

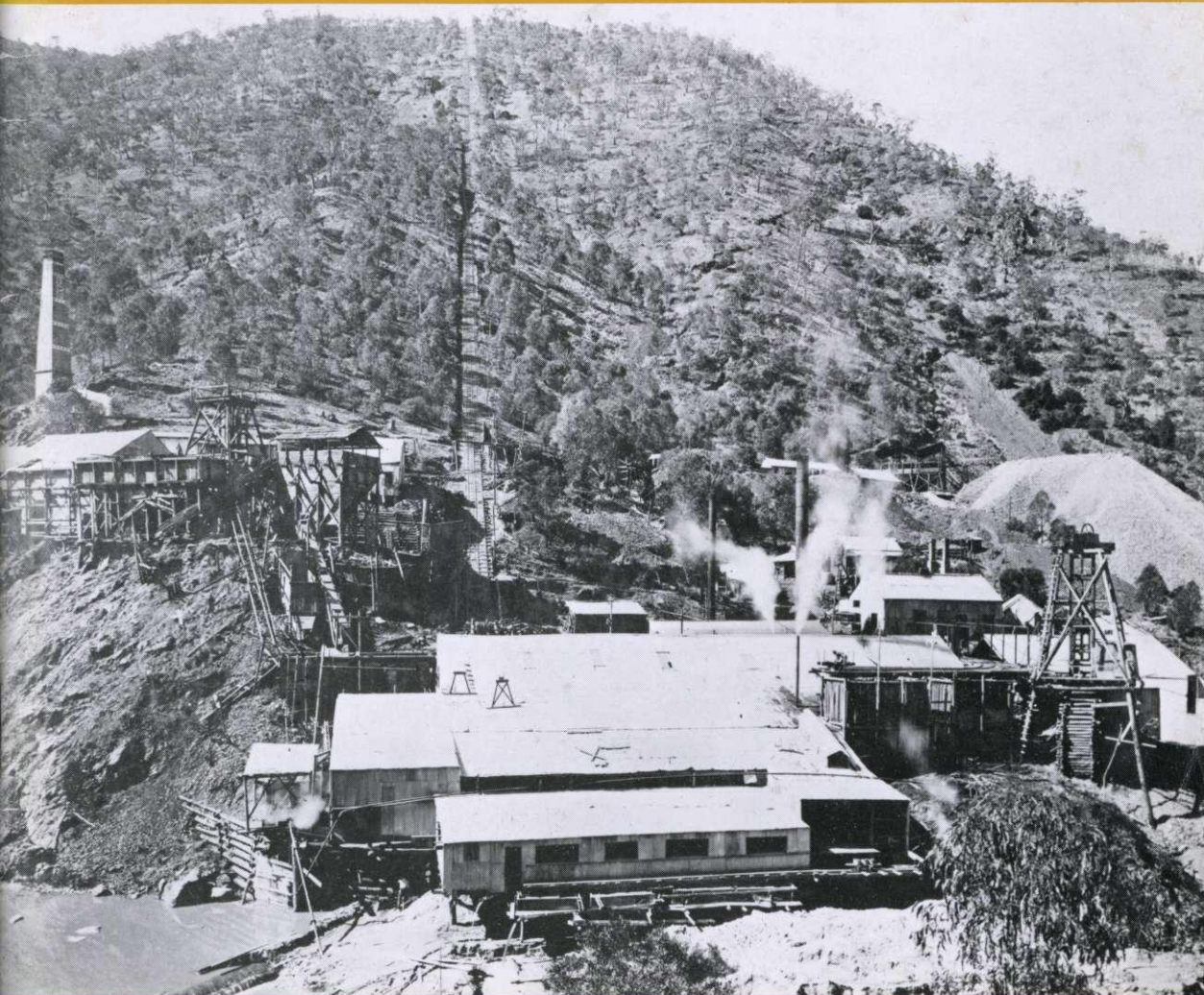
**Light Railways**

**No. 94**

**October 1986**

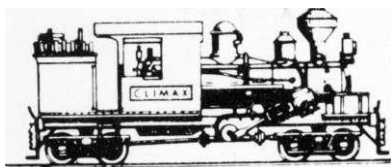
# **TRAMWAYS DOWN THE GORGE: the story of Hillgrove, 1887-1921**

**by Ross Mainwaring**



**Published by  
The Light Railway Research Society of Australia**

Registered by Australia Post - publication No. VBQ1339



# No. 94 Vol. XXIV OCTOBER 1986

ISSN 0 727 8101

## Light Railway Research Society of Australia

P.O. Box 21, Surrey Hills, Vic. 3127.

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**President,** Mike McCarthy (03 762-5847)

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**Subscriptions:** \$18.50 per year covering 4 issues *Light Railways*, 6 issues *Light Railway News* and information on Society activities, publications etc. Overseas \$22.70. To Membership Officer, 3 Fairless Street, Shepparton, Vic. 3630. Back numbers *Light Railways* and other publications from LRRSA Sales, P.O. Box 21, Surrey Hills, Vic. 3127.

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(Phone 02 958-4516)

### Glossary of Terms

*Adit:* Horizontal entrance to a mine.

*Berdan Pan:* An open metal pan that rotates at an angle of 45 degrees, for amalgamating gold.

*Grizzly:* An iron or steel bar grating for screening ore.

*Frue Vanner:* An ore dressing machine.

*Wilfley Table:* An inclined vibrating table that separates gold from crushed ore.

*Winze:* A small underground shaft from one level to another.

*Trommel:* A revolving sieve.

*Scree:* Small stones on a steep slope prone to slides.

*One Cord of Wood:* 8' long x 4' high x 4' wide = 128 cubic feet.

1 Chain = 66 feet.

100 Links = 1 chain

7.92" = 1 link.

20 Pennyweights (dwt) = 1 ounce

112 Pounds = One hundredweight (cwt).

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## EDITORIAL

The Hillgrove mining field is probably Australia's most spectacular, being situated in a gorge nearly 500 metres deep. However, scenic beauty did not bring economic rewards: instead the miners had to contend with the formidable obstacles the gorge presented for access. Incline tramways down the steep sides of the gorge were the answer and between 1889 and 1976, seventeen inclines were constructed to provide access to mine adits.

This issue of *Light Railways* brings Part I of Ross Mainwaring's comprehensive history of the Hillgrove mining field and the fascinating transport systems which developed to cope with the unique environment. Hillgrove, which was the third most productive goldfield in New South Wales, enjoyed a boom period in the 1890s, but then declined until the Baker's Creek Mine closed in 1927. This history covers the period from the discovery of the field in 1877 until 1927. Part II, which will be published in April 1987, covers the revival of mining operations in 1937, through to the present day.

**Cover:** Baker's Creek mine c.1900 The incline tramway to the top of the gorge is behind the Baker's Creek Company mill in the foreground. The Baker's Creek North workings are to the left of the tramline, and the Baker's Creek Consol's shaft and plant is to the right.

Photo: Geological and Mining Museum

# TRAMWAYS DOWN THE GORGE: THE STORY OF HILLGROVE, 1887-1921

by Ross Mainwaring

## 1. HILLGROVE

### Early History

Gold, Antimony and Tungsten; these three metals contribute to the story of Hillgrove. They provide wealth and employment for many people in years gone by and, to a lesser extent, continue to do so.

The town of Hillgrove is situated 24 km east of Armidale in northern New South Wales, in the New England Tablelands. Hillgrove is 960 metres above sea level while the Baker's Creek gorge, which runs north to south, plunges down 460 metres. The scenery is spectacular.

The land was originally devoted to pastoral activities but in 1877, Havershed Bros and Thomas discovered an antimony lode on the western side of the gorge. In 1878, Daly, Elliott and Brackin found a similar lode on the eastern side of the gorge. Afterwards, an antimony smelting works was erected at the head of Swamp Creek, by an

Armidale syndicate. The first gold was credited with having been discovered on the Garibaldi leases and shortly afterwards the Eleanora property of 200 acres was taken up. A return of seven ounces to the ton resulted.

1887 saw the opening up of the real gold bearing reefs of the field, with the discovery of the Little, Big, Middle and Baalgammon lodes. Mr George Smith discovered the outcrop of the Big Reef in the Baker's Creek, which led to the application for a 15 acre block on 27th of March 1887. Originally there were only four shares in the partnership but this was increased to five to admit Adelaide interests, who agreed to finance a tramline up the face of the gorge. A company, with 100,000 shares paid up to 17s 6d, was floated, becoming the famous Baker's Creek Company.



Hillgrove's main street, Brackin Street. Date unknown.

Photo: Geological and Mining Museum

The auriferous nature of the Sunlight reef was discovered prior to 1887 by Elliott and O'Donnell, on the western side of the gorge. This reef was worked by the Sunlight and West Sunlight Companies. To the north the various Hopetoun properties were amalgamated by a Victorian company in 1897.

1887 also saw the pegging of the North and South Cosmopolitan claims. Due to the poor gold values this property was afterwards worked for antimony. In July 1899, the Cosmopolitan and Carrington were amalgamated into the "Hillgrove United".

The Hillgrove Proprietary Mines was formed in 1898 from the amalgamation of the Golden Gate Company with the Cooney Proprietary Mines and the Hillgrove Proprietary Mining Property Pty Ltd.

These aforementioned properties were the principal ones of the field in its formative years. They all shared the same difficulties of access. These were overcome by the construction of incline tramlines from the tablelands down into the Baker's Creek gorge.

Peak production of the Hillgrove goldfield was in 1896, with 28,501 ounces won, which was also the highest return in New South Wales. Thereafter, a steady decline in production began.

### Hillgrove Township

Hillgrove was originally known as Eleanora, reputedly named in honour of the manager's wife of the nearby Eleanora antimony mine. In the town's heyday, the population was in excess of 3000 people. All the amenities of a thriving mining town were to be found, including a cottage hospital, technical college, stock exchange, gymnasium and numerous masonic halls and lodges. The town was proclaimed a borough on 29 September, 1899. Water was pumped, beginning in December 1891, by steam engine from the government dam on the eastern boundary of the settlement, to five stand-pipes.<sup>1</sup> The supply became inadequate to service domestic needs, and the mines as well. Things were grim during droughts.

By December, 1893 Hillgrove held a Spring Show and George Smith had his pick on display, it "being a rusty, battered, handle splintered pick;" a trusty tool which helped to discover the wealth upon which Hillgrove was founded.<sup>2</sup>

The *Hillgrove Guardian* newspaper provided the citizens with all the latest news. The first edition was on 1 June 1889, under the editorship of Mr EK Brown.<sup>3</sup> The paper folded up in February, 1909.

Transport was provided by a daily coach service which departed Hillgrove at 6.15 pm, arriving Armidale at 9.45 pm. The single fare was 5

shillings. A gold escort also ran. From time to time the idea of a light railway to connect Hillgrove with Armidale was mooted, but nothing ever came of it. Freight charges may have been considerably reduced and fuel more easily procured.

### Metz Township

The sister town on the western side of the gorge was originally known as Sunlight, then West Hillgrove, finally becoming Metz in 1897. It was home for the employees of the West Sunlight and Sunlight mines. The town possessed numerous shops, two hotels, the *Gara* and *Tattersalls*, a public hall, churches, school of arts and a school. Eight hundred people lived around Metz in 1889. Today, only three houses remain, a scene so very typical of many long-forgotten mining towns.

### Electric Power

Hillgrove was the first New South Wales town to be offered the benefits of hydro-electricity. It was estimated that the cost of steam power was from £50 to £62 per annum per hp unit, compared with £30 for electricity.<sup>4</sup> The Hillgrove and Armidale Electric Power Bill had its first reading before Parliament on 23 February 1893.

Unfortunately, financial troubles beset the company almost immediately. As a result, the Crompton Power Company was formed in 1894. The Eleanora and Baker's Creek mines were to be connected to the grid. The machinery was erected by January, 1895 and Baker's Creek mine was first lit in March. However, because of the meagre storage capacity of the dam, the electrical supply was not reliable.

In March, 1896 the Crompton Company entered into negotiations with the New England Electric Supply Company.<sup>5</sup> A new dam was to be built at once. The Sandon Electric Light and Power Company was formed shortly afterwards. A dam on the Gara River, built by Mr F Cotton MP provided water for a 300 hp Pelton wheel. An oregon wood flume, 1 mile long, channelled the water from the log dam to the turbine. Five miles of

1. *Armidale Express*, 11.12.1891.

2. *Ibid.*, 15.12.1893.

3. *Ibid.*, 4.6.1889.

4. *Hillgrove Guardian*, 2.11.1901.

5. Report from Select Committee on Hillgrove and water power electrical bill of 1.1.1892.

6. *Australian Mining Standard*, 17.2.1894.

**Right:** The spectacular setting of the Baker's Creek mine in the Hillgrove Gorge is evident in this scene. The Golden Gate Company's battery is evident a little below the tableland.

Photo: Geological and Mining Museum





copper wire ran in a north-easterly direction to a sub station at West Hillgrove (Metz).<sup>7</sup> In July 1900, the Sandon Company advertised in the *Hillgrove Guardian* for the supply and installation of one or two electric lights from 25 shillings each.<sup>8</sup>

In October 1900, the International Railway Corporation Ltd of England acquired the plant.<sup>9</sup> A new dam 575 ft long and 24 ft wide at the top was built. The previous dam was built of logs and not unexpectedly it came to grief during flood time when a large boulder damaged the wall. Electricity was first switched on at the Sunlight Mine on 8 January 1901.<sup>10</sup> In 1906 New Hillgrove Proprietary Mines built the Styx River Scheme to supply electricity to the Eleanora.

Drought conditions over the years caused all the hydro schemes to be unreliable, adversely affecting the production of the mines. Reliance on steam power was never fully supplanted. Mr Pinto was leasing the Gara River plant for £1 per week to selected customers in 1907, but the scheme closed sometime later.

### Social Events

Lord Jersey, the Governor of New South Wales, and Lady Jersey, on a farewell tour of northern centres before their return to England, visited Hillgrove on 23 February 1893. After lunch, chaired by George Smith at the Commercial Hotel, the couple descended in a tram to inspect the Baker's Creek mine. As a paper reported, "Lady Jersey went to the shaft of the New Baker's Creek Consols — a trip few men care to negotiate."<sup>11</sup> A photograph album of Hillgrove was presented to Lady Jersey.

On Friday, 7 December 1901, the English cricket team visited Hillgrove after playing a demonstration match in Armidale. The highlight of their visit was a descent of the Baker's Creek gorge. Four tram loads of players went down the Sunlight tramline after which they inspected the Sunlight and Proprietary mines. They were entertained to afternoon tea with the Mayoress of Hillgrove, at the Baker's Creek mine. It must have been an unforgettable experience for them.

In October 1904, a tea party for the people of Hillgrove was held in Metz. The townspeople descended the gorge by the Baker's Creek tram, then ascended to Metz by the Sunlight tram. Mr P Jones, the Sunlight Manager, was thanked for the free use of the trams.

In 1916 the Governor of NSW, Sir Ronald Munro-Ferguson, whilst on a visit to Armidale, was driven by car to Hillgrove on the 8 August. His

purpose was to take a trip down the Baker's Creek tramline. He was accompanied on the descent by Mr GH Jones, Mayor of Hillgrove and Mr William Curtis, Mayor of Armidale.<sup>12</sup> After their inspection of the mine they adjourned to the Commercial Hotel for afternoon tea, before returning to Armidale.

### Social Issues

Possibly as a reflection of the intransient nature of the community, there were few industrial disputes on the field. One, however, occurred at the Baker's Creek mine on the 2 November 1901, when the underground truckers struck for an increase in wages to eight shillings a week.<sup>13</sup>

Influenza in the early years of this century was still a deadly affliction for many of those unfortunate enough to be stricken. The Hillgrove community was particularly hard hit in 1919. With a population of 800, by July, 15 deaths had been recorded, 14 of them miners. This calamity affected production at the Baker's Creek mine, with many more men off work sick. Even the school was temporarily closed. The author's theory as to why miners were more susceptible, is that, after finishing work in the depths of the hot mine, the ride up to the top in the open tram exposed them to the cold winter winds.

One victim was John Peas, a prospector whose camp was three miles from the Baker's Creek mine. The Mayor became aware that Mr Peas was in distress so a rescue party was organised. Not having eaten for three days he was too weak to walk, so a litter was built to carry him around to the Baker's Creek tram. He was sent up to the hospital.

### Hillgrove Today

The decline in the fortunes of the Hillgrove mines early this century was reflected in the town. The peak population of 3000 in the 1890s had dwindled to 530 when the Baker's Creek mine closed in 1921. Today there are only a few dozen residents in Hillgrove.

Visitors to the town will find little to show of the past activities of a once thriving community. A few old miner's homes, the post and telegraph office and the former school — now a museum — are the only significant buildings still intact. Scattered bricks in empty paddocks bear witness to another age.

7. *Ibid.*, 5.3.1896.

8. Mineral Resources No. 8. Report on the Hillgrove Goldfield. 1900. Geological Survey Department, Sydney.

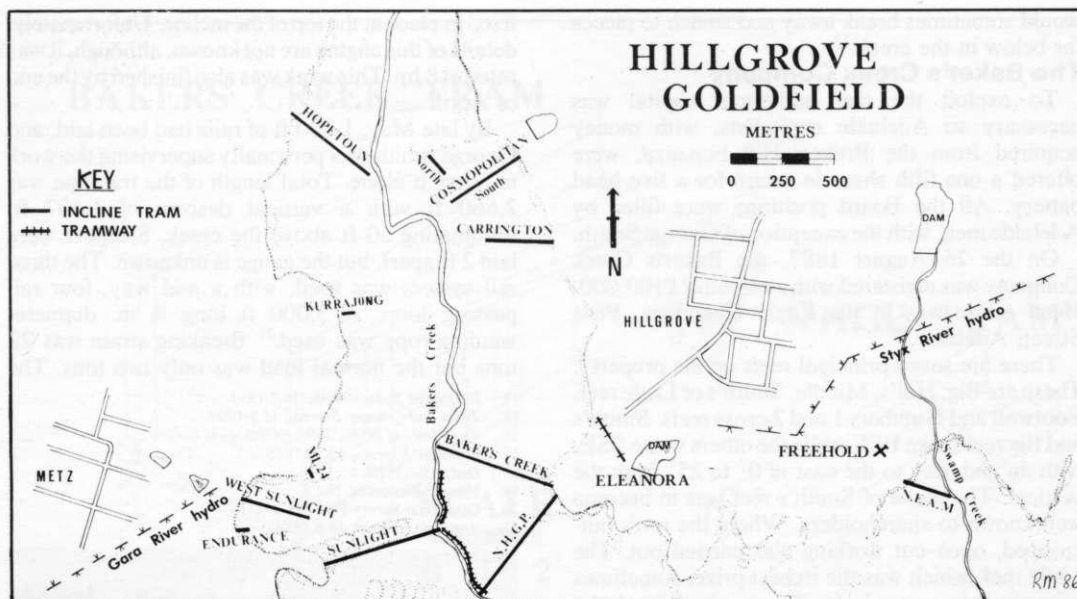
9. *Hillgrove Guardian*, 21.7.1900.

10. *Ibid.*, 27.10.1900.

11. *Ibid.*, 12.1.1901.

12. *The Mineral Industry of NSW*, No. 2 *Antimony*.

13. *Ibid.*, "No. 41 Tungsten".



### Mineralogy of the Hillgrove Field

On the Hillgrove field stibnite (*Antimony trisulphide*) is the most prolific ore. It is lead grey in colour. Once the most common usage was for antimonial lead in auto batteries. Other uses include anti-friction alloys for bearings, printing type, glass and ceramics, plastics and medicines to name a few. The stibnite ore bodies are mostly found within a sedimentary deposit of slates, schists and quartzites. The lodes strike in a north-westerly direction and are two feet or less in width.<sup>14</sup>

Scheelite is mainly white in colour, with small variations in tints. It is one of the chief ores of tungsten. The metal became important in 1898, when it was realised that high speed turning of steels

was possible with this very hard material. Its main uses are in alloy steels, chemical compounds, tungsten carbide and electrical contacts. Hillgrove has been a leading producer in New South Wales with an output of 1,956.5 tons to date. The metamorphosed sediments have been intruded by diorite and granite, the scheelite lodes being found in the granite. In some lodes, gold and scheelite are combined.<sup>15</sup>

Gold was found combined either with the antimony or scheelite, or in quartz reefs such as Baker's Creek mine. This combination with antimony was the bane of early metallurgists with satisfactory gold returns not forthcoming until the advent of the flotation process.

## 2. BAKER'S CREEK GOLD MINE

### Introduction

Baker's Creek Gold Mine was the premier company of the field, which helped to establish Hillgrove as the third richest goldfield in the State. Many important people came to gaze upon this wealthy mine, situated deep down in the awe inspiring gorge. However, the gorge was to cause immense difficulties in the early construction days.

Mr George Smith had the good fortune to discover the outcrop of the Big Reef in the bed of Baker's Creek in March 1887.<sup>16</sup> George Smith and his brother, along with the two Miller brothers, won

£2,500 worth of gold in four months, using a primitive spring loaded dolly. They named the show the 'Four Brothers Mine', but this name soon fell into disuse.

Initially, materials had to be sledded down the precipitous hillside to the mine, a difficult and dangerous operation, employing up to 30 men each day. The sleds were large logs lashed together; they were lowered in stages using tree stumps as anchor points for the ropes. This part of the hillside was known as "The Slide". Not unexpectedly, sleds

would sometimes break away and smash to pieces far below in the creek.<sup>17</sup>

### The Baker's Creek Company

To exploit the reef additional capital was necessary so Adelaide capitalists, with money acquired from the Broken Hill bonanza, were offered a one fifth share in return for a five head battery. All the Board positions were filled by Adelaide men, with the exception of George Smith.

On the 26 August 1887, the Baker's Creek Company was registered with a capital of £100,000. Head office was in the Eagle Chambers, Pirie Street, Adelaide.<sup>18</sup>

There are seven principal reefs on the property. These are Big, Hill's, Middle, Smith's or Little reef, Footwall and Numbers 1 and 2 cross reefs. Smith's and Big reef strike ESE while the others strike SSE, with an underlay to the east of 0° to 25° from the vertical. The name of Smith's reef was to become well known to shareholders. Where the reefs outcropped, open cut working was carried out. The Little reef, which was the richest prize, sometimes contracted to a very insignificant vein through the blue slate, making it both difficult and expensive to follow.

The company sought to exploit their resource by sinking a vertical shaft at the entrance to the tunnel on No. 3 level; from this shaft cross cutting intersected Smith's reef from No. 6 level downwards.

### Incline Tramway

For efficient operation of the mine, it became imperative to abolish the troublesome sledding down of supplies, so naturally the idea of a tramline was appealing. It was to be the first on the field. Surveying of a suitable route began on 14 December 1888.<sup>19</sup> Mr George Smith, accompanied by Mr Westcott, Manager of the Hillgrove branch of the City Bank, descended the gorge to the mine, from whence they began surveying.

On conclusion of this difficult task, construction had begun by the 22 February 1889, on a site a little to the south of "The Slide". Mr Martin, who had only recently arrived from England, was the engineer-in-charge. The heaviest earthworks encountered were at a place known as "Kangaroo Camp", where a cutting 30 ft deep had to be excavated. The formation here cut down through the southern side of a spur. This work was finished by the end of April.<sup>20</sup>

An interruption to this work was the lowering of two boilers measuring 24 ft x 6 ft. Most of the larger items of machinery had already been sledded down to the mine, so progress on the tram could be pushed ahead. Meanwhile, the winding engine was being

fixed in place at the top of the incline. Unfortunately, details of this engine are not known, although, it was rated at 8 hp. This work was also finished by the end of April

By late May, 1,600 ft of rails had been laid, and George Smith was personally supervising the work to hurry it alone. Total length of the tramline was 2,660 ft with a vertical descent of 1,407 ft, terminating 50 ft above the creek. Sleepers were laid 2 ft apart, but the gauge is unknown. The three rail system was used, with a mid way, four rail passing loop. A 3,000 ft long 7/8 in. diameter winding rope was used.<sup>21</sup> Breaking strain was 22 tons but the normal load was only two tons. The

14. *Illustrated Sydney News*, 16.7.1891.

15. *Town and Country Journal*, 15.6.1899.

16. *The Mines of NSW*, 1897, "Geological Survey".

17. *Armidale Express*, 15.12.1888.

18. *Ibid.*, 19.3.1889.

19. *Mineral Resources*, No. 8.

20. *Geological Survey Plan No. M13781*.

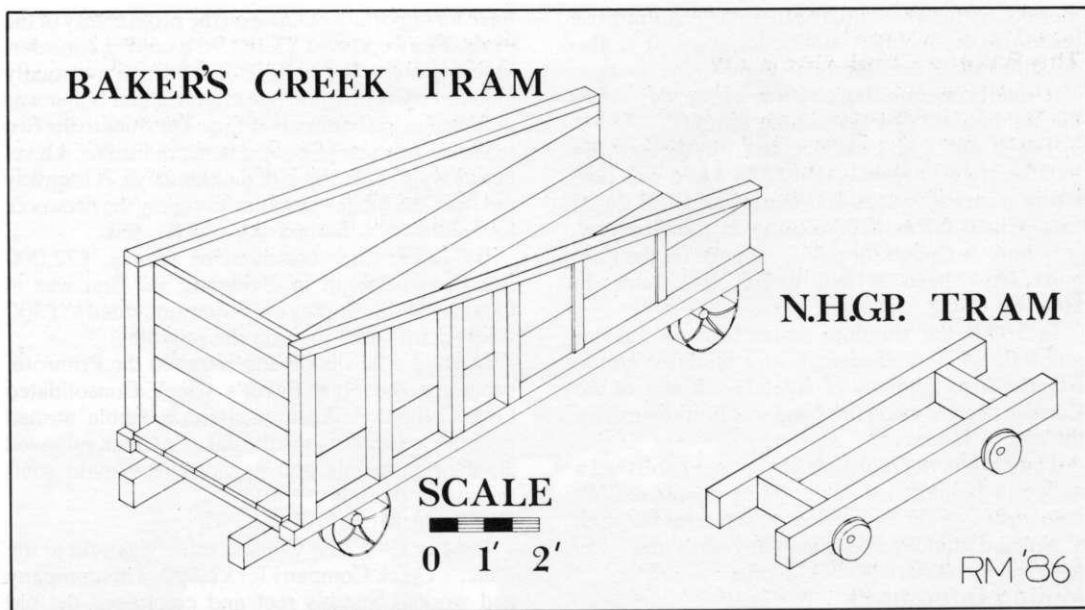
21. *Armidale Express*, 18.6.1889.



A view of the Baker's Creek Company's incline tramway shortly after completion. The route of the "slide" can be clearly seen to the left of the tramline, while the sinking of the North shaft is about to commence.

Photo: Geological and Mining Museum





steepest angle of descent was  $43^\circ$ , from a point about 50 ft above the passing loop to the summit. The lower section was on an easier angle of  $33^\circ$  while the passing loop was 154 ft long and 11.2 ft wide. Eight links was the width of the remainder of the tram formation.<sup>22</sup> Construction cost amounted to £1,300.

The four wheel, wooden trams were of an unusual design, necessitated by the steep inclinations of the line. It was higher on the downhill end so as to allow plenty of room to accommodate up to ten passengers.

#### **Incline Operation**

Thursday, 13 June 1889, witnessed the opening of the tramline. Its inaugural duty was to send tramloads of bricks down to the mine. George Smith personally supervised the procedures and was well pleased.<sup>23</sup>

The method of working for a descending tram, was that before the half way point was reached, steam was shut off to the winding engine, then the brakes were applied, allowing a controlled trip down to the terminus. Very heavy loads would have to be counterbalanced. Although there is no definite confirmation, the winding engine may have had cylinders 20 in x 12 in stroke, working two coupled drums.

Telephone communication was used on the tramline: indeed, the Mines Inspector insisted on it before passengers were allowed to travel up and

down. Phones were installed in the engine house and also in an office at the mine, possibly the signalbox.<sup>24</sup>

In 1897 the tramline was resleepered as white ants had feasted on the originals. The Inspector of Mines reported that the winding drums had new wooden brake locks fitted, also a new pinion wheel on the crankshaft. He also advised that a new regulation be implemented to prevent tram passengers from dangling their legs over the front while ascending. Safety first was not a strong point with some people. The tram carried as many as 1,000 passengers each 24 hour period. Derailments were not unknown.<sup>25</sup>

The life of the winding rope was relatively short even though rollers were spaced at regular intervals between the rails. One rope was replaced in 1897, then again in 1902.

Six men were employed in the daily operations. Most of the engine drivers were certificated men from Victoria.

The Baker's Creek North Mine, which owned the adjoining property, had rights to the use of the tramline for their own materials. Another mine known as the Primrose Company, had an agreement with Baker's Creek with regard to the use of the former's land. The main shaft, a tramway and

22. *Ibid.*, 25.6.1889.

23. Mines Inspector's notes for 1897: MR0151 Geological Survey.

24. Directors Report for 1890. Mortlock Library, Adelaide.

25. *Australian Mining Standard*, 14.8.1902.

mullock dump were situated therein. The Primrose could use the incline tramline in return. It is also possible that the Golden Gate mine, whose electrically operated battery was a little way below the summit, may have used the tramline.

The Profit and Loss account for the last six months of 1890 reveals that £316 3s 9d was paid out in tramway wages and materials. £163 2s 2d was written off as depreciation on tramline construction. A charge for public haulage on the tram must have been levied, as receipts came to £69 16s 11d.<sup>26</sup>

In 1902, the tramline boiler became due for renewal, so a replacement was built by Union Engineering Company of Adelaide. It was of the Cornish design, wood fired and was first steamed at the end of January.<sup>27</sup>

The *Hillgrove Guardian* newspaper published a notice in January 1903, informing people that no passengers would be carried on the tram between 8 am and midday.<sup>28</sup> Presumably this time was reserved for materials.

### Mining Operations

Mr Pleitner was the first mine Manager. He was known as Captain Pleitner, an old Cornish tradition of those times which did not long survive the new century. The company built their mill at the bottom of the incline, but its position was the object of litigation with the neighbouring Baker's Creek North Company, the outcome of which prompted the resignation of Captain Pleitner.<sup>29</sup> The terms were allegedly unfavourable, so the Captain claimed, to the shareholders. Mr Thomas Eyre was appointed in his place. As compensation to the North Company, Baker's Creek agreed to erect a new ten head battery to crush North's stone. In mid February 1890 the foundations collapsed, causing the battery to be rebuilt.

By the middle of 1889, ten head of stamps were working, powered by a single cylinder 10 hp steam engine. Five head were then used to crush Primrose Company's stone.<sup>30</sup> A new 40 hp engine and additional stamps were already in the course of erection. The battery eventually expanded to 40 head by 1893. Built by Langlands of Melbourne, each head weighed 672 pounds, and the normal speed was at the rate of 95 blows a minute. At this time about 500 tons of stone was milled fortnightly. Other plant included six Wilfley tables and two Berdan pans.

Treatment costs amounted to about 10s 11d a ton. The gold concentrates were sent to the Wallaroo smelters in South Australia. The boilers were wood fired, and this factor of fuel costs was, later on, to

have an important bearing on the profitability of the mine. Firewood cost £3 10s 9d a cord, a considerable expense. The boiler house, which eventually held three Cornish and one multi-tubular boiler was attached to the battery building. The flues to the two iron chimney stacks passed beneath the No. 4 level before entering the base of the chimneys. A tramway ran from the incline terminus to supply the firewood; four wheel iron framed skips were used.

By 1889, since commencing mining, £72,000 had been paid out in dividends, the first was in October 1888. Mining expenses amounted to £300 weekly, with 170 men on the payroll.

In 1893 a new company acquired the Primrose, becoming the New Baker's Creek Consolidated GM Company. An immediate squabble ensued over the lease. As a result, Baker's Creek removed all their materials and began a new main shaft further up the hill.

### Consols Mine

In May 1901, the Consols mine was sold to the Baker's Creek Company for £1,500. This company had worked Smith's reef and comprised the old Primrose, Enterprise and portion of Hacks selection leases. £175 was spent on returning it to working order.<sup>31</sup>

The Consols shaft was a headache for Baker's Creek Company as water continually seeped through into their own workings. Pumping was required seven days a week, adding to expenses.

In October 1901, a tramway was laid to remove the Consol's boilers, weighing some nine tons, to a new position at the Baker's Creek plant.<sup>32</sup> A special skeleton framed wagon had to be built for the job.

### Mine Tramways

A single track tramway linked the Sunlight with Baker's Creek mine. No direct references to it could be found except that a firewood tramway was being laid in October 1901, and finished by the end of November.<sup>33</sup> This may have been it, but evidence is very meagre. From a photograph the gauge was about 24 in. Many trestles were necessary along the route which in some places was high above the creek. The tramway entered the Sunlight battery building on a high curving trestle, which was necessary to gain a suitable gradient and elevation.

Internal tramways were necessary to service the various parts of the mine plant, which were situated

26. *Hillgrove Guardian*, 10.1.1903.

27. *Armidale Express*, 7.5.1889.

28. *Ibid.*, 25.6.1889.

29. *Hillgrove Guardian*, 10.1.1903.

30. *Ibid.*, 12.10.1901.

31. *Ibid.*, 12.10.1901 and 30.11.1901.

32. *Ibid.*, 13.10.1906

33. *Ibid.*, 3.9.1903.



Baker's Creek mining complex, 1905. The Baker's Creek Company's main shaft is at the top right. The huge mullock dump is prominent. Photo: Armidale College of Advanced Education

on different levels down the hillside. The incline tram had two unloading points, the first at No. 3 level, then further down at No. 4 level. The tramway signal box was located adjacent to the terminus.

The author's drawing of the mine tramway system, which is based on photographs, shows the tramways in use in the early 1900s. On No. 3 level a partly elevated tramway ran from the main incline tram across to the North battery. This may have been for the conveyance of firewood for the battery boilers. A chute sent the wood down from the end of the tramway, which terminated high above the battery buildings.

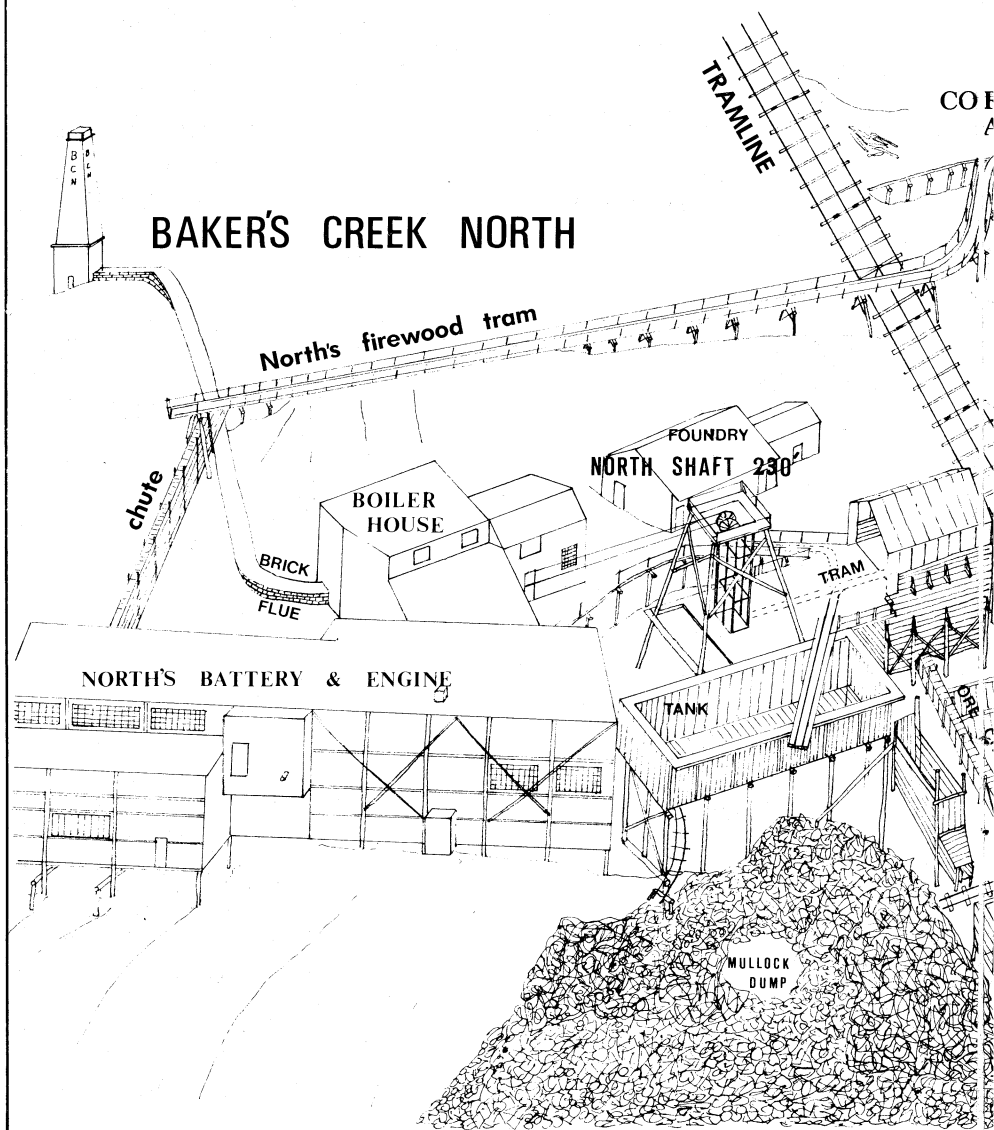
After the stone was hoisted up the main shaft, it was picked through by men and boys to remove any mullock, which was pushed out in skips into the dump. Upon studying photographs it appears that

battery stone was hand trucked in skips to a point just south of the incline tramline where the stone was tipped down a chute into a shaft, or actually an ore pass, which connected with No. 4 level. The stone was again loaded into skips for the final short distance underground along the No. 4 level drive to the battery. In most photographs this tramway, though only visible from the adit to the battery, has an appearance of being very well used. The main shaft was also connected by another tramway to the incline to carry across mine timbers, explosives and supplies.

No. 4 level tramways supplied the boiler house with firewood. In earlier days the wood was thrown down to the same level as the battery floor, thence transported around to the boilers by a partly elevated tramway. A tramway also ran from beneath the North shaft ore bin to the battery. The Consol's

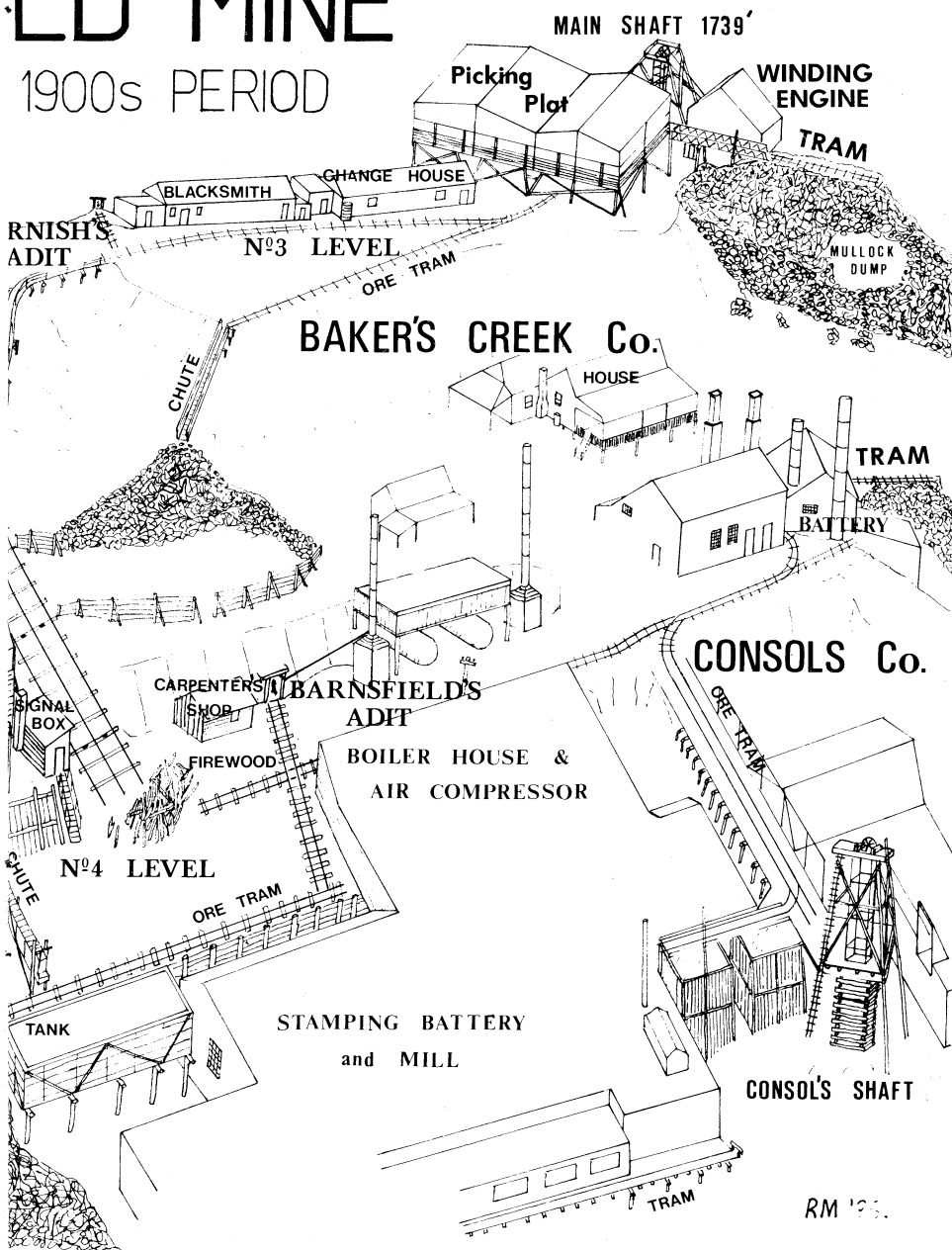
# BAKER'S CREEK GO

## PLAN OF MINE TRAMWAYS — EARLY



# LD MINE

1900s PERIOD





bring across wood and supplies from the tramline terminus. Their gauges are not known, though probably about 18 in. The tramways formed an important network for the efficient operation of the three mines.

### **Baker's Creek Gold Mine Company**

Dividends were not forthcoming for the Baker's Creek Company after 1900. Inadequate mine development, declining gold values and increased costs with depth contributed to the decline of prosperity. In March 1903, the first ever call of 6d was made on the shareholders, to finance development costs in the lower levels.<sup>34</sup> A loss of £2,430 was recorded.

As aforementioned, the high cost of fuel was to be one of the factors in the decline of the company. However, some of the engineering practices fell far short of necessary economies in running the plant. One such instance was supplying steam to the main vertical shaft winding engine. This was some 80 ft further up the hill behind the boiler house. A steam pipe from the boiler entered the No. 4 level adit, passed along the tunnel, then up the main shaft to the winding engine. During winter time, the condensation in the pipe must have been terrific. Another example was the laying of a 5 in. diameter steam pipe from the original battery up to the acquired North's battery.<sup>35</sup>

Production and values continued to decline throughout the next few years, until in June 1906, the old company was wound up and a new company, known as Baker's Creek Gold Mine, was formed with a working capital of £25,000.

In 1910, the mine was let on tribute, but apart from a rich shoot of gold worked in 1912, results were poor.

### **The Consols Fire**

On Monday morning, 15 November 1915, a fire broke out in a pile of bark and wood scraps near the carpenters shop.<sup>36</sup> Before it could be extinguished it had destroyed the signal box and burnt the tramline. The men thought that the fire had been extinguished, but smouldering wood again caught alight down an old shaft in front of the blacksmith's shop. This shaft was connected with the old Consol's shaft, thus creating an ideal drafting effect. Early next Wednesday morning, the watchman was astonished to see flames, 30 feet high licking from the Consols.

The fire quickly destroyed the poppet head, engines and air compressor, which was irreparably burnt. The plant was not insured. To allow pumping to continue, the Eleanora kindly connected its compressed air pipes to the Baker's Creek pumps.

The fire caused severe disruption to production; indeed by December stone was still being sent up to be crushed at the Eleanora battery. This must have been very expensive.

### **New Baker's Creek Gold Mining Company**

After rebuilding the plant, the mine soldiered on until 1917, when it was closed, then re-opened as the New Baker's Creek Gold Mining Company Ltd with Cameron and Sutherland of Melbourne with £20,000 capital. The registered office was transferred to Melbourne. They acquired the 39 acre property for £1,150.<sup>37</sup> Hydro electricity had been purchased from the Eleanora, but when that company closed, a new lighting plant was urgently required. A suction gas engine was later built for this purpose.

With Government financial assistance, 744 ounces were won in 1918. By mid November, the mine was again shut as the capital had been expended. A four month labour suspension was granted. Tributers worked the property in late 1920.

### **Closure**

In May, 1921, mining finally ceased. Only 135 ounces had been recovered. Although the auriferous stone was not exhausted, high production and haulage costs from the lower levels could not be contained. Firewood, costing 18 shillings a cord had to be carted from Long Point, a distance of eight miles to the south.

Messrs Sutherland and Cameron took charge of the dismantling.<sup>38</sup> A petition by local residents was sent to the Minister for Mines in November 1921, asking to retain the tramline winding engine, rope and boiler in the hope of a future revival. The petition was fruitless. The main shaft winding engine was dismantled, then re-erected at the top of the tramline to pull up a boiler weighing 12 tons. The accident at New Hillgrove Proprietary was not going to be repeated. (see p.35)

By the second week of February 1922, all the machinery, valued at £3,000 had been removed, including the tramline boiler, winding engine and ropes. Mr William Flood had purchased the tramline rails intact, as he now held the leases. The Baker's Creek mine of old was now no more.

A revival of the mine in 1937 is covered in Part II of this history.

34. *Armidale Chronicle*, 20.11.1915.

35. *Armidale Express*, 28.2.1893.

36. *Armidale Chronicle*, 12.8.1916.

37. *Australian Mining and Engineering Review*, 1916 Vol. 9.

38. *Armidale Chronicle*, 15.6.1921.

### 3. THE ELEANORA GOLD AND ANTIMONY MINE

#### Introduction

The Eleanora property, managed by a succession of owners, has been the stalwart of the Hillgrove field. It is still worked today, and holds promise for a few more years to come.

In 1878, the discovery was made by Messrs Brackin, Daly and Elliott of an antimony vein, known as the Isabella lode, on the tableland to the east of Baker's Creek gorge. A government reward of £500 was claimed in consideration for the discovery of a new payable mineral deposit. After a little initial work, mining ceased because of the low price of antimony in England.

#### Initial Mining Development

An Armidale resident, Mr Duncan, sent some stone to Victoria for testing in 1881. Results were promising so a private company consisting of Messrs Speare, Moses, Duncan and Brackin was formed. They shipped 124 tons to England which realised 3 ounces of gold to the ton.

Mr Schouler, the founder of quartz mining in Stawell, Victoria, was invited to inspect the 20 acre property. He was so impressed that he invested £1,000 in the mine.<sup>39</sup> At the beginning of 1883 the Eleanora was formed into a company of 12,000 shares. A battery of ten heads was brought from Stawell. By 1899, this had increased to 70 head, the largest on the field.

The company sunk three shafts into the lode, which varied from 4 to 14 feet in width. Furnaces were erected in 1888 to extract the antimony from the ore. Plant was valued at £15,000 and up to 80 men were employed. In 1889 it was reported that the company had built a tramline down "the face of the falls" to an adit 270 feet below the summit. A steam winding engine was used. To connect the North shaft with the battery, a tramway "200 to 300 yards long" was laid down. In the days before motor vehicles, tramways provided an essential internal transport system.

#### Fluctuating Fortunes

Unfortunately for the shareholders, the history of the company was not one of success. The combination of gold with antimony made milling both difficult and expensive. The presence of sulphide of antimony, or stibnite, "sickens" the mercury on the battery plates, thus preventing the amalgamation of the gold. This gold is therefore carried over in the tailings. The profit of the mine was closely related to the price of antimony, which sometimes fluctuated dramatically from month to month. Boom years were 1880-1890 and 1906-1907.

By 1902, the company was in liquidation. In 1904 the Australian Mining and Gold Recovery Company retreated the tailings dump, recovering 2,963 ounces from 22,453 tons of sand.

The New Hillgrove Proprietary purchased the Eleanora during the year and began to erect new machinery. Early in 1907 the price of antimony peaked at £25 a ton, but it then dramatically plummeted to only £5 a ton by May.

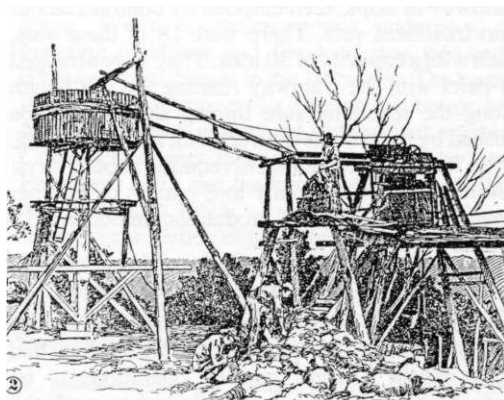
The company erected a new 15 head electric powered battery and in conjunction with this an "automatic ground tramway" was laid from the South shaft to supply the stone. At this time the concentrates were sent to Europe.

#### Eleanora Mines Ltd

With the demise of New Hillgrove Proprietary in 1908, the Eleanora was worked by tributors until in 1912, a new company known as Eleanora Mines Ltd was formed. Capital was £60,000 with Mr AF Miner the engineer-in-charge.<sup>40</sup>

The South shaft was deepened to 247 ft and the first motion winding engine from the Cooney tunnel was re-erected at the shaft. Two boilers and a single stage air compressor, ex the Proprietary, were also installed. Ten head of stamps began crushing, but success was as elusive as for the previous owners.

Concurrently, Mr WHC Lovely, described as "an Australian metallurgist with South African experience" erected a tailings cyanidation plant in 1912, to again retreat the large dump of battery sand. Because of the aforementioned imperfect treatment process, it was still possible to profitably



Early sketch of a horse whim and shaft of the Eleanora Mine.



Eleanora Company's tramway, looking south-east.

Photo: Geological and Mining Museum

extract residue gold. The dump was estimated to contain up to 72,000 tons of sand. Tramways were required for the operation of this plant.<sup>39</sup>

The dump was worked by the usual open-cut method, with the sand being brought up an incline tramway in skips, then emptied by contract labour into treatment vats. There were 18 of these vats, each with a capacity of 30 tons. They were arranged in pairs with the tramway running the full length along the top. The side tipping skips would be pushed by hand to the desired point for discharging. Time for complete treatment required about 7 days. Average yield was from 1 to 2 ounces of gold per pound of slime. Cost of production amounted to a low 4s 1d a ton.

### Closure

Eleanora Mine was closed by August 1914, but after a brief re-opening, again closed in January 1915, throwing 100 men out of work. Values had fallen below 8 dwts, causing operations to be unprofitable. Tributers were allowed to work the property.

The debenture holders sold their interests in the Eleanora, Garibaldi and Golden Gate mines to Cameron and Sutherland in 1916. This Melbourne firm overhauled the plant and carried on experimentally until August 1917, when the mine was finally closed for good. All equipment was auctioned off on 21, 22 and 23 November 1917.

High costs of mining, complex ore structure, low values and the railway strike, which prevented concentrates from being sent away, all combined to thwart the mine's viability.

Hillgrove's oldest mine had caused much disappointment for both shareholders and metallurgists throughout its life; with earlier perfection of the flotation process the story may have been rather different.

Today the Eleanora ore reserves are again being worked by New England Antimony Mines. This is covered in Part II of this history.

39. *Town and Country Journal*, 23.7.1884.

40. *Australian Mining and Engineering Review* 1913 Vol. 6.

41. *Ibid.* 1912 Vol. 4.

## 4. SUNLIGHT GOLD MINE

### Early History

The Sunlight mine is situated on the western side of Baker's Creek gorge. The initial discovery of the reef was made by Moore, Speare and Company in 1878, who originally worked it for antimony. Elliott and O'Donnell recognised the auriferous nature of the reef, which led to two years of litigation between the two parties, as to the ownership of the property. Moore and Speare eventually won the day.<sup>42</sup> James Dalzell and Alfred Angles took out a 15 acre lease on the property in 1887. They agreed to Peter Speare having a 1/6 share in the lease for consideration of him providing a quartz battery, for which he was to receive £120 out of their dividends.<sup>43</sup>

### Sunlight Company

Registration of the Sunlight Company was on 30 September 1888, with a capital of £70,000. The head office was in Pitt Street, Sydney.

The lode, which is about 6 ft in width, strikes N25 degrees W and dips in an easterly direction at 1 in 5. Initial gold values were 2 ounces. From the outcrop down to No. 5 level, access to the slopes was by adits, driven into the side of the gorge. No. 5 level was 30 ft above Baker's Creek, and intersected the reef 240 ft from the adit. No. 6, 7 and 8 levels were gained by an underlay shaft, 500 ft along the western crosscut in No. 5 level. No. 8 level is 250 ft below the level of the creek. Blacksmiths and Day reef were worked at a later date.

The company erected a 5, later expanding to 40, head battery on the opposite side of the creek to the mine. This battery was on a separate 2 acre lease, surveyed on 16 December 1887 for Mr John Edwards.<sup>44</sup>

Machinery was first lowered to the site in October 1887. It required 16 hours to lower a 10 hp steam engine down the extremely precipitous western face of the gorge. The men used thick manilla ropes and a steel cable: a very difficult and dangerous task. A wooden sled was built for the 5 head battery.<sup>45</sup>

### Self Acting Incline

To lower the stone from the No. 1 level adit down to the battery, a flying fox was built, in January 1889. This had iron buckets suspended from a cable but as it was somewhat less than successful, it was deemed a failure. Something more reliable was required so construction of a self acting incline began in early April, 1890. By the 19 April the rails had been laid down to the creek, which was crossed on a bridge supported by four vertical wooden piles. The brake gear and a quartz hopper were erected at

the No. 1 level.

A tram, upon arriving beneath the quartz hopper would be filled, then when all was ready, the brakes on the winding drum were released, allowing the full tram to slowly descend, at the same time drawing up the empty tram from down below. After crossing the bridge over the creek, the full tram entered the battery building, where the quartz was tipped directly onto the floor. The procedure would then be repeated.

### A New Battery

To increase production, a 20 head battery was purchased from the Strauss Gold Mining Company at Drake, east of Tenterfield.<sup>46</sup> Delivery was delayed because of heavy rains. Ten thousand bricks were ordered, these were made locally at West Hillgrove. A team of 40 bullocks pulled the boiler, then the largest on the field, from Armidale railway station. Crushing commenced on 29 August 1890.

To send down firewood from the top of the gorge, the company built a wood chute, which connected with the self-acting incline. Presumably the wood was then transhipped into a tram. The chute was in two sections, one 600 ft long and the other 300 ft. At this time, owing to heavy rain, firewood was fetching 20 shillings a cord. Forty tons were stacked ready for use.

### Sunlight Incline Tramway

The highly undesirable method of lowering heavy machinery by ropes finally became intolerable, so work commenced on 5 October 1891 on the building of an incline tramline to the top of the gorge. While construction was underway, the lowering of stores and firewood was suspended because of the danger to the labourers. The battery stopped work temporarily. During this break, over 400 tons of store was mined and awaited crushing. Construction was basically completed by early February, 1892 and the battery resumed crushing on 5 February 1892.

The upper section of the tramline was exceedingly steep, up to 1 in 3 in parts. A deep cutting of about 20 ft deep by 80 ft long passed the tramline through the cliffline. This cutting was up to 14 ft wide. The three rail system was used with a passing loop at the

42. Mineral Resources No. 8: Report on the Hillgrove Goldfield, 1900. Geological Survey Department, Sydney.

43. *Armidale Express*, 4.12.1891.

44. *Armidale Courthouse Records*.

45. *Armidale Chronicle*, 21.10.1898.

46. *Australian Mining Standard*, 5.2.1890.



Sunlight gold mine with bridge for the self-acting incline over Baker's Creek, circa 1890.

Photo: Geological and Mining Museum

midway point. The gauge is not known, but the lower section connected with the top of the self-acting incline.

The winding engine had been delivered by 29 February 1892. To accommodate the engine and boiler an area of land, measuring about 82 ft wide and 12 ft deep had to be excavated out of the southern side of the spur. An access road to West Hillgrove (Metz) came in from the west. Total length of the tramline was about 2,000 ft from top of the gorge down to the battery.

#### **Incline Operation**

The incline tramway brought savings in the transport of firewood for the Sunlight mine. Up to 20 per cent of firewood had previously been lost with the chute method of transport and the new incline achieved an immediate saving on previous methods of firewood handling. On the basis of previous usage, about 1,400 tons of firewood was required annually.<sup>47</sup>

In 1897 a bad accident was narrowly averted on the incline. A tram carrying men was on its upward journey when, quite unexpectedly, the winding engine's crankshaft broke. The tram ran back down the incline a little distance before the engine's brakes could hold the winding drums. After getting the fright of their lives the men probably would have had to walk to the top. No doubt the Metz hotels did a roaring trade that night. Breakage was attributed to an undetected flaw in the forging.<sup>48</sup>

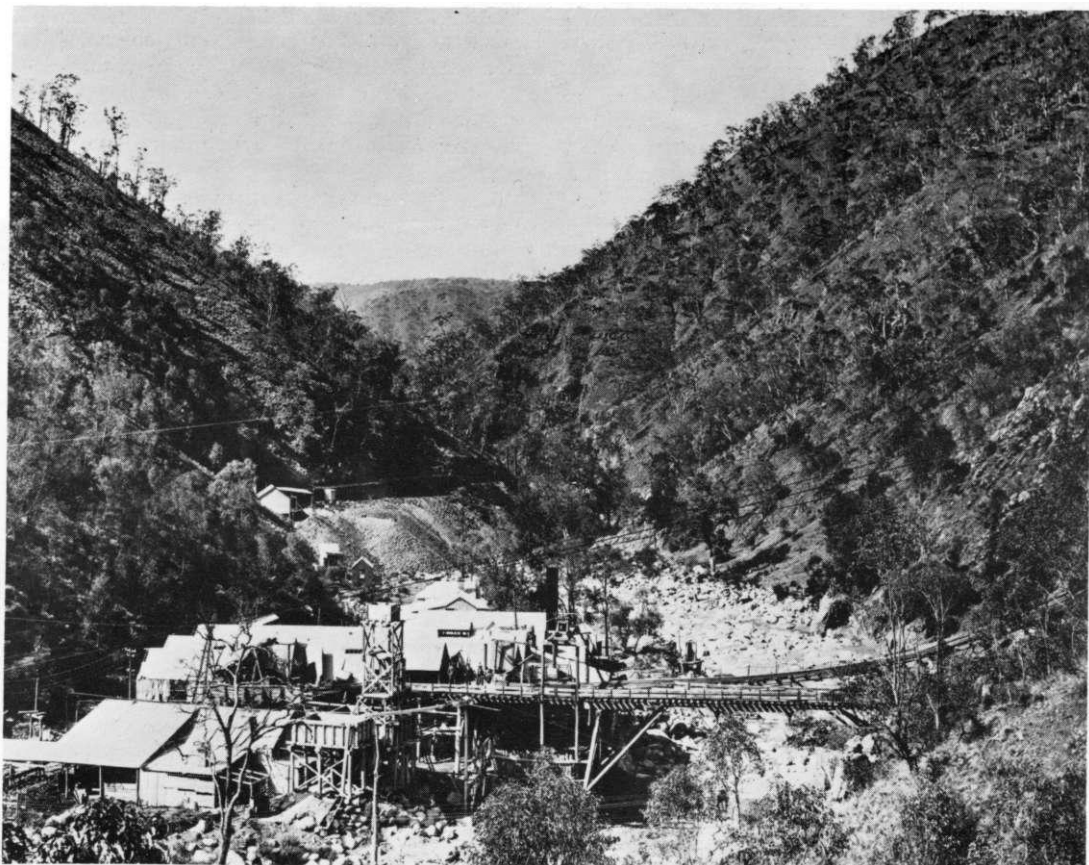
Later that same year, the Inspector of Mines deemed the winding rope unsafe, due to its getting out of round. The upper section of the tramline frequently caused the derailments of the four wheel

**Right:** The spectacular Sunlight tramline. The No. 5 level adit and tramway is in the lower background, with the mill and tailings wheel in the foreground.

Photo: Geological and Mining Museum







Sunlight mill and tramway bridge in the foreground, with Cooney adit and mine tramway in the background. The narrowness of the Baker's Creek gorge is apparent.

Photo: Geological and Mining Museum

trams, because of poor alignment and sudden curvature of the rails. Late in 1897 an attempt to re-sleeper and realign the track proved inadequate as derailments still occurred. Scree sliding onto the rails was also a hazard. By early December a new winding rope had been fitted.

In February 1898, the tramline was valued at £2,048 7s 0d while the tramline employees wages for the financial year amounted to £372 4s 2d.<sup>47</sup>

During June 1899 and again in January 1900, efforts were once again made to reduce the vertical curvature of the tramline. New sleepers had to be laid as well. Another new crankshaft was fitted to the tram winding engine in early December 1900. It was made in Sydney.

#### **Floods and Financial Losses**

With all the necessary expenditure, the mine ran into financial difficulties in 1892. A 10 per cent

royalty charge did not help matters: the company was in the red to the tune of £3,074 11s 6d. The government extended a £300 subsidy.

Flooding of Baker's Creek was not infrequent. One flood washed away the tramline bridge, in March 1893. The piles had been driven into the bed of the creek so to prevent a recurrence, the bridge was redesigned. Two massive wooden logs, 70 ft long, spanned the creek, supported either end by piles, which were over 13 in. in diameter. A boiler was also washed out of its foundations. Eighty feet of the incline had to be pulled down and relaid.<sup>48</sup> Repairs were completed by 6 May 1893.

In July 1894, the royalty charge was reduced from 7s to 3s 4d. A government imposed royalty of

47. *Ibid.*, 6.8.1892.

48. Geological Survey Report, MR.0151, 1897.

49. *Hillgrove Guardian*, 26.2.1898.

50. *Australian Mining Standard*, 1.4.1893.

2s an ounce was abolished by the passage of the "Mining on Private Lands Act". Sunlight stone cost £1 13s 10d a ton to win, but yielded only £1 11s 3d. Another loss of £500 resulted.

In an effort to reduce the losses, the management changed the miner's conditions of payment, which resulted in an unsuccessful strike. A dance was organised to aid the married men.

### New Mine Development

No. 5 level adit was developed in April 1895. To connect it with the battery a double track mine tramway was built. After emerging from the adit the tramway abruptly turned then was carried on a wooden trestle, protected by a penthouse. In some parts there was a sheer drop straight down to the creek. Continuing on in a northerly direction, the tramway passed beneath the main incline tramline, before again turning to cross the creek on its own bridge and enter the battery building. Hand trucking appears to have been employed. A wooden fence was erected a little way above the penthouse to restrain falling rocks.

### Electric Haulage

The Sunlight fuel bill amounted to £1,322 11s 1d per annum with a royalty of up to 2s 6d a cord sometimes being paid for firewood, so the company was always looking at ways to reduce expense. Coal, from Rix's Creek, near Singleton was tried, but transport costs were prohibitive.<sup>51</sup>

With the awareness of ever increasing mining costs, an electric haulage winch was installed to hoist up skips in the underlay shaft. The winch chamber was started in January 1898.

Electricity for the winch was supplied by a generator, driven by a belt off the battery's flywheel, an arrangement that was dubious from the start. It produced 100 volts at 150 amps for a Walker 25 hp motor. Half-ton capacity skips were used in the shaft. To hoist up the skip required about 27 seconds. Mr Bainton, the electrical engineer-in-charge, claimed that this winch was the first successful electrical winding plant in Australia.<sup>52</sup>

Efficiency was greatly increased with the introduction of electric light in the drives as it enabled trucking speed to be increased when compared with candle illumination. An electro-plating plant to silver the copper battery plates was built as well. This saved the cost of freighting the copper plates to Sydney.<sup>53</sup>

Regretfully the benefits of electricity were only of short duration, for in September 1899, the electric

winch was replaced by an Adelaide-built steam winch. Steam was deemed more reliable than new fangled electrical appliances. The new winch had two 8 in x 16 in cylinders. Steam at 100 psi was supplied by a boiler sited alongside the winch. Ventilation was directly to the surface by way of a rise.<sup>54</sup>

In 1901, electricity was tried for the second time. This was supplied by the International Railway Corporation Ltd from the Gara River plant. Mr Erskine, who was the Corporation's Manager, officiated at the opening ceremony, on Tuesday, 8 January. This mine was the first so connected with the new scheme.<sup>55</sup>

### Decline

Because of declining values in the lower levels, as meagre as 2 dwt a ton, work was suspended in March 1901. A meeting of shareholders was convened, where a decision was reached to close the mine, as a loss of £1,000 had been made in the previous year. Over the mine's life of 14 years £12,043 15s 2d was paid out in dividends; the total value of gold won amounted to £194,020.<sup>56</sup> However, the financial position of the company was always rather precarious.

Tributers began to work the property in December. By 1906, the tributers had switched to antimony mining, but with only limited success.

The New Sunlight GM began operations in March 1914, with the lowering down of a new engine.<sup>57</sup> The battery began crushing on 20 May 1914, with Mr Tom Snow as Manager. Three car-loads of shareholders visited the mine for the official opening. However, their optimism was short lived for by the 1 July 1914 the fourth call of £1 a share had been made. By 1915, with the exhaustion of ore above No. 5 level and no capital to bail out the lower levels, work came to a standstill. A loss of £490 had accrued.<sup>58</sup> The tramline must have been dismantled sometime about this period.

This once busy mine, which always seemed to be handicapped by litigation, insufficient capital or excessive expenses, faded from the scene.

51. *Ibid.*, 18.3.1897.

52. *Ibid.*, 12.1.1899.

53. *Ibid.*, 23.9.1897.

54. *Hillgrove Guardian*, 30.9.1899.

55. *Ibid.*, 12.1.1901.

56. *Australian Mining Standard*, 9.5.1901.

57. *Armidale Express*, 31.3.1914.

58. *Ibid.*, 22.9.1915.

## 5. THE COSMOPOLITAN AND LADY CARRINGTON GOLD MINES

### Discovery

During 1887, the North and South Cosmopolitan leases were pegged by a Mr Thomas. These leases were north-west of Hillgrove on the eastern side of Baker's Creek gorge, and comprise 52 acres in all.

The lode, which is believed to be the northern continuation of the Eleanora line, consists of two quartz — stibnite — gold reefs in coarse granite, trending in a north-west direction. Gold was originally of prime importance, but low values forced a switch to antimony.

Meanwhile, the Lady Carrington mine, adjacent to the southern boundary of the South Cosmopolitan Mine, had been prospected in 1886. Three tunnels and two shafts were used for access to the workings. The reef was up to 30 in. wide, and was worked from four levels.

### North Cosmopolitan Mine

In December 1889, laying of an incline tramline for the North Cosmopolitan began. The length was 614 ft and it connected the works site with a dray track which came down a spur to the north of the mine.<sup>59</sup> No further details of the tramline can be found, although, according to one newspaper report, it may have been double track.<sup>60</sup>

The mill had a twelve head battery powered by an 18 hp Pelton wheel. The use of water power to drive the machinery was the first in the district. Two reservoirs of 1,800,000 gallons capacity provided the required amount of water and a 3 in. diameter iron pipe, 1,920 feet long was laid from the top of the gorge down to the battery.<sup>61</sup> Total value was £2,500. The battery began crushing on 26 May 1890.

One hundred and thirty tons of antimony, valued at £30 a ton, was shipped to England during 1890. Returns were disappointing due to the problems associated with the extraction of gold from the antimony.

### New Cosmopolitan Gold and Antimony Mining Coy.

In September 1890, the New Cosmopolitan Gold and Antimony Mining Company was formed, with capital of £25,000 to take over from the previous owners, who had come into financial difficulties. New furnaces were erected to treat the ore.<sup>62</sup>

In July 1891, the new owners laid a tramway across the adjacent gully to the No. 3 level adit, which was on an adjoining two acre lease. This was to enable ore to be trucked to the battery. Two trestle bridges were built, the work being finished by

September. When the Hopetoun battery ceased work, tributer's stone was brought across by pack-horse to the Cosmopolitan battery.

### Lady Carrington Incline and Gold Mine

In February 1890, a tramway was constructed from the Lady Carrington mine up the eastern face of the gorge.<sup>63</sup> It was finished by the end of April, though as of June, the tramway winding engine was still awaiting delivery of the boiler. Total length was 1,450 ft from the summit to the battery site. A considerable length of this tramway was in cuttings which measured 12 ft wide. Steel rods had to be driven vertically into the rock to prevent the track from creeping down the steep hillside. The gauge is not known. A 60 hp steam engine powered the plant which was valued at £10,000.

The battery had previously been removed from Swamp Creek for re-erection at the mill. Morts Engineering Works of Balmain, Sydney, supplied the plant.<sup>64</sup> Fifty men were employed. The mill site was terraced out of the hillside at the lower terminus of the tramway, which was still quite a few hundred feet above the creek. A mine tramway was laid in July 1890, from the No. 2 tunnel to the incline tram. Upon completion of the plant, the battery began crushing on 1 October 1890.

The antimony smelting furnaces were blown in by the 24 February 1891. *The Armidale Express* commented "after the antimony is separated from the gold, it passes through a water jacket condensor where it precipitates in the condensing chambers and, there, all the antimony in the gold is collected. The gold is being extracted from the calcined sand by amalgamation."<sup>65</sup> By mid-August a chlorination plant had been built.

This company was an early victim of the antimony-gold bogey as not withstanding the erection of the expensive plant, all was idle by late 1891. The gold was passing through with the slimes and was lost.

### Hillgrove United

Both the Cosmopolitan and Lady Carrington mines failed to meet the expectations of backers and the companies were soon in financial difficulty. In 1897 the Lady Carrington plant was sold to the Consols where it was re-erected. In July 1899 the

59. Geological Survey Annual Report, 1889.

60. *Hillgrove Guardian*, 30.12.1899.

61. *Australian Mining Standard*, 3.9.1890.

62. *Ibid.*

63. *Ibid.*, 26.3.1890.

64. *Illustrated Sydney News*, 28.11.1889.

65. *Armidale Express*, 24.2.1891.

two mines were amalgamated into the "Hillgrove United" by Fuller and Robinson. Mr Fuller had a 5 head battery at work on stone of 3 ounces to the ton. A flying fox transported the ore to the battery at the summit. The operations were assessed by the mines inspector to be quite expensive, at up to £4 a ton for treatment.

In February 1902, Mr J Thomas was awarded a contract for construction of another incline tramline. It was in operation by 18 March 1902. The location of this tramline is unknown, but it is possible that the old North Cosmopolitan tram was rebuilt. A new battery engine, known as the *Lady Rawson* began operations on 27 August 1902.<sup>66</sup> It was officially put to work at a special ceremony attended by the Mayor.

### **South Cosmopolitan Incline Tramway**

During October 1909, the company was acquired by the "Cosmopolitan Gold Mining Company".<sup>67</sup> A new plant was erected, becoming in effect the South Cosmopolitan. After surveying a new tramline route, across the gully and to the South of the old North Cosmopolitan, Mr Pinto began construction in December. The direction of the tram was N56 degrees E up the eastern face of the gorge.<sup>68</sup> The defunct West Sunlight tramline, steam winding engine, boiler and trams were purchased and re-

erected. The gauge was 30 in. and the three rail system, with a central passing loop was used.<sup>69</sup> The rail was of light weight, probably 14 pounds per yard, while the sleepers measured 7 ft x 9 in wide. A 1 in. diameter steel winding rope drew the trams up and down. The five head battery, with associated vertical boiler, was housed in a building adjacent to the top of the incline. The lower terminus was on a wooden landing stage. Stone embankments, some 2 ft high, carried the rails on the lower sections.

At the end of August 1910, crushing commenced. A new shaft was sunk from the lower tunnel onto the reef.

However, by 1911, the mine was again in difficulties because of the poor gold values in the lower levels. The Carrington was purchased to increase the ore reserves, but the mine then closed down. Capital had been exhausted.

Spasmodic working began in 1913, with the reconstruction of the company, with £10,000 in 40,000, five shilling shares. Work had again ceased by April 1914. The tramway was dismantled by 1915.

Today the tramway formations of the Lady Carrington and Cosmopolitan inclines have largely eroded and only the brick foundations remain of the Lady Carrington's once extensive plant.

## **6. EARL OF HOPETOUN GOLD MINE**

### **Hopetoun Mines**

This property of 17 acres, on the western side of Baker's Creek gorge was prospected about 1887 and first worked by messrs Brown, Sullings and party. It was originally known as the "Roothog". The various claims were later amalgamated into the Hopetouns by a Victorian company, who issued 100,000 £1 shares.<sup>70</sup>

The Lady Hopetoun was worked by three tunnels driven into the reef, which was from 10 to 24 inches wide. Initial values were five ounces to the ton. In all, five adits were developed on these properties, from 20 ft to 220 ft above the creek. No. 1 level adit, the lowest, went in 1176 ft in a W 15 degrees N direction.<sup>71</sup>

### **Hopetoun Incline Tramway**

In December 1890, construction for the Earl of Hopetoun of an incline tramline began. Only one gang of men at a time could work on the formation because of the danger from falling rocks. Total length was 2,442 ft. Although no other details are available, the three rail system was most probably used. The winding engine had two drums powered by a 16 in. diameter cylinder engine.

The tramline entered the battery building at the top of the gorge on an elevated wooden trestle. Upon descending from the battery, the tram entered a cutting about 20 ft deep and 12 ft wide. Two further cuttings were required about half way down, one 3 ft deep and the other 10 ft deep. This last cutting was dug in solid granite, so the floor was terraced to provide a firm footing for the wooden sleepers. Steel spikes were driven into the rock to provide additional support. Wire cables anchored the track to the steep hillside. On descending further from this cutting the tramline was carried on a very narrow spur of land, barely wider than the tram formation into the mine area, a few feet above Baker's Creek. Hoppers were erected here to hold the stone before it was sent up to the mill. No. 1 level adit was only several yards to the south of the tram terminus. The grade of the tramline was very

66. *Hillgrove Guardian*, 30.8.1902.

67. *Armidale Chronicle*, 20.11.1909.

68. Mines Department Plan ML102, No. 16532.

69. Author's field observation.

70. Mineral Resources No. 8. Report on the Hillgrove Goldfield, 1900.



uneven. To allow for adequate drainage of the granite cutting, drains 10 in. wide were dug each side of the trackbed.

### Mine Operations

On Saturday, 29 August 1891, the 20 head battery, built by Langlands of Melbourne was officially put to work.<sup>72</sup> Mrs Hobby performed the honours by breaking a bottle of champagne over the machinery. Visitors then retired to lunch in the retort house.

Steam power was provided by a 30 hp engine, supplied by two 25 hp boilers. Two dams of a combined 8,000,000 gallon capacity supplied water, via two Worthington duplex pumps. A telephone connected the mine with the battery. Up to this time £20,000 had been spent on the mine. The first battery clean up in September yielded 495 ounces from 395 tons of stone.

High hopes of the shareholders were soon dashed. With declining gold values the company was acquired by the Earl of Hopetoun South Company in February 1893 for £2,210.<sup>73</sup> This new concern had an equally short life. It was purchased by the Eleanora in December 1893 for the bargain price of £1,050.<sup>74</sup> All the plant, including the tramway, was removed to Hillgrove.

Mr Arthur Fuller and party worked some

Hopetoun blocks in 1897 but expenses were high as their ore had to be carted by flying fox to the Cosmopolitan mill on the opposite side of the creek.

### New England Scheelite Properties

Scheelite was present in this mine, so with poor gold values and an increase in the price of scheelite, mining was switched to this metal. 1.25 tons were won in 1898, realising £30. The greatest production was in 1899, with over four tons produced at £40 a ton. It was thought that much of the world's scheelite production came from Hillgrove at this time, amounting to some 70 tons.

In 1901, the mine was floated into a company known as New England Scheelite Properties. For the extraction of scheelite the stone was crushed in the usual way, except that the drop of the stamps may be reduced as scheelite is not as hard as quartz.

However, the angle of inclination of the Wilfley table has to be altered as compared with gold, otherwise the scheelite, being much heavier than gold, would wash straight off the end of the table instead of about six inches beforehand. Additionally, if scheelite is run through an ordinary gold mill, the copper amalgamating tables must be covered by blankets to protect them.<sup>75</sup>

Operations continued for a few years, then the company faded from the scene.

## 7. THE WEST SUNLIGHT GOLD MINE

This company worked the north-western continuation of the Sunlight line of lode. Two parallel reefs, the Magazine and West Sunlight main reef, outcrop along the side of Metz gorge, about 50 ft apart. At the 430 ft level, they merge into one, striking N 20 degrees W.

The company was registered on 22 July 1891, with capital of £50,000. Head office was in the Empire Buildings, Collins Street, Melbourne.<sup>76</sup> The property covered 120 acres, which was freehold land leased from Speare, McBean and Moore. A royalty was thus payable on the gold produced. The mine, which is approximately half way down the gorge, began operations early in 1892, when a trial crushing was put through the Sunlight battery.

### West Sunlight Incline Tramway

For access, a tramline was required up the western face of the gorge. Tenders were called for construction in mid-January 1892 and the work was completed by June.<sup>77</sup> Total length was 1,650 feet. The lower section of the tramline entered the mine site on a wooden trestle bridge built over a small creek. Track gauge was 30 in.<sup>78</sup>

The trams, running on two independent sets of rails, tipped the ore directly into the battery self feeders at the top, which kept the 20 head, 900 pound stamps supplied. The concentrates were sent to the Dapto smelting works for refining.

Derailements on the tramline were frequent. On the 27 January 1897 heavy rain caused scree to wash over the trackbed. Much shovel work would be needed to clear the rails. Later that year the Inspector of Mines reported that the tramline was overgrown with weeds and scrub, apparently so thick that it was difficult to see the rails.<sup>79</sup> Sleepers were also in need of replacement.

On the 11 June 1900, a tram ran away down the tramline, breaking the arm of a Mr McLennan who

71. Robertson Research Report. Geological Survey, G.S. 1970/40.

72. *Australian Mining Standard*, 5.9.1891.

73. *Ibid.* 4.3.1892.

74. *Ibid.* 16.12.1893.

75. *Australian Mining and Engineering Review*, 1910.

76. The Mines of NSW, 1897 Geological Survey, Sydney.

77. *Australian Mining Standard*, 25.6.1892.

78. Gauge deduced from site measurements at South Cosmopolitan tramway.

79. Mine Inspector's notes, Geological Survey.



The West Sunlight incline tramway.

Photo: Geological and Mining Museum

was working further down. The tram disappeared into eternity, never to be found.<sup>80</sup>

### Mine Development

The reef was initially worked by a two compartment wood lined shaft. This shaft which reached an ultimate depth of 796 ft entered a curve at the 400 ft level.

The shaft winding engine, which had two 12 inch diameter cylinders, was lowered down in September 1892. The engine was built by Tangye of Birmingham, England. Steam was supplied by a wood fired Cornish boiler, built by B and R Buchanan of South Melbourne. As the hillside is extremely steep the boiler house and winding engine foundations had to

be terraced partly into the side of the hill, to allow for an adequate works area, which even so, is still only a few yards wide.

Because of the curvature of the shaft, considerable wear on the rope and shaft runners resulted, so in 1897 work was put in hand to reduce the curve.

Evidently the company was not a great believer in safety because the boiler for the shaft winding engine was in such poor condition that weights had to be added, against regulations of course, to the safety valve. During May 1898 a new steam winding engine for shaft sinking, built by Thomson and Company of Castlemaine, Victoria, was erected. A new boiler was also installed.

### Closure

Falling gold values caused all work to be suspended from the 14 July 1900. The 26th call on shares was made to raise additional capital but to no avail. Mining costs amounted to £1 18s 11d per ton but the stone was worth only £1 13s 7d per ton.<sup>81</sup> The payment of royalties was claimed to be an insurmountable burden. Total gold production amounted to 22,966 ounces.

The plant was auctioned on 25 September 1901 by Chas Wilson and Co of Armidale.<sup>82</sup> Mr Edward McNamara purchased the lot for £1,560. At the time of sale, the plant comprised two boilers, three Berdan pans, one Frue vanner and five Woodbury concentrators. Two antimony smelters had been erected many years before. Mr McNamara also acquired 40,000 tons of tailings for £51. These carried values of up to 5 dwt per ton.

The mine was let on tribute so the mining of antimony was pursued due to the high price then prevailing for that metal. By 1906 it had risen from £5 to £33 per ton due to the Japanese-Russian war, when China was unable to supply. Work only continued for a few years.

The tramline was finally dismantled in December 1909 for re-use at the South Cosmopolitan mine.<sup>83</sup>

80. *Hillgrove Guardian*, 16.6.1900.

81. *Australian Mining Standard*, 10.2.1894.

82. *Ibid.*, 12.9.1901.

83. *Armidale Chronicle*, 25.12.1909.



Ruins of the West Sunlight Mine, with boiler and shaft winding engine on the left, beneath the timber, in 1985. Photo: author

## 8. HILLGROVE PROPRIETARY MINES

In April 1898, the Cooney Proprietary Mines Ltd was amalgamated with the Hillgrove Proprietary Mining Property Pty Ltd to form the Hillgrove Proprietary Mines. This was the last of the big companies to begin operations on the field. It was formed with English capital of £225,000 by the United Australian Exploration Company.

The head office was in St Swithins Lane, London with an Australian office in the Equitable Buildings, Sydney. Three of the six directors were associated with the Rand mines in South Africa. Other mines owned by the group were at Wyalong and Dark Corner, NSW, and in Western Australia. None enjoyed particular success.

### Mine Development

The new company inherited the upper and lower Cooney tunnels, originally begun by the Baker's Creek South Company. The lower Cooney had been continued on for a further 100 ft by the Baker's Creek Number One Extended syndicate, before

changing hands. Total distance then was 405 ft from the adit.

The intention of the new company was to continue driving in a NE direction to intersect the Golden Gate and Little, or Smith's reef. To this end they commenced to drive both Cooney tunnels, which were 310 ft apart, simultaneously. For this purpose, the company erected a compressor engine at the top of the gorge in March 1898. Steam was supplied by a 25 hp boiler, with feed water supplied from the town main. The compressor supplied air at 85 psi for the six rock drills used far below in the tunnels. Cast iron pipes, reached 2308 ft down to the adit. These were five inches in diameter and each weighed one hundredweight.

Tunnel driving could only manage a slow 11 ft a week. As the slates encountered were extremely hard, a *national* rock drill required 22 minutes to bore a five inch deep hole, a very laborious and time consuming task for the miners.

By February 1899, the lower Cooney was in 1150 ft and Mr Boucher, the company's General Manager, considered that the tunnel must have passed through the line of Smith's reef. At the 1044 ft mark, driving began on a quartz vein toward the Baker's Creek Company's boundary.<sup>84</sup> This was to reveal whether the vein would open out into the prized Smith's reef.

In August 1899, at a distance of 992 ft from the adit, an underlay shaft was begun, to follow Smith's reef at depth. The shaft was inclined at 72 degrees and measured 13 ft x 4 ft inside timber and 15 ft x 6 ft outside. Two compartments of 4 ft x 4 ft x 2 in were used for haulage. The shaft was timbered on the "Nevada" principle, using hardwood.<sup>85</sup> The cage was built by the company blacksmith, Mr Alan Cain. A safety catch was fitted in case of failure of the winding rope.

The winding plant with 5 ft diameter drums, was powered by a pair of first motion engines. These

compressed air engines, which had 14 in x 30 in cylinders, were built by A Roberts & Sons of Bendigo. It was not until November 1904 that these engines were installed.

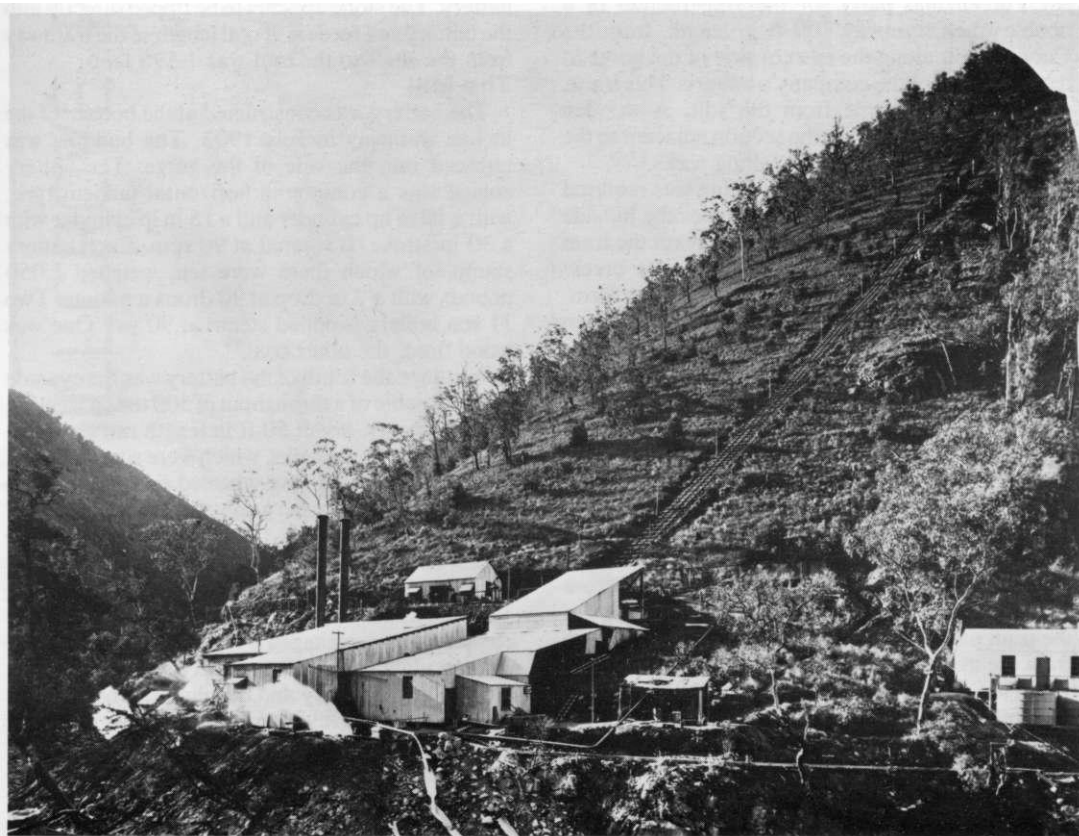
In the final week of December 1899, the company completed a tramway from the Sunlight battery to the lower Cooney tunnel. Now all materials could be more easily delivered to the adit. Hand trucking may have been employed. No trace of this tramway remains.

An advantage of an underlay shaft over a vertical shaft, was that the length of cross cuts to the reef could be kept to a minimum. Deadwork was thus greatly reduced as were development expenses.

Mr Boucher presented a paper to the NSW Chamber of Mines on shaft timbering. To illustrate his talk, he had the company carpenter, Mr W Stuart, construct a model of the Cooney underlay

84. The lower Cooney tunnel reached an ultimate length of 2,054 ft

85. *Hillgrove Guardian*, 29.9.1900.



New Hillgrove Proprietary tramline and mill in 1905.

Photo: Geological and Mining Museum

shaft timbering method.<sup>86</sup>

### New Hillgrove Proprietary Mines

On the 5th of June 1902, the London shareholders agreed to voluntarily liquidate the company in a restructuring move to finance further development. A new company, called New Hillgrove Proprietary Mines, with a capital of £225,000 in £1 shares was formed. Mr Patterson, an English mining engineer, was sent to Hillgrove to advise on the mine's prospects. This gentleman stayed on at Hillgrove as an adviser to the new company.

### Tramway Construction

Initially, all materials had to be sledged down by ropes or sent via the Sunlight or Baker's Creek tramlines. It was while working on the former method that a Mr Hindson was killed when a dislodged rock struck him on the head, dashing him 250 yards to the bottom of the gorge. It was surprising that more accidents did not occur.

At the end of March 1903, a contract was let to a Mr Purcell and party for the construction of a double track tramway 700 ft in length, from the Cooney adit, along the eastern side of the gorge to the future site of the company's battery. This track, was to convey quartz from the adit. A wooden penthouse was built over the section adjacent to the adit, as a protection against falling rocks.<sup>87</sup>

A considerable amount of blasting was required to build the formation. In some places the hillside cutting was up to 30 ft high, then beneath the tram formation, a 50 ft cliff fell away to the creek. Several trestle bridges were built. The tram formation was 12 ft wide. Hand trucking may have been used.

Upon a permit being issued by the Minister of Lands, for which there was some delay, a start was made on the main incline tramline up to the top. The contract was let to Joseph Carney and WJ Howes, in April 1903 and a route was surveyed down a spur to the battery site.<sup>88</sup>

The upper section of the tramline involved heavy earthworks. Upon commencing the descent the rails passed through a shallow cutting before crossing a gully on a wooden trestle. This is where the tram passes through the cliffline. Further down from the trestle, a large cutting about 30 ft deep by 150 ft long was entered. This cutting, 15 ft in width, was dug through solid rock. The total length of the tramline was 2,560 ft while the gauge was 33 in. The three rail system with a mid-way passing loop was used.

The foundations for the tramline winding engine were begun in the second week of April. Because of the forces involved, the foundation was necessarily

of substantial proportions. A concrete slab was put down then locally manufactured bricks were laid on top. These were buttressed on the downhill side.

Steam for the winding engine was supplied by a wood fired Cornish boiler built by A Roberts and Sons of Bendigo who also built the engine. The winding engine was of a single cylinder type with a 12 in x 24 in stroke cylinder.

By the 24 November 1903, two temporary trams were running up and down. A permanent steel winding rope was fitted by the end of November, allowing the tramline to become fully operational.

In January 1904, the Cooney adit tramway was relaid, and a trestle constructed to carry it over the incline tramline.

Precise details are not known about the Cooney tunnel haulage, however, upon the stone being hoisted up the underlay shaft, it was tipped into an ore bin. A tramway haulage may have moved the skips to the adit from where they were sent to the battery. The stone appears to be tipped directly into the battery self feeders. Total length of the tramway from the shaft to the mill was 1,596 feet.

### The Mill

The battery was constructed at the bottom of the incline tramway in July 1903. The building was terraced into the side of the gorge. The battery engine was a compound horizontal tandem type, with a 10 in hp cylinder and a 18 in lp cylinder with a 30 in stroke. It rotated at 90 rpm. Each battery stamp, of which there were ten, weighed 1,050 pounds with a 7 in drop at 90 drops a minute. Two 11 ton boilers supplied steam at 90 psi. One was wood fired, the other coal.<sup>89</sup>

A little to the south of the battery was the cyanide plant, capable of a throughput of 500 tons a week. A short tramway, about 50 ft in length ran along the top of four cyanide tanks, which were situated in the bed of the creek. A four wheeled side tipping skip was used to feed battery sand to each tank.

It should be mentioned that downstream from the mines, Baker's Creek was a putrid mess with all the slimes and tailings dumped straight into the creek.

In accordance with the progressive nature of the company, now managed by Mr Porter, an electric lighting plant was built to supply electricity to the mine tunnels, battery and tramline engine house.<sup>90</sup> A Tangye single cylinder horizontal 7 in x 9 in steam engine rotated a shunt wound dynamo. A marble switchboard was even provided.

86. *Australian Mining Standard*, 1.1.1900.

87. *Hillgrove Guardian*, 28.3.1903.

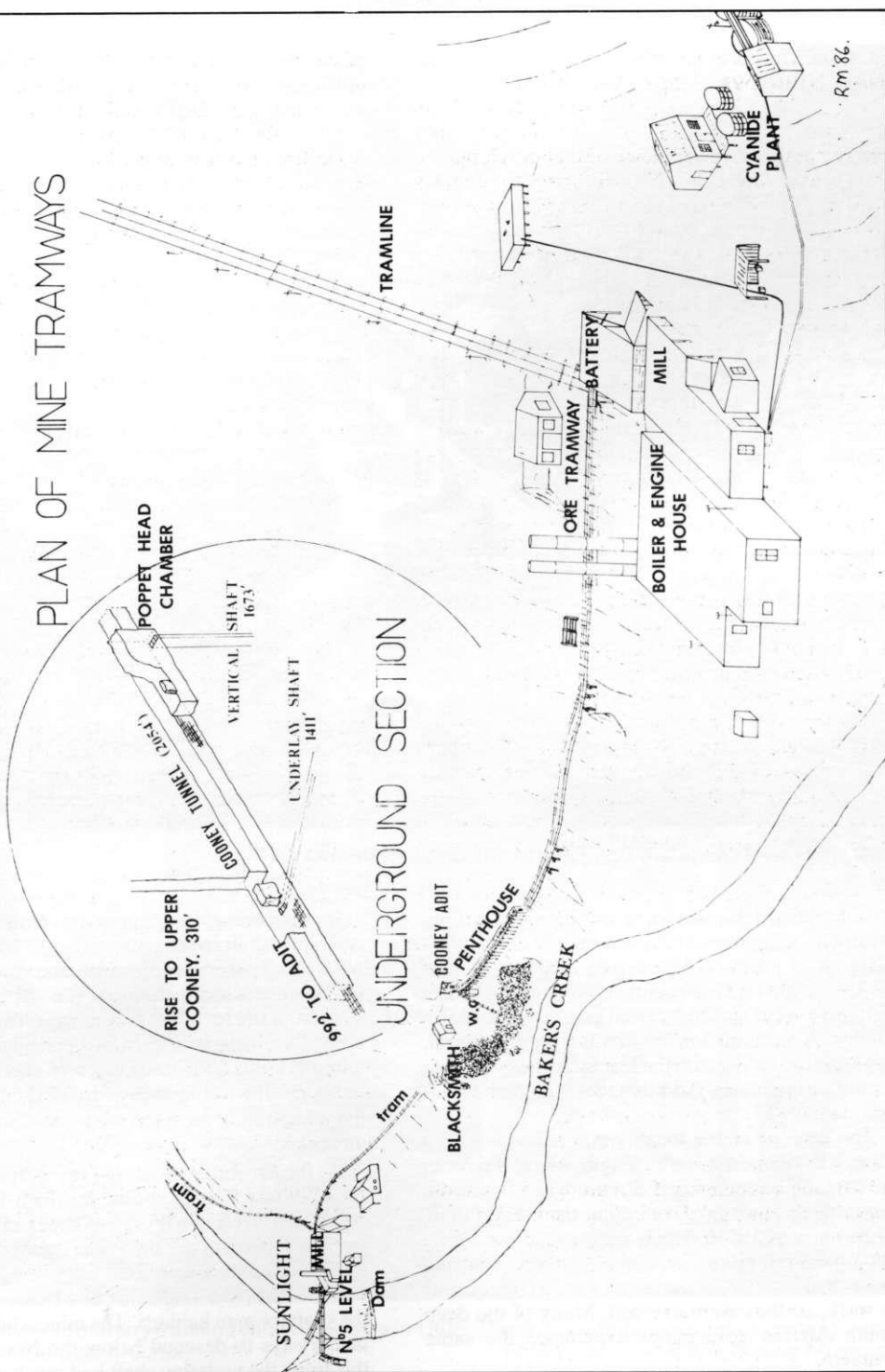
88. *Ibid.*, 18.4.1903.

89. *Ibid.*, 10.1.1904.

90. *Ibid.*, 6.5.1905.

# NEW HILLGROVE PROP. MINES

## PLAN OF MINE TRAMWAYS





New Hillgrove Proprietary Company's cyanide plant tramway, 1905.

Photo: Geological and Mining Museum

For all this new machinery, cartage by road from Armidale amounted to 10 shillings per ton.

### Crises at Depth: Pressure Bursts

At 5.30 am on 15 December 1904, the people of Hillgrove were woken by what resembled an earth tremor. A phenomenon, known as a pressure burst, had wreaked havoc with the stopes between number six and seven levels. Additionally, 70 ft of the shaft was damaged.

The geology of the locality is a zone of altered slate, a few hundred feet in length; where the rocks are in a condition of stress. Pressure bursts usually occur when the stope is nearing the level above. With an increase in depth, rock pressures acting upon the shaft pillars becomes excessive, causing the rock to explode. Some stopes were too dangerous to work, so they were avoided. Many of the deep South African gold mines experience the same problem.

In retrospect, the company realised that an underlay shaft was a mistake, as adequate size pillars and sufficient distance from the reef could not be satisfactorily attained. The shaft was 18 ft to 20 ft from the reef thus permitting pillars only 20 ft long. The Inspector of Mines considered that the minimum distance from the reef should be 40 ft although this would cause financial difficulties for the company,<sup>91</sup> as much of the reef would be left unworked.

A further burst occurred in July 1905, and October saw a severe burst, in which 100 ft of the shaft from No. 5 to 6 level was wrecked. Both cages were in motion at the time, one carrying four men; luckily, they were unhurt.

Mr Smith, the Inspector of Mines, condemned the shaft for man haulage. The miners had to use the ladderways to descend below the No. 5 level. At this time, the underlay shaft had reached a depth of



1,383 ft.

The miners were of the opinion that the department's action was too severe, so after a meeting in the Hillgrove School of Arts hall, a petition was forwarded to the Minister of Mines, through the local member, Mr Kearney, asking him to rescind the directive. This was rejected.<sup>92</sup>

### New Investment

In February 1906, tenders were called for the sinking of a new 3 compartment vertical shaft, and for the Cooney tunnel to be widened 4 ft for a distance of 400 ft. Including the excavation of an engine chamber, the cost was estimated at £6,000.

Work began with shaft sinking on 16 June 1905, upon the completion of a large machinery chamber, 100 ft long by 55 ft high. This chamber was 400 ft further in from the underlay shaft. It was excavated on the South side of the tunnel.

A rise had already been put up from the 1,040 ft point to connect with an extension from the Baker's Creek No. 3 level on Smith's reef. In March 1906,

the rise was further extended to connect with the upper Cooney tunnel to provide adequate ventilation.

The new shaft was sunk at a very rapid rate, 1,238 ft in 12 months. The highest speed of sinking was 134 ft in one month, a record for shaft sinking in New South Wales at that time. The shaft was to reach an ultimate depth of 1,673 ft at No. 14 level. Electric signalling and telephones were installed.

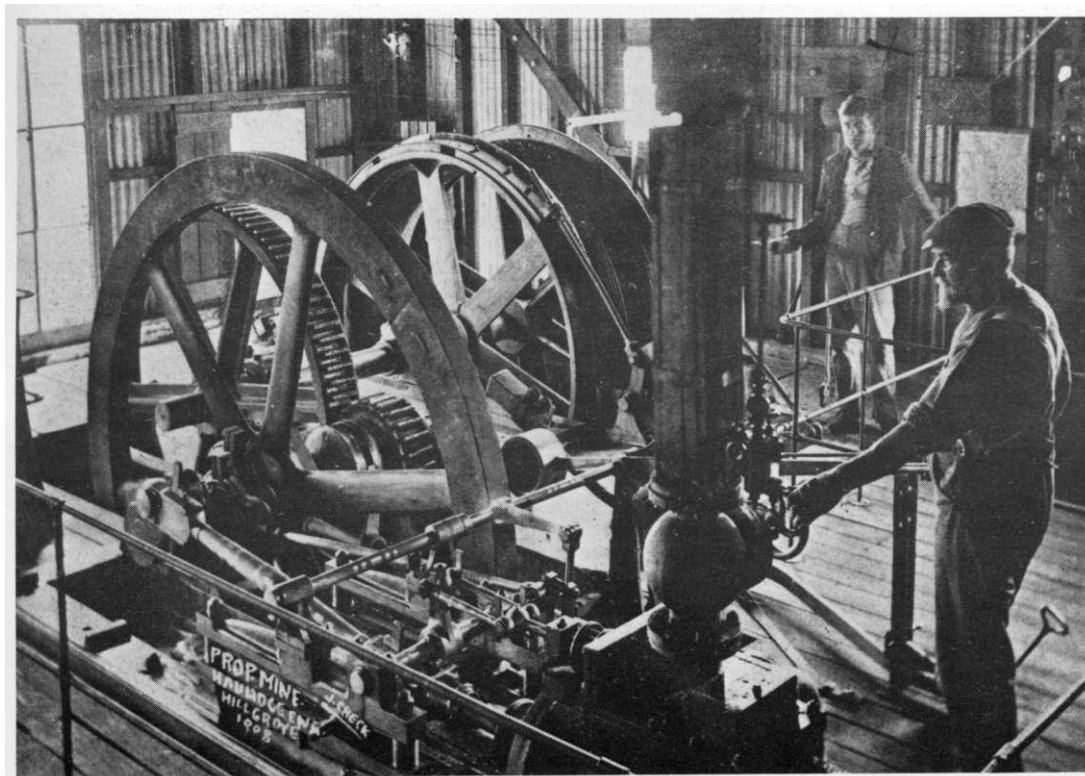
The company had acquired the closed Eleanora mine back in October 1904 for £4,000. They planned to extend the Cooney tunnel to cut the Eleanora reef, but this idea was abandoned.

The necessary connection with the old workings in No. 9 level was effected in April 1907. This crosscut, 1,060 ft below the Cooney tunnel, was 150 ft long and its driving proved that the Big Reef, and other parallel reefs in the Baker's Creek mine did not extend into the Proprietary.

The winding engine at the underlay shaft was

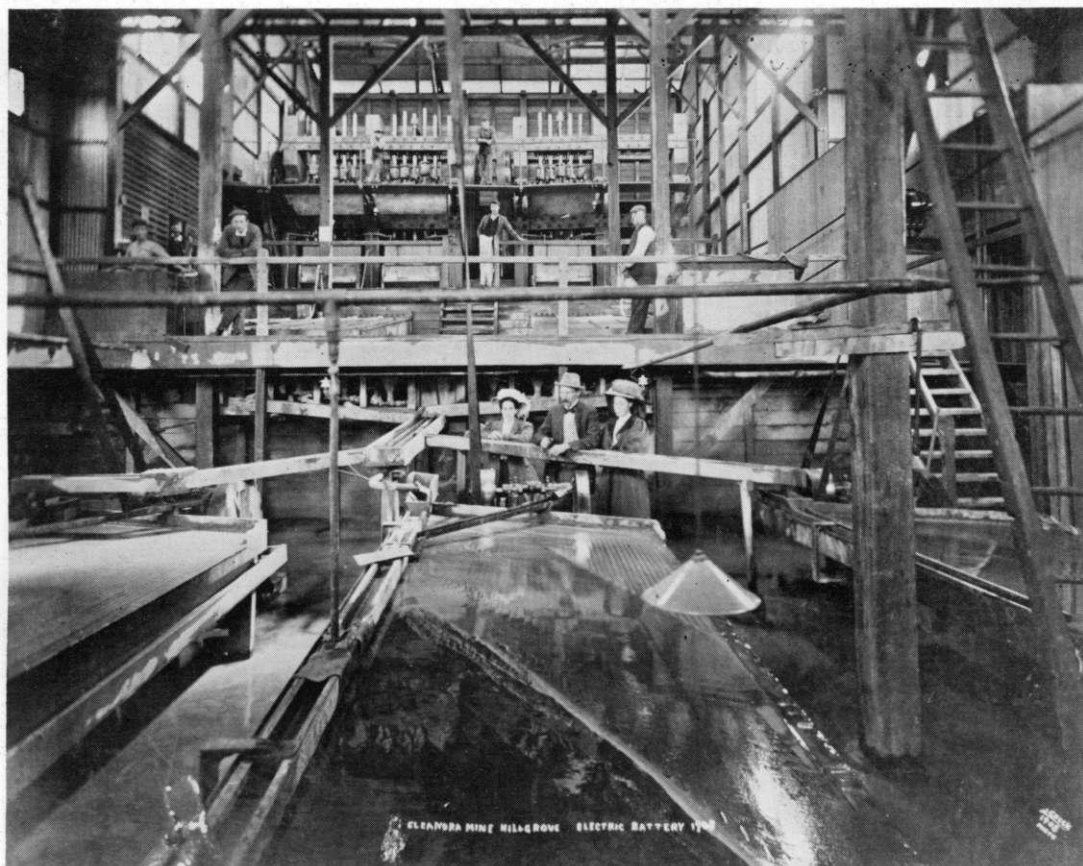
91. *Australian Mining Standard*, 16.2.1905.

92. *Hillgrove Guardian*, 2.12.1905.



New Hillgrove Proprietary tramline winding engine in 1908. The driver is Bill Tarr and his assistant, Jack Porter, is in the background.

Photo: Geological and Mining Museum



New Hillgrove Proprietary electric powered battery (15 head) in 1908. The alluring colours of gold on three Wilfley tables in the foreground, are being admired by the visitors.

Photo: Geological and Mining Museum

dismantled in mid August 1907, and relocated at the vertical shaft. It was in operation by September. A small winch was installed at the No. 2 level plat for shaft sinking.

An endless rope automatic haulage was installed to haul stone from the shaft to the Cooney adit. The gauge was 18 in with sleeper spacing of 36 in.

### **Styx River Hydro-Electric Scheme**

In mid 1907, a new 15 head battery, built in Bendigo, was erected on the tableland, near the tramline engine shed to crush ore from the Eleanora section. This was to be electrically powered, so the Styx River hydro-electric scheme was built. A 19 mile transmission line was erected from Hillgrove, in an easterly direction to the Styx River. The 250 hp turbine was built by G Gillies of England. Output was 160 kw at 550 volts, with the voltage stepped up to 23,000 volts for transmission.

Engineering difficulties were immense because of the extremely rugged nature of the country. A 70 ft tunnel had to be blasted out and a 2,000 ft long, 3 ft x 2 ft wooden flume was carried in certain places on a trestle up to 80 ft high, from the dam to the turbine houses.<sup>93</sup> Tramways were used during construction.

Finally, the plant was tested on 1 December 1907, and the battery beginning work 17 days later.<sup>94</sup>

Total expenditure on the hydro scheme amounted to £6,000, but a cost saving of about 85% over steam power was hoped for.

**Right:** New Hillgrove Proprietary's underground engine chamber in the vertical shaft (Cooney tunnel). The compressed air winding engine is in the foreground.

Photo: Geological and Mining Museum

93. *The Electrical Record*, 6.5.1908.

94. Plant operators were trained at the Hillgrove Technical College.



PROPRIETARY MINE HILLGROVE THE GREAT POPPET HEAD CHAMBER 55 FEET HIGH  
100 " LONG

## Financial Problems

Both Eleanora and Proprietary sections were worked simultaneously. A new vein on No. 13 level, known as the No. 2, or Sandstone reef was cut on 9 July 1907. Values ran up to 6 ounces. It ran parallel with Smith's reef, and was up to 12 in wide. However, below the No. 14 level this vein became poor. Smith's reef too, became devoid of payable values. Little did shareholders know that the writing was on the wall for their company's future, although a 1s call was made on shares in July 1904.

In 1905 thirteen thousand five hundred and twelve ounces of gold, worth £48,431 was recovered, allowing a one shilling dividend to be paid to shareholders.<sup>95</sup> A similar value of gold was won in 1906, but the mine company made a loss of £7,058 14s 7d. This was a result of sinking the new shaft and lost production, but with the introduction of electricity it was hoped that the Eleanora would return a profit of £1 10s 0d per ton. It was not to be.

The company crushed 220 tons for 502 ounces in January 1908, then 190 tons for 491 ounces in March, so it came as a surprise when on the 6 May 1908, the mine closed, throwing 200 men out of work. No reason was given at the time.

The following Thursday morning, work resumed with only 40 employees, at the Proprietary mine only. The air compressor was not able to supply both sections simultaneously. Shares which were quoted at 8s 4d in April plummeted to 4s 9d.

By late May, both sections were again working, though arrangements were made to install an electric winding engine, for the vertical shaft, to reduce air consumption. A newspaper report stated that electric motors were being installed but this is not certain.<sup>96</sup>

Mr Patterson cabled London on 23 September with the following: "Hillgrove Section Chute has pinched out both veins low levels, Eleanora Section. Treatment at the mill unsuccessful. Advise you to close."<sup>97</sup>

On Friday, 2 October 1908, the mine shut. A six month labour exemption was granted. All hands were dismissed, although the Eleanora battery crushed for a little longer.

## Retribution

A sorry tale now unfolded. £56,000 had been sunk into the mine. The shareholders at a meeting on 12 October in Sydney blamed the management for the poor showing. Mr Patterson had stated that £39,000 worth of ore was in sight in the Proprietary section and £75,000 in the Eleanora. Where had this gone? Mr Patterson departed Hillgrove at the end of October.

The directors mortgaged the property, firstly to London interests for £13,500 then to Australian shareholders for £7,500 to bear interest at 6 per cent. This advance was for mine development and to supply an additional air compressor. This was all to no avail and the management was accused of incompetence and excessive secrecy.<sup>98</sup>

In December, Messrs Ashcroft and Savage, two mining and metallurgical engineers of Sydney, sampled the mine. They submitted their report on 14 January 1909. This, though hopeful, was not encouraging. A peculiarity of Smith's reef was that the gold was always found in patches and regular assays were not always a true guide to the value of a particular block of ground. Simply stated, the Proprietary had no payable ore in sight, while the Eleanora had no payable ore at depth. Although the continuation of development was advised it was not pursued by the management.<sup>99</sup>

The last big hope of the Hillgrove field had come to nought. Up until closure of the Proprietary section, 35,473 ounces, with a value of £139,095 12s 8d had been won from 11,557 tons of ore.

In October 1909, the mine was dewatered and tributors set to work. During April 1910 one group, Smith, Roach and party crushed 5 tons for 95 ounces, 15 dwt, a satisfactory result. All crushing was done at the Eleanora battery.

Mr EW Jansen, a former NHGP director contacted the Australian shareholders, in May 1911, with a view to forming a new company to resume operations.<sup>100</sup> The mortgagees would accept £10,000 for the property. Mr Jansen proposed to float the company with a capital of £50,000 in two shilling shares, £2,000 worth to be allotted to himself. Nothing came of this scheme. However a company called Eleanora Mines Ltd was formed in 1912 to take over from NHGP.

## A Tragic Finale

During dismantling operations, on Wednesday 16 July 1913, a fatal accident occurred on the tramline. About 1 pm Mr Charles Nicholson, the engineer-in-charge, was killed when the steel winding rope broke.<sup>101</sup> It was, unfortunately, his 22nd wedding anniversary, making the accident doubly tragic.

95. *Mines and Minerals of NSW*, N. Danvers Power, 1906.

96. *Armidale Chronicle*, 18.3.1908.

97. Mine Record No. 0159. HGP Geological Survey Department.

98. *Australian Mining Standard*, 23.7.1908.

99. *Ibid.*, 30.12.1908.

100. *Ibid.*, 4.11.1911 and 4.5.1911.

101. *Armidale Chronicle*, 19.7.1913.



The runaway boiler, New Hillgrove Proprietary tramline accident, 1913. The remains of the battery is in the left foreground.  
Photo: Geological and Mining Museum

The procedure involved hoisting two 11 ton boilers, one at a time, to the top. As the boiler and ballast trams reached the passing loop, Mr Mann, the winding engine driver was preparing to bring them to a halt. Three trams of ballast were to be unloaded and removed to one side of the tramline. The steel rope of the ascending tram should have wound onto the centre of the 20 foot diameter winding drum, but because of its concave shape, the rope gradually worked towards the top, or outer edge. While the ballast trams were being unloaded, the rope slipped on the drum. The impact of about 40 feet of slack rope caused the winding drum to split and the rope to break.

The deceased was sitting on the leading ballast tram. It was believed that he hit his head on the boiler, before being thrown 200 feet down the hillside. The last 150 feet of the tramline was ripped up, the boiler careered into the battery house. It was then only fit for scrap. Mr Bill Waters, the signalman, who was watching from the bottom had a narrow

escape from injury. He quickly hid behind the other boiler.

The body of Mr Nicholson, was carried around to the Baker's Creek tram, then sent up to the top. He was buried in the Presbyterian section of the Hillgrove cemetery. His death was the only recorded fatality on any of the mine tramlines.

The tram was repaired the following week so the remaining machinery could be hoisted up. The tramline was dismantled some time later.

Most mining fields have a second "life" and Hillgrove is no exception, although the revival, which commenced in 1937, is more limited than the mining activities described in this article. The hectic activities of the Hillgrove Goldfield at the turn of the century were never to return. However, a number of mines have been reopened and tramways continue to play an important role in servicing the workings in the gorge. These later mining activities will be covered in Part II of this history.

