett's Winding Engine-house.



Johnny Green now installed on top of the reconstructed Peacock's Chimney at the entrance to the Burra Mine.

In the second of these floods an earthen embankment causeway across the creek, carrying the road from the mine to the smelting works suddenly gave way under the pressure of the rising water'.
Another report described the event in this poignant fashion:
'The Creek presents a fearful sight; the water rose in half an hour to an unprecedented height and those occupying huts excavated in its banks are at this moment floating their furniture out of the holes they have lived in. Livestock in the shape of fowls, ducks and pigs are going down the Creek; and men are seen carrying little pigs, women and children in all directions.'
In typical Cornish style, the townsfolk responded to this disaster by generously offering refuge in homes throughout Kooringa to all those displaced in this terrible way. Some would never return to their homes in the creek. The Mining Company's response was to issue a directive that in future these creek dwellers, who had lost almost everything, would no longer be employed at the Mine if they continued to live in the dugouts. Mine workers were expected to rent one of the few company cottages built in the township of Kooringa or to build ones of their own.
The first recorded death as the result of a flood in South Australia occurred in Burra on Sunday 8th June 1851.
One poor man by the name of Box, a lander at Paxton's shaft, was killed by the falling in of his hut in the Burra Creek, whilst in the act of removing his furnishings. It appears that the deceased had previously helped his next door neighbour and his neighbour in return assisted him for the same purposes and was standing within a yard of the deceased when the roof fell in and covered the unfortunate sufferer. He has left three poor little children, now motherless and fatherless.

Creek Dwellers

The 1851 census indicates that most of the dugouts were occupied by the families of miners who were Cornish, Welsh or Scottish. Other residents included carpenters, masons, shoemakers, saddlers, sawyers, mechanics, builders, clerks and even a doctor.

The Township of Kooringa

In 1846 the South Australian Mining Association (Sammie) had laid out its private town of Kooringa to provide for its miners and artisans. Starting in Thames Street in 1846, two-room stone cottages, designed by George Strickland Kingston one of Sammie's Directors, were built by the



The scene at the 'Pig and Whistle' Crossing with the Burra Creek in full flood
Although this is September 1910, it gives an indication of the fury of the Burra Creek after heavy rain..

Company to be leased to its employees. These two-room, stone cottage, with shingled roofs had whitewashed earthen floors and a large fireplace in each room. Some rows of cottages were also erected along this street that runs by the Burra Creek. Some business premises in Market Square were also rented from the Company and a row of cottages on the south eastern boundary of Market Square survived until 1915, when they were destroyed by fire. All properties in Kooringa were leasehold only. With no freehold property available and because the life-time of the mine was uncertain the miners preferred to dig houses into the clay banks of the Burra Creek and its tributaries, thus avoiding the rents charged. By 1850 there was close to 2000 people living in dugouts along the banks of the creek.

As early as 1848, floods had washed people out of these homes and in an attempt to entice families out of the dugouts, the company laid out a square of cottages named after William Paxton, a Company Director, that became known as known as Paxton Square. By 1850, the company had built over a hundred, two and three-room cottages throughout Kooringa. An example of one of these cottages can be seen in the picture on page 37. They could be rented by miners for three shillings a week out of an average wage of one pound five shillings. Although only a few of these company cottages survive today, like those in Thames Street, Paxton Square remains in its entirety. There is evidence that some of the Paxton Square cottages had been completed as early as 1849. The original square of stone cottages had roofs of split timber shingles but these were covered with galvanised iron in 1873. There is evidence that a well was sunk within the boundary of Paxton Square to supply water for the tenants. It is of note that this same square also boasted long-drop dunnies for the tenants.

The Gold Rush of 1851-54

Significantly, gold was discovered in 1851 in Victoria, leading to miners and other workers deserting the district for the Victorian goldfields, reducing the Mine workforce to less than 100 in 1852.

During 1853, with the Mine at a standstill, Roach's Engine-house was partially dismantled to remove its engine which was eventually sold to the adjacent Bon Accord Mine. The English and Australian Copper Co., the Burra smelter, imported 180 mules with their handlers from Chile and Uruguay. The 70 day sea voyage from Montevideo on the barque Malacca was a very rough one with 110 mules being lost. The arrival of these Spanish-speaking muleteers caused quite a stir in the town. This venture was an attempt to make better use of the Gulf Road in all weathers. The mules carried the copper in panniers slung across their backs enabling them to negotiate muddy roads where bullock drays had previously become bogged. Captain Isaac Killicoat, returning from England, was a fellow passenger aboard, arriving at Port Wakefield in July 1853. Killicoat, who had overseen the transportation of the mules, was the Mine agent responsible for the purchase of ore for the smelter.

A Description of the Mine in 1851

This description of the Burra Burra Mine by Thomas Fisher appeared in the *Sydney Morning Herald* on the 3rd May 1851:

The mine is worked day and night by parties of men who continue at work eight hours, so that three relays take place every twenty four hours. Smiths are employed also day and night in sharpening the tools used by the miners. On Sundays the works are stopped, the pumping engine alone continuing at work and two men being kept below to traverse the mine and see that nothing goes wrong. The miners, about 400 in number are chiefly Cornishmen. About eighty are Germans, many of whom have worked in the Harz Mountains; they are quiet and steady, but not such strong and affective hands as the English.

Among the Germans who had migrated was Heinrich Christian Wilhelm Fuss who, because of his experience with the smelting process in Hanover, was made the superintendent of the charge yard at the smelter. A position he held throughout the lifetime of the Burra Smelter.

The miners are employed at tut work, ton work or tribute. Tut work consists of sinking the shafts and excavating the levels for which the Burra Company pays them, on average, thirty shillings a week each. Ton work is piece work, usually performed by the miners at eighteen shillings per ton. They can pick out two tons of copper ore a week, for which they obtain thirty six shillings a week.

More Furnaces at the Smelter

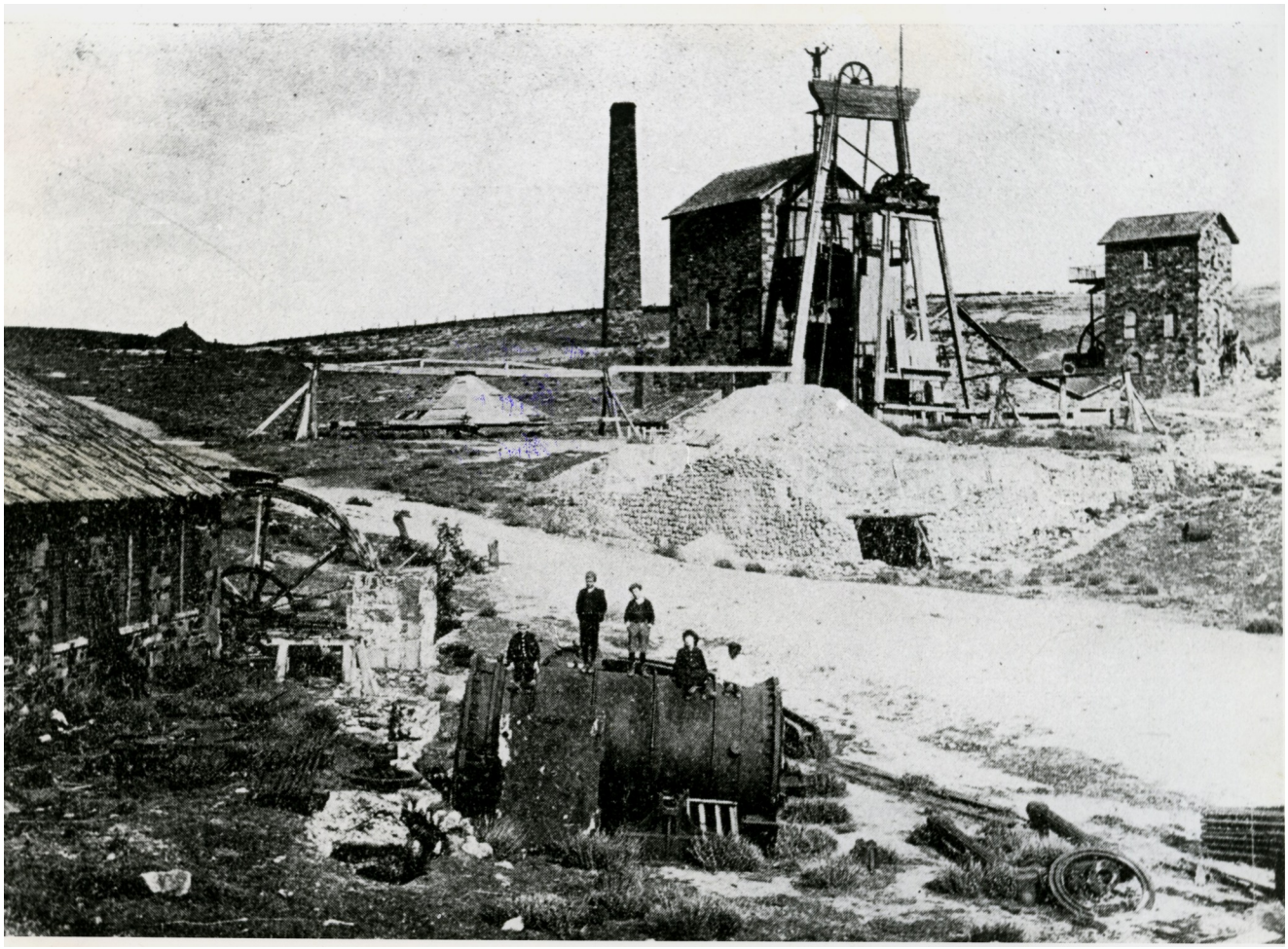
A second furnace house with nine furnaces in two rows that had underground flues leading to a single large red-brick chimney was completed after delays due to shortages of labour and building materials, in 1853. Also on the property were a crushing house, a saw mill, as well as workers sheds, cottages, offices and a mechanics workshop. Up to twenty one furnaces were constructed on the site, but there is no evidence that they were ever all operating at the same time.

Mining Recommences

When the mining operations recommenced in January 1855, as men returned to Burra from the goldfields, Schneider's engine was once again set in motion to keep the water in fork[8] to the 40 fathom level. As can be imagined, initially there was a lot of work replacing rotting and sodden timbers and removing a build up of silt in the shafts and drives so that mining could continue below ground. By 1856 the mine was back in full operation and because of the amount of mining going on underground, the Mining Company established a candle factory, near the slaughterhouse which provided the tallow to satisfy the need for 53 tons of candles each year. These candles were purchased by the miners as were their tools.

Eventually it became evident that even Schneider's pumping engine was inadequate and by 1857 another 80 inch engine had been ordered. It continued to operate for another two years after the replacement engine commenced pumping; its engine being removed in 1863. Schneider's engine-house was eventually demolished, stone by stone, during 1867 as its stone was used to build Graves' Engine-house. The huge engine was left a rusting hulk on the mining site until its removal for scrap in 1916. One of the large sandstone bed-stones from this engine-house is now on display in Market Square, Burra.

[*] free of water



Burra Mine Site c1900

In the centre foreground lies the cylinder of Schneider's engine. It had been removed from its engine-house in 1863 and left to rust away within sight of Morphett's Engine-houses, the engines that had replaced it. For two years prior it had shared the pumping duties with Morphett's engine, but its stone was needed for building Graves' Engine-house.

The copper ore thus picked out may be worth £30 a ton, but the Burra Company have put the expense of raising and dressing the ore.
The tut-workers were required to shore up the shafts and drives with timber and would have had carpentry skills. The ton workers would have been experienced at recognising the various types of ores and sorting them into piles.
Tribute work is performed by the miners in partnership with the Burra Company. If the ore is very rich, say seventy percent, they receive out of the value two shillings in every pound sterling. If the ore is ordinary yield, say thirty five or forty percent, they receive out of the value four or five shillings in every pound sterling. Sometimes it happened that they are deceived in their estimate of the quantity and quality of the ore contained in particular parts of the level where the pitches or places to work the ore are set. In such cases they do not raise enough ore to pay the outlay upon tools, gunpowder, etc and their own living. Under such circumstances they receive fifteen shillings a week called subsistence money, with which they are debited in the Burra Company's books and with which they remain debited until fortunes turns in their favour.
Frequently they meet with the greatest luck. Such was the case in former times when the captains were less vigilant and less able than now. At present, before pitches are set, very good care is taken by Captain Roach and his assistant captains to ascertain the probable quantity and quality of the copper ore contained in the pitches and then fix such terms for working upon a tribute as will give miners average wages of thirty six shillings or £2 a week. Still it is a lottery and some men meet with unexpected prizes. The tributers not only have to excavate the ore, but to raise, dress and arrange it according to quality before they can claim their proportion.
From this it seems evident that the tributers worked below and above ground and followed the ore from their pitches at the rock face to the final assaying of their ore.
Dressing the ore properly is a matter of utmost importance and is under the continual superintendence of experienced men, called Surface Captains. Samples are taken of the heaps by the miners as well as by the Company Samplers and the two are respectively assayed and compared and the percentage of the ore having been arrived at the quantity raised by the party is weighed and entered in the books, after which the balance due to the miners is paid to them. When the ore is dressed at the Company's expense it is generally done by contract. The average amount received by the ore dressers is from twenty five to thirty shillings a week. The whim and other boys received from eight to fifteen shillings per week and the landers twenty seven shillings per week.

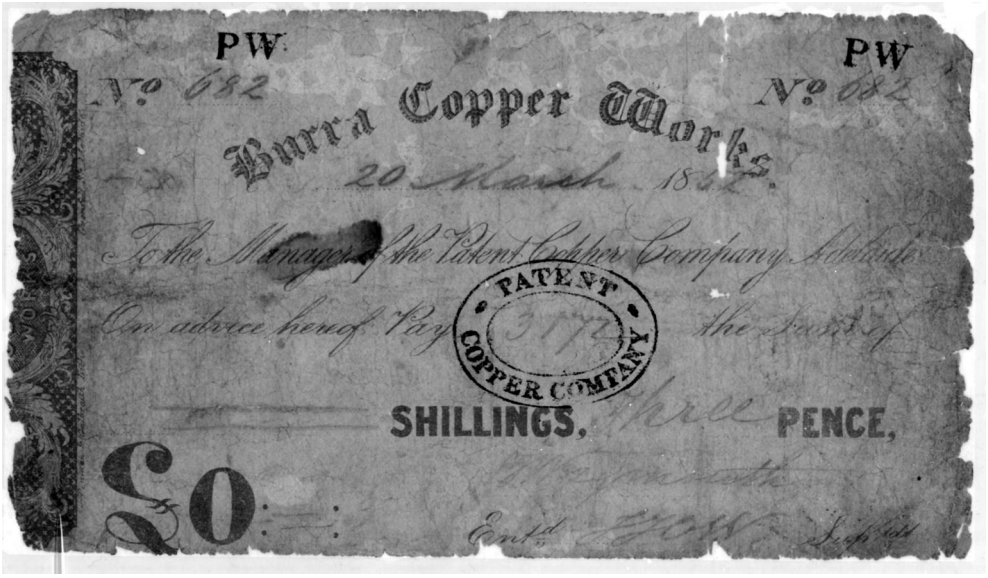
The Descent Underground

In May 1851 Thomas Fisher continues his recount of the Burra Burra Mine;
The descent is by a shaft to one of the old levels, say the six fathoms or ten fathoms level. On leaving the ladder, you light the thick tallow candle with which you have been provided and traverse the levels or galleries excavated for the purpose of coming upon lodes or veins of copper ore. The shaft which strangers frequently descend is called Waterhouse's shaft, the different shafts being distinguished by the names of the Directors, Secretary and Captains. The perpendicular sides of shaft are prevented from falling in by stout substantial framework reaching from the opening at the surface to its lowest depth. This framework is boarded over so as to present a smooth surface on each side and thereby prevent any hitching of the iron buckets with the framework.
One fathom is a depth of six feet or 1.83 metres. The names of other shafts were Hector's, Roach's, Graham's, Ayers' and Stock's shaft. The timber work was done by tut-workers. The kibbles or buckets were egg-shaped so as to avoid catching on the timbers lining the shaft.
Levels or galleries are excavated at the depth of six fathoms, ten fathoms, fifteen fathoms, twenty fathoms, thirty fathoms and forty fathoms. The descent to these levels is unattended with fatigue and quite easy. You stick your lighted candle with its candlestick of moist clay upon the front of your Jim Crow hat and avail yourself of both hands while stepping down the rounds of the ladder.
The Jim Crow hat was made of felt, affording no protection from falling objects. The Company called for large numbers of tallow candles, which the miners had to purchase from the Company, and there were times when supplies were short.

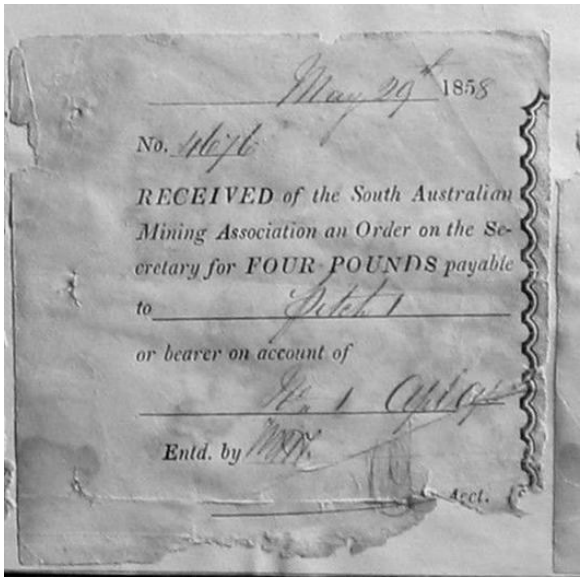
The miners' strike in 1848 originally over the Company's decision to reduce pay rates failed to increase these rates above what is quoted here. A few miners considered to be the 'ring leaders' were denied any prospect of future employment and they moved on with their families. These rates seem niggardly when compared with the enormous dividends paid to Company shareholders during these times; as high as 200% in 1849 and 800% in 1850. Towards the end of 1851 miners began to leave the town in search of gold in the Victorian goldfields.

The Cornish miners and their families live comfortably and moreover, lay by a good portion of their earnings. A paper currency finds no favour in their cautious eyes; such dread have they of the orders of promissory notes pretty generally issued and circulated here, that they transmute them at once into silver, of which it is currently reported they have a considerable hoard.

In fact the employees of the Company were not paid in coin of the currency of the realm but instead received promissory notes that although they could be cashed 100 miles away in Adelaide, were effectively only honoured by the shopkeepers of Kooringa and the surrounding district. Many miners were quite distrustful of these notes and wherever possible converted them to silver coinage or trinkets, which they hid in holes in the walls of their homes. Payday was once a fortnight and after 12 Noon on a Saturday and the Company 'printed its own money.' I wonder how the workers on the Saturday shift got their pay?



Above is an example of a promissory note for three pence issued to a worker at the Burra Smelter on the 20th March 1862. Below is a note issued by the Mine Company, 'Sammie' for four pounds on 29th May 1858. This would have been earned by a tributer who was working pitch 1 underground. Notice that the Secretary, Henry Ayers who was 100 miles away in Adelaide would honour this note





A kibble made from iron sheets riveted together, held the ore as it was hauled to the surface by a whim or capstan.



A capstan used by miners to haul kibbles filled with ore to the surface.
Peacock's Engine-house and chimney are in the background with Graves' Engine-house on the right.



Cornish miners

The first thing that strikes you is the provision made to prevent the gallerias giving way either at the top or the sides. Two uprights made of strong gum tree logs into which another log is inserted horizontally, are placed at regular intervals along the gallery and behind each of these uprights a rough but substantial boarding or wainscotting is worked against the walls, while the horizontal logs support a longitudinal ceiling constructed after the same fashion as the wainscot. Most of the ground, with the exception of the thirty fathom and forty fathom levels, is soft which facilitates the working of the lodes, but endangers the security of the mine; however, the levels hitherto have remained uninjured and no loss of human life has yet occurred. Similar precautions are adopted with respect to the large openings or caverns from which the copper ore has been stooped or picked out. Stout logs are jammed between the sides of the roof in these caverns and the cavity Is filled with the earth excavated from the levels and rubbish which accumulates where the pitches or lodes are worked.

Although there were a considerable number of minor mine accidents, at this stage, there had been little loss of life. On separate occasions, two boys had fallen down shafts to their death and miners had been buried alive under rock falls, prompting Captain Roach to call for more shoring timbers to be installed. Nevertheless the mine was considered to be a safe one. The big killer however lay outside the mine. This was dysentery, particularly among the children of the town.

To ensure a perfect ventilation, various expedients are used, such as sinking small shafts or winzes between two levels and running wooden pipes along other levels, where doors are interposed to prevent the natural current of air and divert it into wooden channels. During your progress, your attention is claimed by the thundering noise and reverberation of the pumps at work in the pumping engine shaft. This din, intermingled with the sound of streams of water gushing along the wooden channels and of water dropping heavily from the upper parts of the engine-shaft to the plats or landing places at the bottom of the shaft, occasions at first a disagreeable sensation of confusion.

The din described was quite rhythmical as the beam engine went through its cycle of rising and falling; the beam rocking on its fulcrum would thunder throughout the shaft and levels. At each stroke of the pump a volume of water equivalent to a small swimming pool would be lifted and

A Miner's Day Off

The Day of Rest

With a six day working week, there was a great temptation for Burra Mine workers to spend their seventh day in their favourite inn. To be found drunk on the Sabbath was a special offence with proper observance of the Lord's Day rigorously enforced until 1851. The court cases of the day point to the reality of Cornish mining life with 'deplorable looking nymphs' being drunk and disorderly on the Sabbath, sly grogging, wife-beating, and miners unable to work on 'Maze Mondays'. Little wonder meetings of the Burra Total Abstinence Society were often held on a Monday with bouts of pledge-signing by remorseful miners. One Cornish housewife, after an orgy of furniture smashing by her drunken husband, rather than referring to the courts, took her own action. On the following day when he opened his Cornish pasty below ground, found it to contain pieces of broken furniture, 'nicely arranged.' Apparently this had the desired effect.

By 1851 the population of the Burra Townships was approaching 5000 and crime was on the increase. The commonest offences were drunkenness, petty larceny and disorderly conduct. Of the 358 arrests in the March quarter that year, 114 were for drunkenness, 61 for theft and 30 for disorderly conduct.

Serious Affray with the Police At Kooringa

South Australian Advertiser Friday 26th November 1858

Thomas Pearce, a miner, was charged with having on the evening of the 29th instant feloniously assaulted Police-trooper William Rollinson and his assistant whilst in the execution of their duty. Police-trooper Rollinson, upon being sworn, gave a deposition to the following effect:- 'As I was coming into the township last Saturday evening, about a quarter before 11 o'clock, I observed a crowd of 200 or 300 people assembled in the Market Square, in the midst of which there was a fight going on. As I approached the place, someone called out 'Here's the bloody police'. I collared one of the men, who was pulled back by another man. I requested him not to interfere,

spill out along the launder on its way to an engine pool nearby. The blasting, hammering, shovelling and pick-work and the occasional sound of kibbles scraping on the shaft timbers adding to the confusion.

Upwards of four hundred men are at work underground and the ore is taken principally from the thirty fathom and forty fathom levels. The men working in parties of two, four, six or eight, engage in excavating the levels blasting the hard ground and ore, picking the ore from the walls or from the stopes or workings overhead and in wheeling the ore in barrows along the levels to the plats or landing places at the shafts where the ore is transferred to the iron buckets drawn upwards by the horse whims. Communication between the men underground and the man who empties the bucket above ground close to the opening of the shaft is easily effected. A rope is pulled which operates an iron clapper above ground and the whim horses being stopped at this signal, a slight elevation of the voice enables the men below to be heard at the surface and vice versa.

The communication and understanding between the miners below ground and the landers above was of great importance, as any slight slip could have led to ore cascading back down the shaft. The lander needed to synchronise his actions with the boy handling the horses on the whim. One could be forgiven for underestimating the difficulty this posed.

With respect to the general appearance of the copper ore in this mine the visitor is struck chiefly by the beautiful sparkle and varied graining of the green malachite mixed with blue carbonate, which the miners are working from stopes in Kingston's thirty fathom level. Specimens obtained from such workings are sometimes retained and sold by the miners; they are cut and polished and then set as broaches and bracelets in gold or steel, making appropriate presents for 'friends at home'. The red oxide in Ayers' thirty fathom level with upwards of fifty per cent of copper and sharp enough to prick a finger passed over the broken surface. In most cases the natural beauty of the ore before it is picked out is smoked over by the explosion of the blasting powder.

Malachite (green) and azurite (blue) are both hydrated copper carbonate minerals. The red oxide is a mixture of native copper metal (reddish colour) and oxides of copper (red or black). It was the malachite, often with whirls of dark and light green that was more commonly used as a gemstone, but the brilliant dark blue azurite crystals made spectacular keepsakes. Black gun powder was used to blast out the copper ore from its surrounding hard rock. This blasting would leave a black residue on the rock.

Thomas Fisher 'The Sydney Morning Herald' - 3rd May 1851



Malachite



Azurite

when he up with his foot and kicked me. This man is called 'Walkey'. The crowd then rushed and got me down on the ground. I struggled and got up again, to the best of my recollection, I was knocked down four different times. I had two of my teeth broken and one completely knocked out. The name of the man who committed this outrage upon me was Hale. Amidst cries of 'let the bugger have it for old times', I was severely kicked and in consequence of the injuries sustained, had to go to the doctor. Henry Bentley corroborated this evidence. John Fotheringham and William Corey, who went to the rescue of the police, were deposed to having been severely handled. Other witnesses were called, whose testimony fully established the evidence of Rollinson. Pearce was committed to take his trial at the Local Court. John Halls, Feter Benalicak (sic), John Walkey and William Williams were likewise were committed to take their trial for a similar assault. Edward Bopen and Martin Bonin were fined 5/- each for being drunk.

[I am sorry to inform you that the policeman is unfit for the performance of his duties, but owing to the scarcity of police in this neighbourhood, he has been called upon to put down several disturbances during the day, which he has done to the best of his ability.]

It is obvious from the above account that the police were not particularly popular with the miners and that they were frequently lacking support from the public being required to risk life and limb to restore order in the town. The Miners' Arms Hotel in Market Square was often the scene of such sport.

Cornish Pastimes

Among the attractions for the Whitmonday holiday was occasionally the roasting of a whole bullock. It took place on the level ground just beyond the Burra Hotel. The carcase was prepared at the slaughter-house, leaving the head with horns complete. When it arrived, a strong iron bar on spit was passed through it and the head tied to the spit with a chain. The bullock was never properly roasted, because the appliances were too crude to get a uniform heat to properly cook the meat right through. On one occasion there were a number of Aborigines there who took great quantities of half raw beef away to their camp nearby. Besides the bullock roasting there were games and sports going on at the same time; jingling in the ring, bobbing for apples and treacled buns, a greasy pole to be climbed and a greasy tailed pig to be caught. This latter caused much mirth and excitement as the animal ran among the people amid yells of boys and screams of the girls and women, whilst the men were diving down to get hold of a leg as no one could hold it by the greasy tail. Presently it came out into the open and raced for dear life followed by a trail of pursuers and it was by no means certain that the fleetest would be the captor as the dodging porker might be captured by one less fleet of foot. Sustained squeals generally denoted the end of the race.

The old Cornish game of wrestling was promoted at Christmas time and was held in the stable yards of the Miners' Arms Hotel, where there was plenty of manure and sawdust. The Cornish game was not like the brutal exhibitions now witnessed under the name of wrestling, where each contestant tries his best to maim his opponent and where hate and venom plays such an important part. It was I believe quite a friendly game, the contestants standing on their feet and if they came to ground the hitch was broken and they rose to their feet and took a fresh hitch, unless the fall was a fair backfall, in which case the contest was settled between the pair. Players were matched together and the defeated retired until the champion was left.

Strength of course played its part, but feet and leg dexterity was very important. Umpires (called sticklers) walked around the contestants and they were judges of the falls. When these umpires stood still and obstructed the view of the onlookers, 'Walk around stickler' was the signal to keep them moving. Ginger beer was supplied free by the lessees of the hotels, for lubrication of the dry throats of the contestants and one frequently heard the call 'ginger' at the commencement of a contest when no lubricant was needed. On entering the ring the wrestlers removed their coats and waistcoats and put on wrestling jackets made for the purpose of strong canvas and having strings instead of buttons. These contests took two or three days during the holiday season. I think the lessee of the hotel was well paid indirectly for his 'ginger'.

Solomon Williams

Speaking of Hotels

Built on the outskirts of the town near the road from Adelaide, the Burra Hotel was Burra's first hotel. At the time of its completion in September 1846 it was supplied with beer from the adjacent brewery run by Mr. Crawford of the Hindmarsh Brewery in Adelaide. It put an end to the illicit

trade in alcoholic drink. At one time described as ‘a pile of buildings’, it boasted fourteen spacious rooms and a large assembly room that was used for many public meetings. Owned by William Paxton, a Mining Company Director and built by the Mining Company, it was the inn chosen by the Mine Directors when they visited Burra. In its heyday in 1851, it was described glowingly as ‘a fine spacious building furnishing every accommodation to visitors and unsurpassed by any house of the kind either in the province or in New South Wales’ (Sydney Morning Herald). This hardly sounds like a place frequented by lowly miners. In 1876 it closed as a hotel and was converted into the Burra Hospital.

During Burra’s mining era, miners could choose between the following hotels; The Miners Arms, The Commercial Inn, The Pig and Whistle in Kooringa, The Aberdeen Hotel, The Bon Accord, in Aberdeen, The Smelters Home in Graham, and The White Hart, Court House Hotel and Bushman’s Home in Redruth. These hotels mainly stretched along the banks of the Burra Creek close to the miners’ dugouts and other small cottages occupied by mine workers. After 1873 the Unicorn Brewery, whose fame spread as far as Broken Hill, supplied most of the ale and stout for the thirsty miners of the town.

The townships of the Burra were not short on churches either. During the Mining era, there were eight churches in Kooringa; a Wesleyan Church, a Baptist Church on the banks of the creek, the Bible Christian Chapel alongside Paxton Square, the Welsh Church, St. Mary’s Anglican Church, St. Joseph’s Catholic Church both on Limestone Hill, the Primitive Methodist Church in Thames Street and The Bible Christian Church in Bridge Street. In Redruth there was the German Church

Fire Whim

Peacock’s Engine-house and Winding Engine

Whilst the foundations for Peacock’s Engine house were commenced in June 1851, the work did not progress because of the greater urgency for the erection of Schneider’s Engine house.

This winding engine or “Fire whim” hauled kibbles, holding the ore, to the surface from four shafts (Peacock’s main shaft and air shaft, Waterhouse’s shaft and Roach’s shaft).

Peacock’s Engine-house was not shown on the 1853 plan of the mine and the tender for it was awarded to Blackler and Hollow in January 1857, and completed early in 1858. The rotative beam engine began operation in April 1858. It was the longest serving engine on this site, being used to haul ore trucks up an incline during the open-cut operations in 1870 and in 1876 it was converted to pumping water, assisting Morphett’s Engine. Its engine was removed for scrap in 1916 and the engine house was demolished in 1972 to make way for the modern open-cut operation.

A story from the mining days of the 1850s

“One day I witnessed the breaking of a chain when the kibble was nearly up to the surface and its weight as it descended pulled the loose chain so fast that it was entangling itself about the posts and pulleys breaking timbers and making a great clatter. Men were running in every direction except in the line of the posts. Much damage was done to the gearing, but I have wondered whether the men below could find a safe place when they heard the kibble coming down the shaft. They must have realised that the law of gravity was in its worst mood.”

Recorded by Solomon Williams in 1934

This is most certainly a description of an incident involving Peacock’s Winding Engine that raised the heaviest kibbles to the surface. It never completely replaced the horse whims that were found close by every shaft and controlled by boys throughout the day and night.

The Burra Jinker

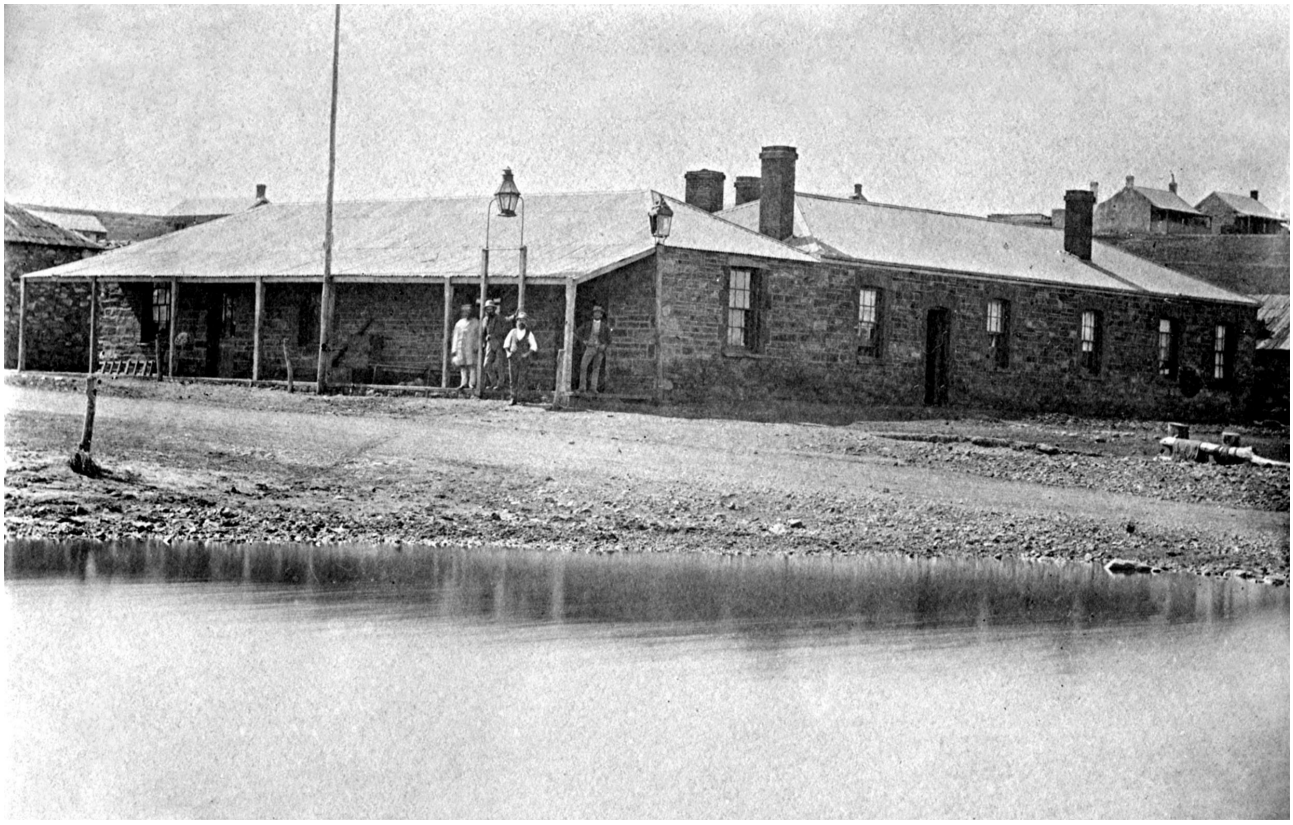
This timber jinker was constructed in 1851 for the purpose of transporting the massive pumping machinery; the atmospheric beam engine, its cast iron beam and steam boilers 100 miles over unmade roads and across creek crossings from Port Adelaide to the mine.

…a carriage is being constructed by Mr. Coulls of Hindley Street, and is now nearly completed… The gigantic vehicle is in all 40 feet long, built of blue gum and iron bark wood….The entire weight of the carriage is 4½ ton, ad its cost will be something more than £200.

Austral Examiner. 11 April 1851.

It was first used by the bullocky Bell Freeman in 1852 to transport the pumping machinery for

The Primitive Methodists' Zion Chapel and the Wesleyan Church, and a Bible Christian Chapel in Hampton. Churchgoing was very much a part of life back then with many a fiery sermon was preached.



The White Hart Hotel in Young Street, Aberdeen alongside the banks of the Burra Burra Creek was a popular haunt of the locals until 1887 when it became a temperance hotel. It was destroyed by fire, in 1916. The Miner's Arms, The Aberdeen, The Pig and Whistle and the Commercial Inn all suffered the same fate. Only the Miner's Arms was rebuilt and now exists as the Burra Hotel.



The Bible Christian Church built in 1859



The Unicorn Brewery built in 1873

Schneider's Enginehouse which was to replace the previously installed Roach's 60 inch diameter pumping engine. It would take several trips.

The Great Engine For The Burra- The cylinder case of the large engine was taken from the Port on Friday, upon the immense dray we described some time ago. Its weight is 17 tons, and it was drawn by 72 bullocks. These were placed six abreast next to the vehicle, but the number swelled out in the second and third rank, then diminished again to the two leaders.

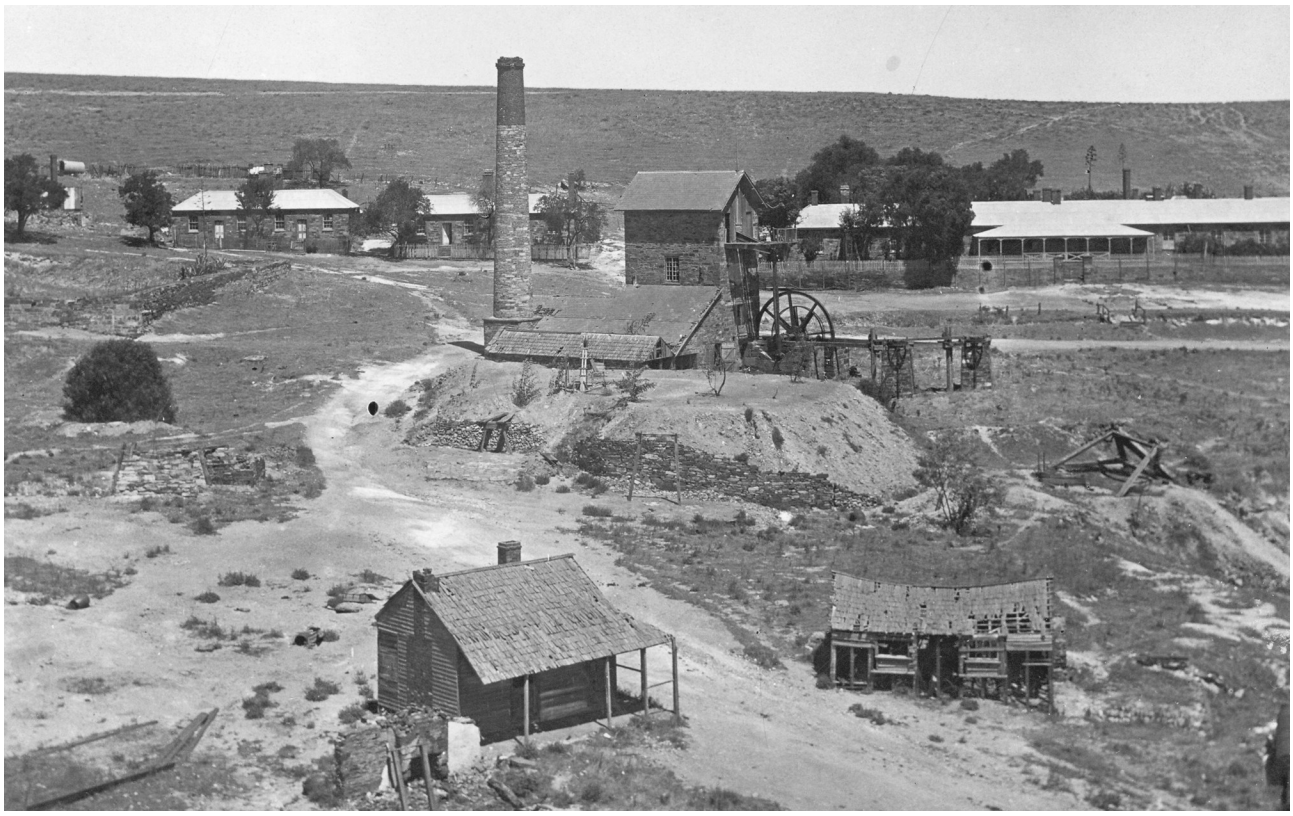
South Australian Gazette and Mining Journal. 29 January 1852

In 1858, a leading bullock driver, William Woolacott used this jinker again to transport the engine for Morphett's Pumping Enginehouse. This return trip took two months.

Morphett's Pumping Engine

Morphett's, 250 horse-power, 80-inch engine, manufactured in 1857, at the Perran Foundry in Cornwall, and served by six Cornish boilers in the adjacent boiler house, commenced operation in March 1860. Pumping water from a depth of up to 600 feet, it had a 32.5-foot beam weighing 32 tons with a pump stroke of 10 feet. Working at eight strokes per minute, this engine pumped more than two million gallons of water per day, considerably more than Schneider's Engine and kept the water in fork at the 60-fathom level. Water pumped from Morphett's shaft, the deepest shaft at the mine, flowed north along a launder to the dressing tower or west to the engine pool, for use in its boilers. There was a smaller engine pool alongside the engine-house which received warm water from condensed exhausted steam from the engine. This was the preferred swimming pool for all the 'local lads'. All pumping engines had a ballast box attached to the timber pump rod as a counterweight to the weight of this long rod reaching deep down into the shaft. As the length of this rod increased, so extra stones were added to the ballast box. Critical to the amount of water lifted with each stroke was the diameter of the pipes in the shaft. In the 1870s, the diameter of these pipes was increased from 18 to 20 inches, to improve the performance of the pump engine.

In April 1877, Morphett's pumping engine suffered a serious setback, when the main pump rod parted a little below the surface causing the beam to 'go indoors' with a massive crash, cracking the piston, but fortunately not damaging the cylinder. All repairs were speedily completed by engineers at the mine.



Peacock's Winding Engine-house in 1901.

Known by the miners as the 'fire whim'; steam power replacing horses, it operated from 1858 until the closure of the mine in 1877. Its engine is still in place at this stage. Note the mine captains' cottages and the mine offices in the background. Its stone flue was dismantled in 1971 and now stands at the entrance to the mine.



The ruins of Peacock's Winding Engine-house with its small boiler house and impressive stone flue. The ruined Mine Offices are in the background and on the skyline above them is the powder magazine. Note that all these buildings still have their roofs in place, suggesting the photograph is before the removal of the atmospheric beam engine. At the far left is a stone wall that was Waterhouse's pool. The ruin of Graves' engine-house is on the far right.

The Closure of the Gulf Road (1857)

The transport of smelted copper along the Gulf Road had always proved to be unsatisfactory. In the early years either the road was muddy during winter or after unseasonable rain, caused drays to become bogged or in summer the waterholes, so necessary for the bullock teams, dried up. This had severely reduced the number of months that it could be used. The road itself had to be maintained by the smelting company and the crossing at 'Dunn's' continually proved difficult. Even the use of Chilean muleteers driving their mules with the copper in panniers across their backs, that seemed a better alternative, was only partially successful and the 'smelts' persisted with them for only a few years. All this added up to the original route used via Kapunda and Gawler being a better alternative. When the railway reached Gawler in 1857, the Gulf Road was closed.

Even Greater Depths

A New Engine-house

With Schneider's Pumping Engine failing to keep the mine dewatered at the 60 fathom level, the building of a new engine-house was commenced in 1858 and a new engine was ordered.

Towards the end of 1858 William Woollacott, a local wood carter, left Adelaide with the new engine for Morphett's Engine-house. It was hauled the distance of over 100 miles on a timber jinker by a team of 72 bullocks, an event that brought the locals out of their homes and work places in every town along the journey, culminating in great celebrations on its arrival in Burra. Its installation and the building of its adjacent boiler house that housed six Cornish boilers continued throughout the rest 1859. This proved to be the peak year for employment at the Mine with 1,208 men and boys with a total of £178,900 paid in wages and expenses. But as the mine deepened the costs were rising. Unfortunately at the same time the price of copper was falling from a peak of £126 per ton in 1858 to £112 per ton in 1859. Profits had come down from £4/8/3 per ton to £1/14/8 per ton over the same period and SAMA reduced wages for tutworkers to 6/- a day and cut all but essential tutwork. Expenditure on repairs and maintenance was also cut to a minimum.

The engine remained in its house after ceasing operation in November 1877, until it was removed for scrap in 1916. Restored in 1986, this engine-house stands at the mine site as a fitting reminder of Burra's mining years.

Fire at the Mine

In April 1860 a fire in Stock's Shaft, at the mine, resulted in a brave rescue of two miners, Messrs. Mitchell and Trezona and the deaths of Peter Johns and Thomas Pryor. The fire in timbers at the 20 fathom level that was noticed at 7am as the new shift was due to commence, eventually burned itself out. The inquest into this tragedy finding that possibly the fire was caused by an unattended miner's candle setting light to a dry timber support and spreading into other timbers.

Morphett's Winding Engine

This engine, a 30 hp, 20 inch beam rotative engine from the Perran Foundry was installed in a stone half-house and was supplied with steam from the adjacent Morphett's boiler-house. It began operation in 1861 and continued hauling from Hector's shaft until 1868 when the open-cut operations commenced at the mine. It was used for hauling ore to the dressing tower during the open-cut operation until 1874, when it was replaced by another haulage engine. The ruin of this imposing edifice can still be seen at the mine site today.

The Beginning of the End

A Dwindling Workforce

New opportunities came to miners in 1860, with the opening of the Wallaroo and Moonta Mines on Yorke Peninsula attracting mine workers to this new field and progress at the Burra Mine slowed. The exodus of miners continued throughout 1861 as more workers migrated to the Yorke Peninsula Mines, and new mines in the Flinders Ranges north of Burra, as well as mines in Queensland and New South Wales.

Activities at the Burra Smelter were confined to the summer months as smelting operations commenced at Port Adelaide and the price of copper fell to a new low of £87 per ton.

By 1862 the mine workforce had been cut to 631 and the wages bill almost halved.

Schneider's Pumping Engine that had worked in concert with Morphett's pump engine for the last two years was stopped.

The Closure of the Burra Smelter

In 1861, because the Burra Mine lode was dwindling, the Company erected a new smelting plant at Port Adelaide. This was the beginning of the end for the Burra Smelter and it became little more than an ancillary to this new plant, that took ore from all of its contracted mine sites, particularly from the Wallaroo and Moonta mines. Despite the improved copper price, smelting operations were scaled down even further during 1864. After the smelter's closure in 1869, the major operational components were either sold off or used at the Company's Port Adelaide or Newcastle plants. The buildings, however, remained intact, but over the next twenty years, they were dismantled and their stone and timber was sold to recoup any costs.

Competing Interests

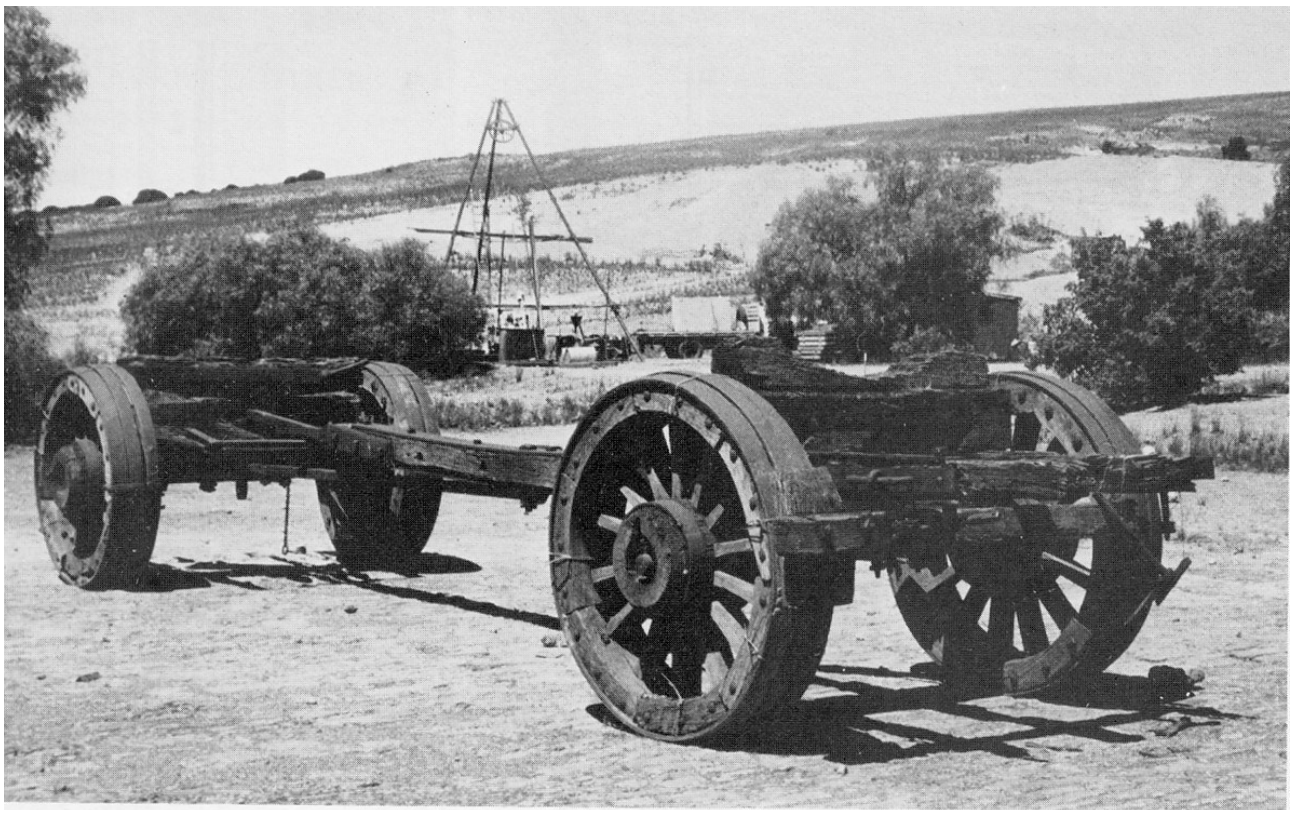
By 1863 the Burra Mine was becoming less profitable even though its ore was averaging 23% copper against Moonta's 18%, the cost of winning it was £10/2/1 per ton compared with £7/15/7 at Moonta. The township of Kooringa was still all leasehold with few permanent business premises and as tenants departed SAMA was pulling down cottages to discourage 'squatters'.

For a short time in 1864 the copper price was at £110 a ton and shareholders received a dividend of 300% but this proved to be the last regular dividend paid by the Company. A return of some miners to Burra resulted from a major strike at the Yorke Peninsula Mines, but essentially the population of the Burra townships was in decline.

The population of the three Yorke Peninsula townships had risen to about 10,000 and prospects there were more promising. By July 1865 SAMA was losing between £800 and £1000 per month and changes needed to be made. The population of Burra was around 4000.

Graves' Engine-house

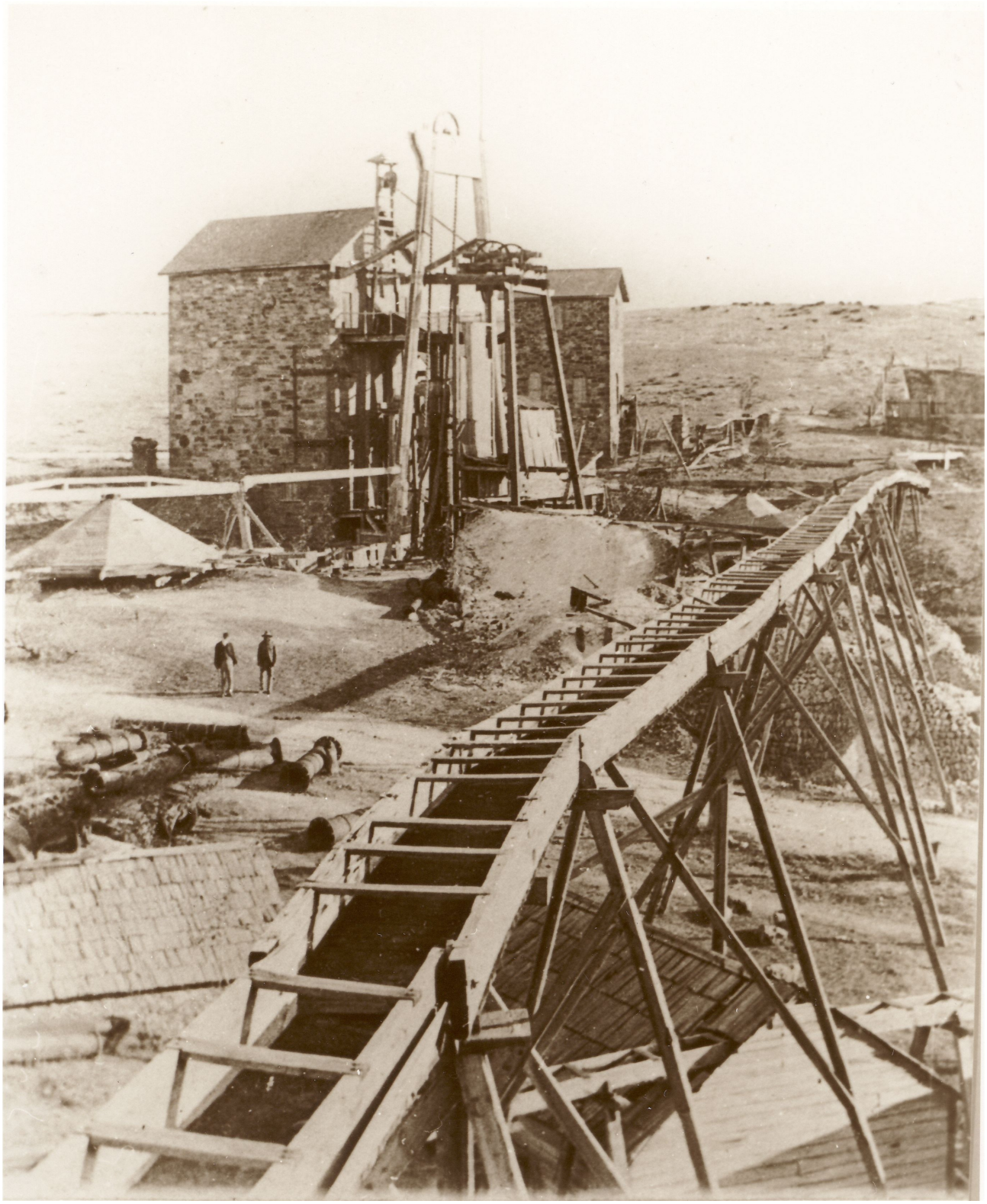
At this stage, Graves' Engine-house was under construction and a drive to link Graves' Shaft with the rest of the mine was still continuing, leaving about 600 workers on the site. This engine-house was being constructed from the stone of Schneider's disused engine-house and was the only one roofed with corrugated galvanised iron.. It was intended to house a pumping engine that would support Morphett's pumping engine in the enormous task of dewatering the mine.



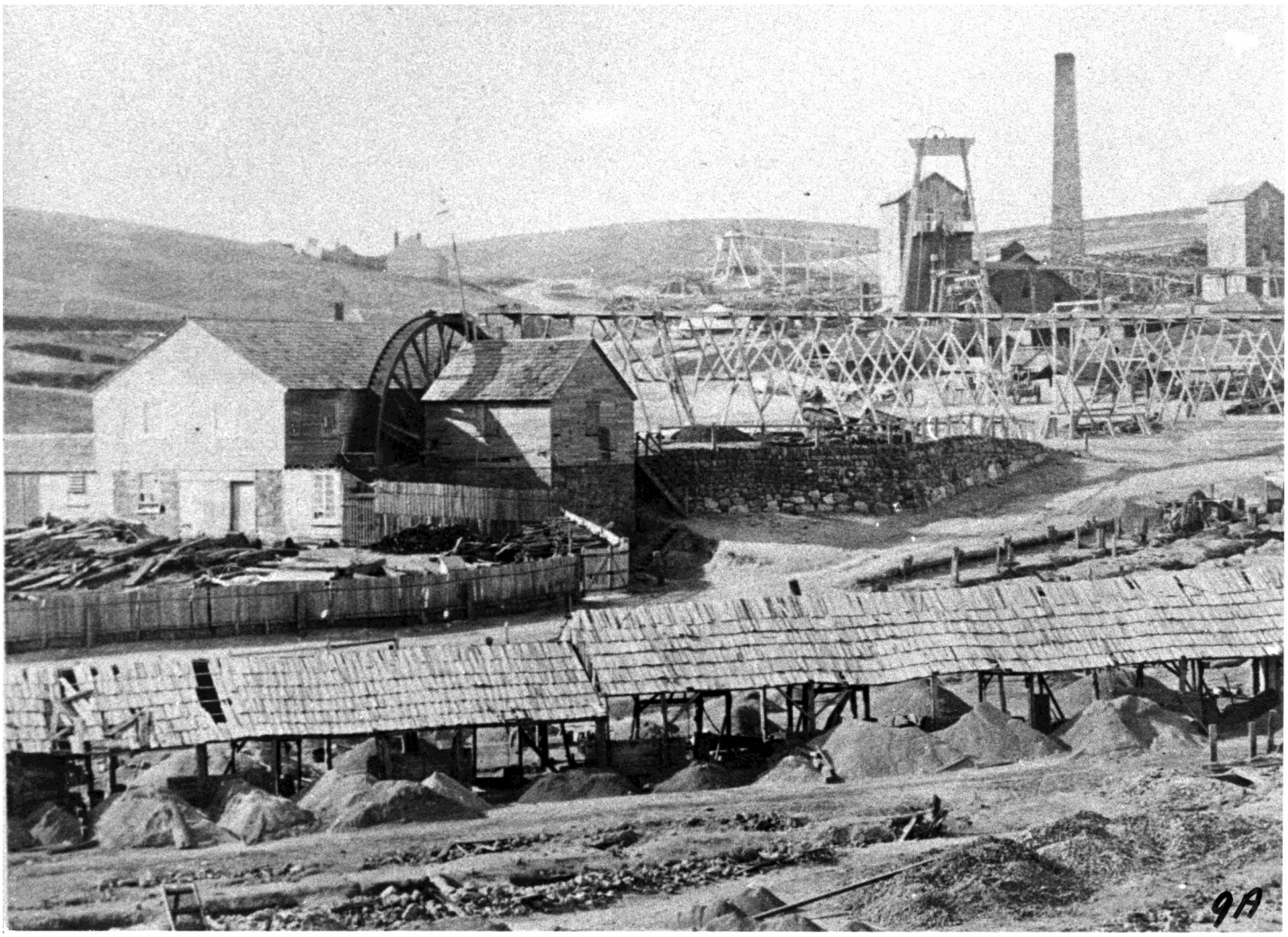
The timber jinker that William Woollacott used to haul the atmospheric beam engine for Morphett's pump-house by bullock teams over 100 miles from Port Adelaide to Burra in 1858-59. The industrial revolution literally came to Burra riding on a jinker. This same purpose built jinker had been used to transport Schneider's engine to the mine in 1852.



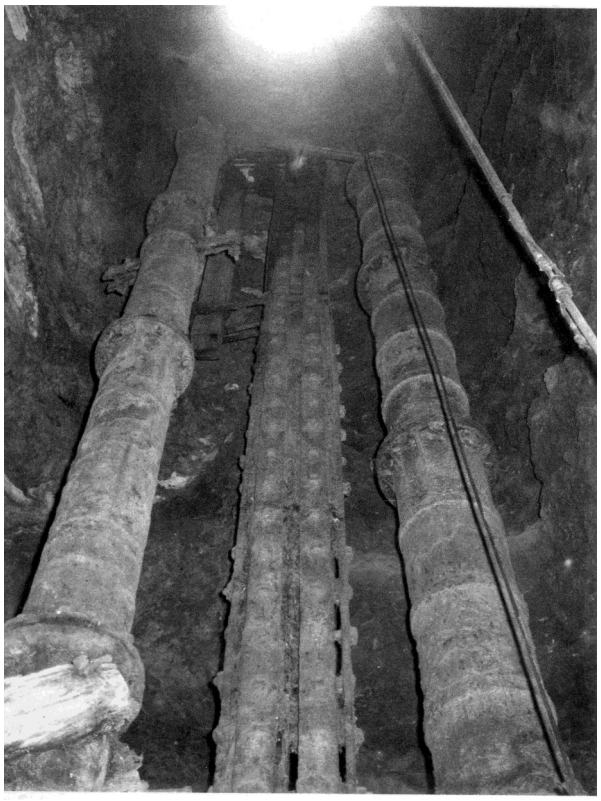
Morphett's Engine-houses in 2007 with Morphett's engine pool in the foreground .



Morphett's Pumping Engine-house with Morphett's Winding Engine-house behind c1900. Note the engine and beam are still in place at this stage as are the shears and large poppet-head above Morphett's Shaft. In the foreground is the launder that carried water from Morphett's Pool to the dressing tower during the open-cut operations of the 1870s. In the foreground are some of the numerous sheds with shingled roofs that grew up throughout the mine.



This photograph of the mine taken in 1869 shows the launder that conveyed water to the giant waterwheel that powered the sawmill and the ore crusher. Note the timber in the fenced yard adjacent the mill. In the background on the right are Morphett's Engine-houses and the tall flue that served the six Cornish boilers. In the foreground are the ore dressing sheds. The poppet-head above Hector's Shaft is visible behind and to the left of Morphett's Pump-house.



Pit work in Morphett's Shaft, showing the 20 inch risers that conveyed the water pumped to the surface from the 90 fathom level. This was the handiwork of tut workers at the mine. Note the lack of timbers in this shaft, the surrounding rock being considered quite stable. Each pumping engine would have required extensive piping and cisterns like this; all requiring constant maintenance by a team of engineers and blacksmiths.

With a slump in the copper price to £80 per ton, in February 1867, Henry Ayers, the Secretary of the Company, informed Captain Roach that all operations would cease and that all officers of the company would be dismissed at the end of March.

A Desperate Situation (1867)

With over 500 jobs lost in Burra and mass unemployment throughout the colony, it was a desperate situation. Mining operations had effectively ceased in February 1867. The mine fell idle and workers began to leave the town. Cottages were demolished, shops and businesses were abandoned. There was little unemployment relief except for a meagre ration for families without an able bodied male in residence. Wages had fallen to 6/- a day, but Henry Ayers, now the Premier of South Australia, insisted 4/- a day was enough. The situation was made worse by the fact that

A New Era

Clearing 'The Flat' for the Open Cut

Frank Treloar described the changes:

The year, 1869, was a quiet one for both the mine and Kooringa. Clearing away the buildings and erections from the flat took several months. Stocktaking and sorting out material not likely to be wanted, ready for sale was attended to so as to be ready for the arrival in October of Mr. Swansborough, who was being sent out by the London firm, J. Darlington and Co. to erect the new machinery and afterwards superintend the working. The work of erection was pushed on, the foundations and erection afterwards of the Dressing Tower being among the most important works. Everywhere the mine wore a busy appearance. Among other matters Captains White and Paull resumed duties. In December of 1870 the machinery was in readiness for a start on the open cut system and as the water had been allowed to rise for months, the first duty of Morphett's engine was to fork the water down to the 30 fathom level where it was proposed to keep it for a time so that haulage and dressing could be proceeded with.

One commentator noted that because of the deterioration of the shoring timbers below ground, the level of 'the mine flat' had subsided about eight feet over the ten years from 1859 to 1869. The cost of re-timbering shafts and drives in the mine, in what was relatively soft dolomite host rock, had been one of the major factors leading to Darlington's recommendation to use open-cut mining at the Burra Mine.

Australia's First Open-cut Mine

In 1870 the Burra Burra Mine became Australia's first open-cut mining operation, with William Swanborough as its supervisor. By June of that year all reports were most encouraging. By October, 10,000 wagons (15,000 tons) had been recovered and the mechanical dressing of the ore was expected to commence within 6 weeks. A new crusher and dressing tower had been erected and an incline track with rails that reached down seventy four feet at an angle of 28^0 had been cut into the old workings. Peacock's 'fire whim' was equipped with an endless chain to enable iron trucks or skips to be hauled up to ground level. The cost of modifying the mine operation had been some £25,000 with a considerable reduction in the size of the workforce required.

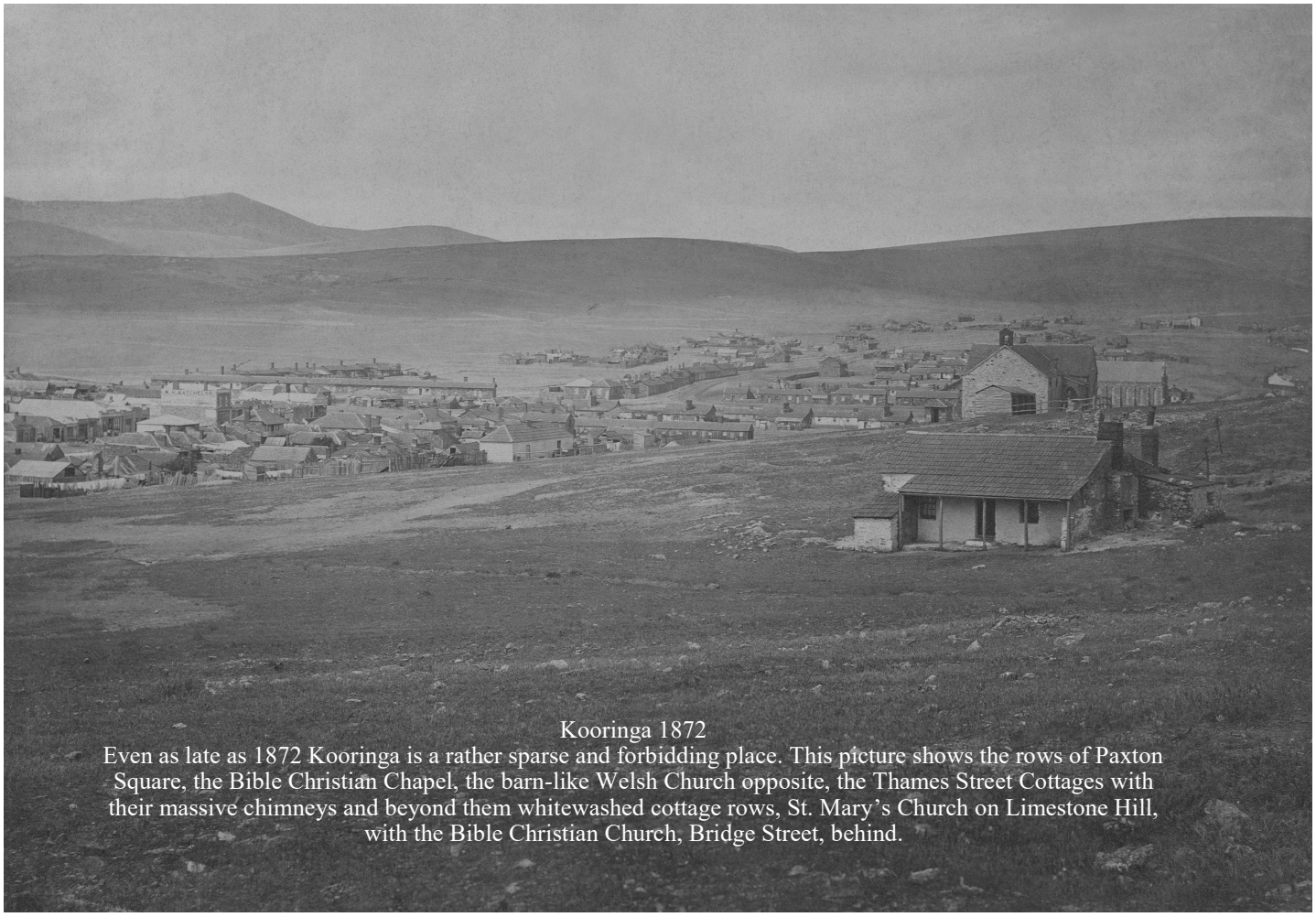
Frank Treloar continuing the story:

A trial was made in December of 1870 when after pumping 57 hours making 20,621 strokes or 96 per minute and raising 4,165,442 gallons of water, which meant forking for 24 feet 10 inches the bottom "clack" of the 40 inch left at the 30 fathom level went off, but it was found later that something more serious had happened. The 14 inch lift was then put to work by itself with 18 feet of water to "fork" which was thought would take nine days with the engine working at eight lifts per minute (its safety limit) but after pumping for a day it was found they had reached the stage when the 14 inch pump was making no impression on the body of water so there was no help for it but to put down a 20 inch lift alongside, to help it. This meant several weeks work for nine men working night and day, when fixed another start was made with the engine working at seven lifts per minute satisfactorily and no further trouble was experienced but the above shows the volume of water to contend with and only 30 fathoms from the surface. As the new machinery was fixed trials were made, particularly with the hauling portion which consist mainly of cables and trucks worked off Peacock's and Morphett's shafts, and passing the water through the dressing

wool producers on the eastern plains were already suffering from a drought that had commenced in 1864.
Despite all this, by the middle of the year, the Mine was still employing about 200 workers dressing previously discarded low grade ore. Henry Roach had gone to Adelaide and the Mine accountant Mr. Challoner was running the mine and the construction of Graves' Engine-house was continuing and a new pump engine had been ordered from Cornwall.
The mine was maintained on standby with Morphett's pump still keeping the mine free of water.

A Crucial Decision

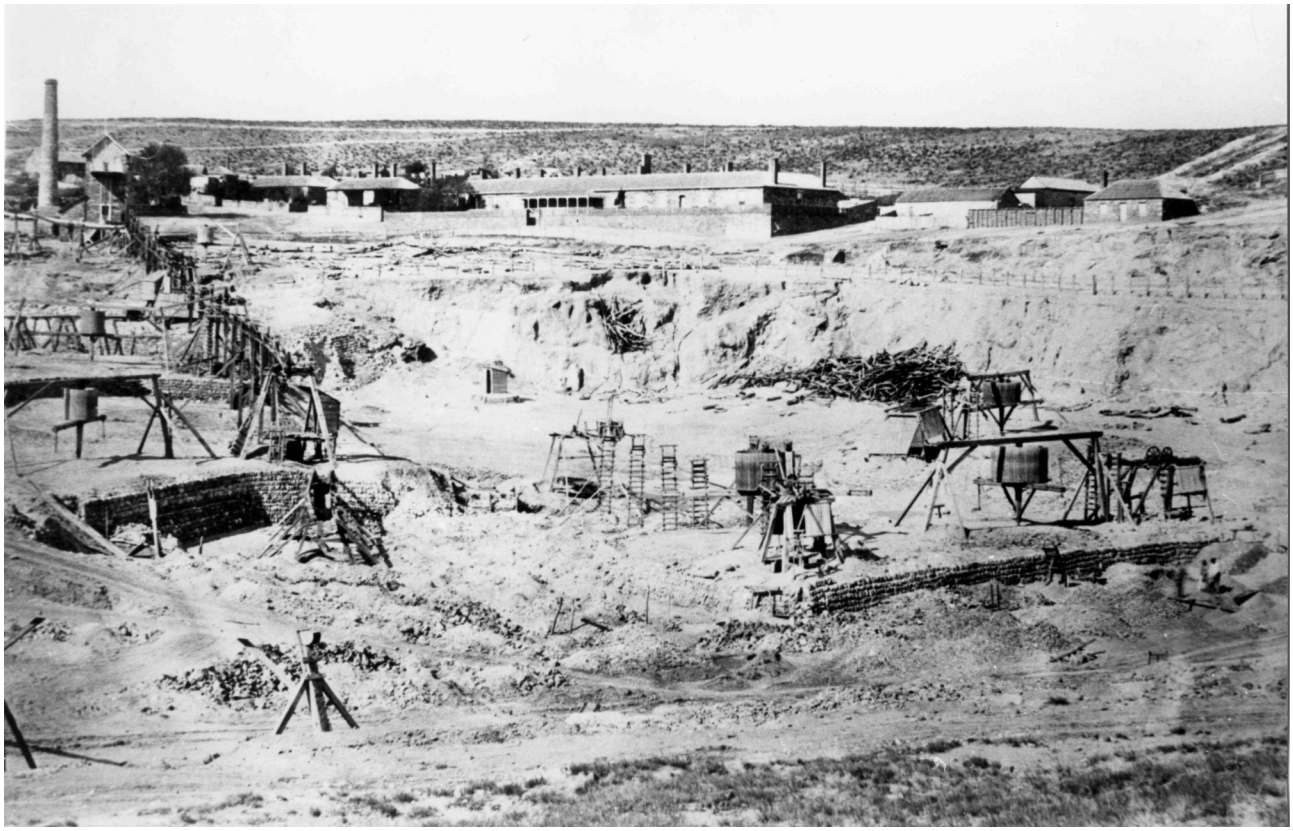
In September 1868, after an inspection of the mine by John Darlington, a mining engineer, the directors of the Company accepted his recommendation to commence open-cut mining as a more economical method of operation. Although Graves' Engine-house was now complete it would not be needed and the engine that was on order was cancelled.
A further 200 jobs were lost when in April 1869; all extraction of ore from material in the Burra Creek was abandoned. A stockpile of 363 tons of ore was sold off and the work force reduced to only 46 (11 mechanics, 19 miners, 1 labourers, 4 boys, and 5 officers). For the six months to March 1870 the wages bill had fallen from £130,000 to just £1,313. The population of Burra fell to 3,400 and the number of occupied houses to 877. As the leases on 21 properties expired in Kooringa, it was decided by SAMA to make them available for freehold. Although some businesses took up this offer, many properties were allowed to fall into disrepair, so much so that by 1872, an article in *The Register* an Adelaide newspaper described the dilapidated town of Kooringa, 'the shabbiest town in the Australias.' The houses 'going paintless, with stucco off their fronts and roofs held on by stones to prevent them blowing away', claimed to be 'the most squalid in the British Empire'. Clearly the writer had never visited India or slums in any English industrial city.
The mine remained idle for most of the year, 1869, as the necessary machinery for an open-cut operation was acquired. A new era was about to commence.



Kooringa 1872
Even as late as 1872 Kooringa is a rather sparse and forbidding place. This picture shows the rows of Paxton Square, the Bible Christian Chapel, the barn-like Welsh Church opposite, the Thames Street Cottages with their massive chimneys and beyond them whitewashed cottage rows, St. Mary's Church on Limestone Hill, with the Bible Christian Church, Bridge Street, behind.



This photograph of the Burra Mine taken, in 1868, shows the crusher waterwheel, shingled ore dressing sheds and significantly, the remains of Schneider's engine-house that was being dismantled for its stone is shown just to the right of the centre of this picture. Both of Morphett's Engine-houses with their boiler-house and its giant flue behind them, a haystack for the horse-whim horses and Schneider's flue up on the hill in the far background. In the right foreground is a poppet-head atop a mine shaft.



This panorama of the mine flat taken in 1868 when the mine was idle, shows at the top left Peacock's Winding Engine -house with a row of poles stretching towards the camera that carried the cable for hauling kibbles from four shafts. The Mine offices and mine captains' houses behind it are set on higher ground whilst down lower are several idle horse-whims. Note the piles of timber that were used to shore up the mine underground.



Built from the stone of Schneider's engine-house, Graves' Engine-house was completed in 1869 immediately prior to the decision to go to open-cut mining The horse-whim on the left and the capstan, which used man power, in the foreground were used to haul mullock from Graves' Shaft as it was sunk to join up with drives in the body of the mine. A kibble can be seen hanging from the poppet-head above the shaft, another is on the far right.



The surface workings of the Burra Mine during the open-cut operations in the 1870s. Note the miners with their hand-barrows clearing away debris and the stacks of timber removed from the shafts and drives.

machinery, here for a time trouble arose in regulating the speed so as to allow the long cable time to run the trucks safely over the lines to where desired.
When the starting troubles were overcome and the new machinery running smoothly, the dressing results were highly satisfactory. Skimpings, waste stuff rejected by the tributers as worthless, after passing through the new mode of dressing showed clean 30 per cent ore. Careful records were also kept of the number of wagon loads of dirt etc., excavated from the Flat and carried to the dump by small lines and for six months ending October, 1871, 29,330 wagons of stuff containing 36,762 tons were tipped, for the previous half year the amount was only 15,000 which showed that everything was working smoothly and gradually reaching its maximum limit.
As the work progressed, the timber that had been installed, to shore up the shafts and drives, was used to fuel the furnaces of the pumping and hauling engines. The new crusher pounded the ore to a fine powder to facilitate its separation from the waste using the water pumped from the mine.
After the accountant Challoner had been confirmed as the senior officer over Swansborough, poor financial returns led to him being asked to resign by October 1871. After 27 years service to the Company SAMA was not represented at his farewell dinner in Burra in December.
In 1872 the Company made a loss of £1,211, mainly because little orey stuff was being discovered. By October, the previous six months had produced only 6,974 tons of ore to 37,174 tons of 'attle' (waste). Although Morphett's pump engine was producing 96,000 gallons of water per hour this was proving inadequate for washing the amount of ore being raised. To increase the volume of water new 20 inch lifts had to be installed in Morphett's Shaft. The new dressing tower proved unsatisfactory and the old stamps were reintroduced whilst awaiting a new 15 head battery that had been ordered. The Burra ore was proving to be very difficult to separate.
A dividend was paid from accumulated funds, but this turned out to be the last dividend paid before the closure of the mine.
When, in 1873, the water level in the mine fell from 40 fathoms to 50 fathoms, some underground work in search of orey stuff was resumed. Any profits made between 1873 and 1876 were spent on new machinery. A 24 foot waterwheel was constructed to assist with ore dressing operations and Swansborough was replaced by Captain Robert Sanders as Superintendent in an attempt to improve returns.
1876 saw a push by tutworkers to sink new shafts, deepen old ones and excavate drives at lower levels, but no new lodes were discovered. The 39 tributers working the mine managed to raise 254 tons of good ore and by October the workforce was back to 307 of which 102 were miners.
Whilst haulage from the open-cut was working well, the lack of water was still proving a problem for the satisfactory separation of the ore. In the first six months of the year the open-cut yielded 22,790 tons of deads, 26,382 tons of orey stuff and 1,156 tons of old timber.
Despite the optimism of Captain Sanders no new lodes of significances were discovered.

The End of an Era (1877)

During this year Morphett's Shaft was being pushed down to 100 fathoms (183 metres) with drives at various levels searching for new lodes but all to no avail. The cost of production had almost doubled since 1868 and the price of copper had fallen below £80 a ton resulting in a loss of more than £12 on each ton of ore. In August five SAMA directors visited the mine and following this, the secretary Sir Henry Ayers wrote to Captain Sanders instructing extreme economy or the mine would have to close. In the face of rising production costs and falling copper prices economies were not enough and in September miners were finally given a week's notice and work ceased on 29th September with the loss of 300 jobs. The mine officers and Captain Sanders were dismissed with a months notice. The Morphett's pump engine was shut down and water began to once again rise in the mine. The mine was put into 'mothballs' to be re-opened when copper prices rose, but the sale of plant and equipment in November made it clear that the directors did not expect this to be any time soon. The mine had closed after 32 years of operation.

The End of the 'Monster Mine'

'In the last week of October, following the final inspection of the underground workings by the three mine 'Captains', the pumping engines were stopped and the mine fell silent. After almost seventeen years of almost continuous working, the great projecting beam high up on the bob-wall of Morphett's pump-house lay motionless. No breath of smoke emerged from the chimney stacks on the surrounding hillsides. Silently in the levels and shafts far below, the ground waters rose. With its life-support system withdrawn and its heartbeat stopped, the old mine slowly and quietly

drowned,' wrote Ian Auhl. How strange that silence must have been for the townships of Burra. Over the history of the mine there had been times of frantic activity with work going on around the clock and at other times the mine lying idle and water flooding the mine, as workers left for other mining ventures or men were laid off because of falling copper prices. Nevertheless it was a most successful enterprise, for over the time of the mine's operation the total ore recovered was 234,648 tons valued at £4,749,234.



This photograph of the open-cut mining operation in the 1870s shows a truck being hauled up the steep inclined railway from the workings below. Peacock's engine performed this operation initially but it was later replaced with another hauling engine.



This photo, taken in the early 1900s, well after the mine had closed, is of the ruins of the crusher and sawmill that was driven by a 42 foot waterwheel. There were several waterwheels operating during the lifetime of the mine. This was the largest one.



Burra Mine 1901

At the turn of the 20th Century the Burra Mine stood idle with the scars of the open-cut mining clearly visible. The water had risen to its natural level, creating a deep pool that was used by the locals as a swimming pool. The water-wheel on the left no longer supplied with water, its launder having been dismantled long ago. The piled up waste near what had been the dressing tower with its flue on the hill. The abandoned engine-houses, silent sentinels, looking down upon an alien landscape

Languishing

Between the mine's closure in 1877 and 1900 there were rumours that the mine was to be sold and perhaps reopened. First it was thought to have been taken up by a company in London and later it was a syndicate in Sydney. Captain Killicoat and John Drew negotiated to buy it in 1882, and again in 1888 another local syndicate tried, but all of these manoeuvres were fruitless. During this time there had been tributers, two in 1886 rising to 34 by 1888, working at the mine eking out a living from the ore they recovered from near the surface. When in 1889 the copper price fell to £40 per ton that number of tributers was reduced to 9.

Over at the smelter, in 1891, equipment was installed to recover copper from the large slag heap accumulated there, but this venture collapsed when in 1892 the copper price fell even further. Some exploratory work was carried out by SAMA at the mine drilling bore holes to over 1000 feet (300 metres) during '98 and '99, none of which proved encouraging.

From January 1900 the Burra Slag Extraction Co. was working over the slag heaps at the old 'smelts' site, but this operation ceased in 1902.

1901 was the year that saw the floating of the Burra Burra Copper Co. which bought the mine. There was also a visit from the Premier F.W. Holder, an old 'Burraite', with other state politicians to inspect the electromagnetic separation process that was treating the tailings of the mine. This venture experienced many problems and as the Burra Burra Copper Co. was relying on the royalties from the Electro-Magnetic Separation Co. to fund its operations, both companies failed. The electromagnetic plant was demolished in 1904 as was the slag extraction plant across the creek.

With the liquidation of the South Australian Mining association in 1912, all the remaining properties around Kooringa and Graham were put up for sale and this was followed by the Burra Burra Co's sale, by auction, of the Burra Mine site for £3,000 to the pastoralist A.J. McBride in 1916. The remaining engines were then removed from their engine-houses and sold for scrap.

One of the landmarks of the mine, Morphett's tall chimney stack that had stood for over sixty years was demolished with explosives in 1921. This was a common way of obtaining valuable building stone for use in construction around the town, one that had resulted in the loss many significant historic buildings.

Another one of the mine's landmarks suffered sever damage from a fire, the result of young lads smoking out rabbits in December 1925. This fire at the disused mine destroyed the timbers of both of Morphett's Engine-houses and the shaft. Apparently a grass fire started in the vicinity of the winding engine-house and was put out by locals. However some time later a much more serious fire was revealed as smoke poured from the shaft and engine-houses. All that could be done was watch and wait until it burnt itself out. At the height of the fire the burning wooden shears straddling the shaft collapsed with the huge wheel and the steel effigy of Johnny Green, the miners' mascot crashing to the ground amid a shower of sparks. The timber balconies of the engine-house likewise were destroyed, rendering the engine-house a stone shell. It was to remain in this ruined state until 1986 when, as a Jubilee 200 project, the timbers of the shaft, engine-house, the balconies and the slate roof were restored, making it the only restored Cornish engine-house outside Cornwall.

Slowly the town of Burra was losing what, in future years, would be seen as significant historic buildings. Even as late as 1956, another Burra landmark, the 80 foot smelter's chimney, the one remaining sign of the smelter's existence here, was deemed unsafe. Fearing its imminent collapse, it was dynamited for its bricks.

Things changed in 1961, when the mine site was acquired by the District Council of Burra and it was declared a tourist site, one that preserved some of Burra's heritage. This did not, of course, preclude further mining.

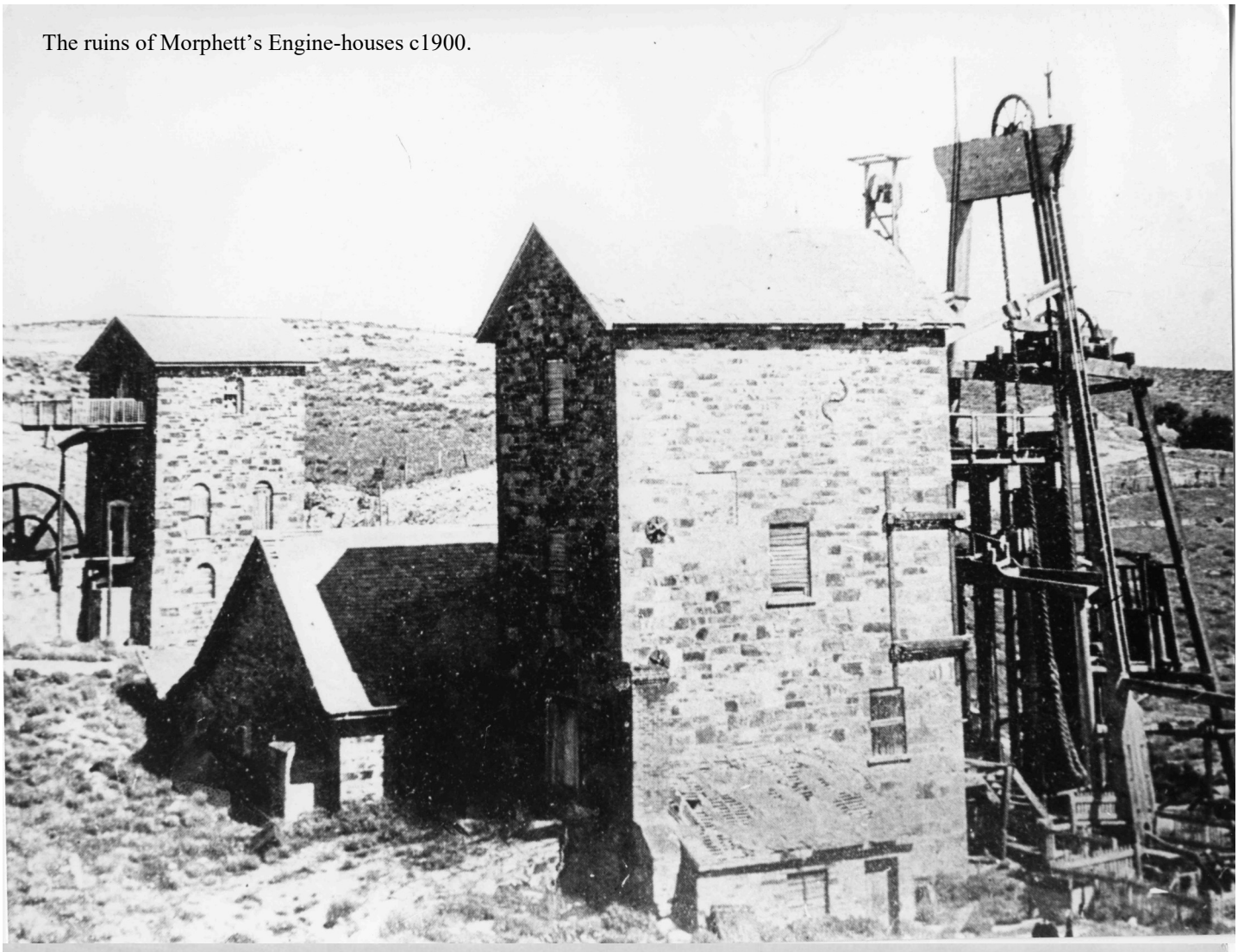
Modern Open-cut Mining

In 1969 'Samin' Ltd. took up the mining rights on the site with the intention of removing any

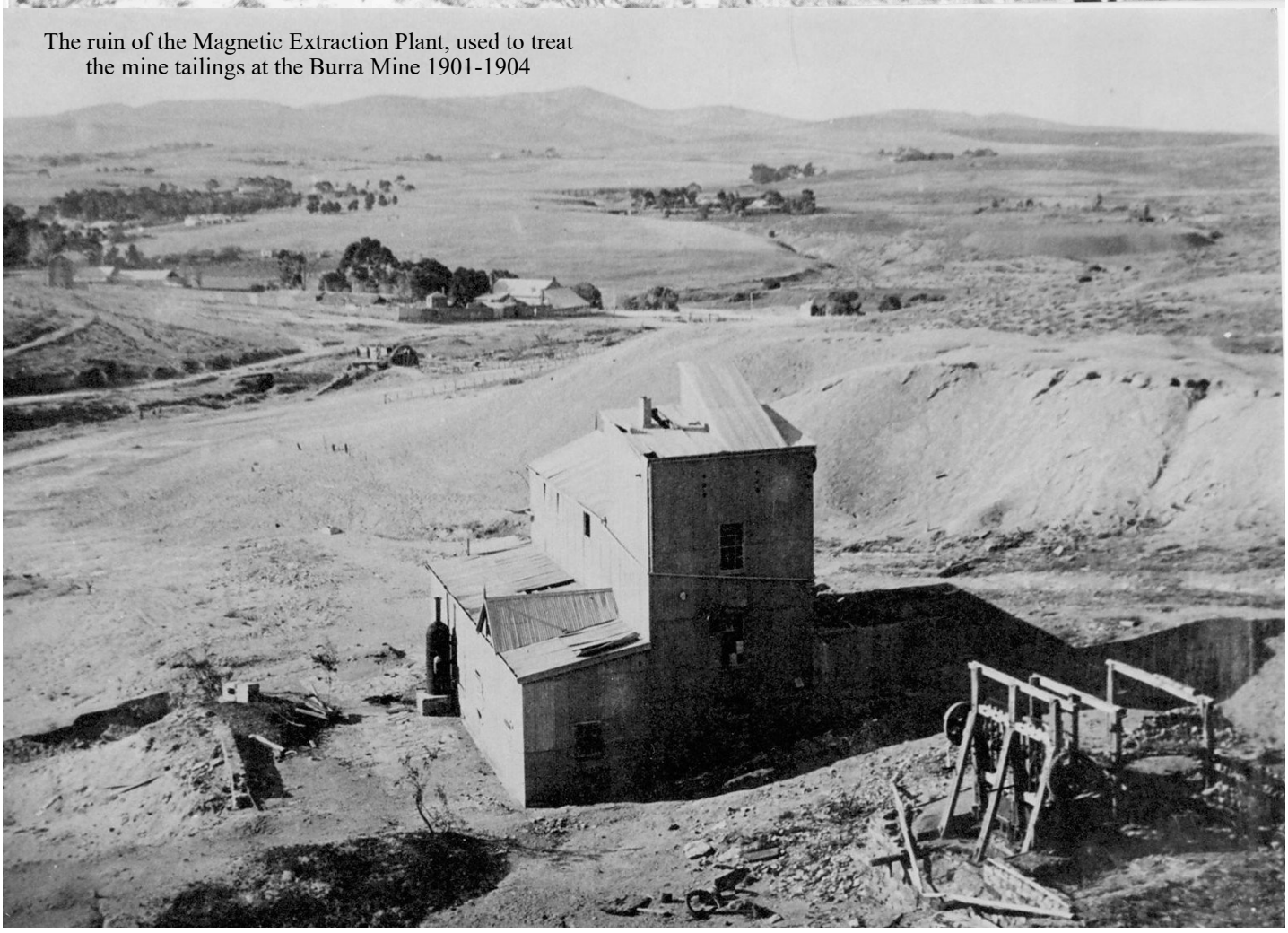


Young men in their Sunday best watch the fire at Morphett's Pumping Engine-house in December 1925.
The remains of the wooden shears that had collapsed into Morphett's Shaft can be seen through the smoke.

The ruins of Morphett's Engine-houses c1900.



The ruin of the Magnetic Extraction Plant, used to treat the mine tailings at the Burra Mine 1901-1904





Morphett's Pumping Engine-house 1869

The huge 32 ton beam can clearly be seen protruding from between the balconies and the giant shears with its wheel towering above. The boiler-house that held six Cornish boilers producing steam for both of Morphett's beam engines is still intact. The launder that delivered the mine water to the crusher's waterwheel runs to the left and to the right to Morphett's Pool. The pump engine is idle awaiting a decision on the future of the mine; one that would see it become an open-cut mine. Note the small poppet-head straddling the shaft, which was replaced by a larger one for the installation of the 20 inch risers during the later stages of the mine. When the mine ceased in 1877 the beam was left slanting downwards, not level as seen here.

remaining copper ore using modern open-cut methods. With the advantage of more efficient machinery and fewer workers required, it now became a profitable alternative. This would require pumping some 2 million gallons (9 million litres) of water daily from the mine and the removal of 14 million tons of rock containing an estimated 4 million tons of low grade ore. The contract for this mining operation was let to Roche Brothers. 'Samin' would use this ore to produce copper concentrate in the form of copper oxide at its plant adjacent to the mine. The chemical company 'Adchem' continues to produce copper concentrates at this plant today for use in wood preservation, anti-fouling applications and glazes for ceramics.
This operation commenced in 1970 and continued until 1981, leaving the large terraced hole in the ground which, when the natural ground water returned, became the 50 metre deep mine pool we see today. During this operation, in 1971, it was considered necessary to remove Peacock's Winding Engine-house that had stood there since 1858. This resulted in its rapid demolition with dynamite amid cheers from some of the locals. Fortunately not before a group of far sighted enthusiasts had dismantled Peacock's stone flue and shifted it from close to its doomed engine-house to the entrance to the mine where it stands today with an effigy of Johnny Green on top. I wonder what the stonemasons who lifted these stones into position during its construction or the engine drivers who pulled the levers or the miners who saw it lifting their loads, who are now long gone, would make of all of this.



The end of Peacock's Engine House 1971
In 1970 a modern open-cut mining operation commenced and this engine house had to be demolished. Peacock's Chimney had been moved stone by stone to the entrance to the Burra Mine site where it stands today.



The 1970s open-cut operation showing dump trucks removing the exposed blue copper ore and the depth of the lode.



Above and Below: The modern open-cut mining operation showing the mine pit before and after it filled with water, the same water that flowed from natural aquifers that so dogged the mine during its entire history.



Preserving the Past

In 1961, prior to the modern open-cut mining operation, the Burra Town Council had acquired the mine site on 17th November it had been officially opened as a tourist attraction. The plan was to make the site open air museum of the mining era and open it up to the public.

The historical significance of Burra was recognized in July 1980 when it was confirmed as a State Heritage Place and at this time the mine and the smelts sites together with other sites around the town were listed.

In 1988 with a Commonwealth Government grant and assistance from the Department of Mines and Energy interpretive signs were placed at the significant remaining structures in this mine museum. These include; the restored powder magazine, the ruin of Graves Engine-house, the ruins of the Mine Offices and the Mine Captains' residences, Morphett's restored pumping engine-house, the ruin of Morphett's winding engine-house, the Welsh style haulage engine chimney, the Cornish style crusher chimney, the ruin of the crusher house and boiler room, the raised ore dressing floor and at the entrance to this mine museum, Peacock's re-sited chimney and the Mine store and store man's residence which is now privately owned.

The mine pool, now filled with water, clearly shows the extent of the ore body of Burra's Monster Mine, which by modern standards was really quite small.

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GLOSSARY

at grass	raised to the surface of the mine
bob	the steel beam that was attached to the moving rod of the steam engine and was pivoted on the bob wall of the engine-house.
buddle pits	a series of ponds used to wash the ore prior to bagging.
capstan	a windlass with a rotating drum used to haul up the kibbles.
dressing ore	removing waste material from the ore
in fork	free of water below that level
kibble	an egg-shaped bucket used to raise the ore from the mine shaft
pitch	a rock face, usually below ground, that the miner dug the ore from.
tributer	a miner who worked for tribute (a percentage of the value of the ore)
tonworker	a worker who sorted and dressed the ore
tutworker	a worker who installed timber shoring in the drives and shafts of the mine.
whim	a windlass with a rotating drum used to haul kibbles from mine shafts
whim boys	boys who drove the horses that powered the whims


etts Enginehous