Light Railways

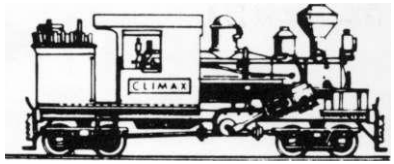
No. 96
April 1986

TRAMWAYS DOWN THE GORGE: the story of Hillgrove, 1937-1987

by Ross Mainwaring

Published by
The Light Railway Research Society of Australia

Registered by Australia Post - publication No. VBQ1339



No. 96
Vol. XXIV
APRIL 1987

ISSN 0 727 8101

Light Railway Research Society of Australia

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

COUNCIL,
President, Mike McCarthy (03 762-5847)
Secretary, Jack Stock (03 288-6601)

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.

Light Railways Editor, Bob McKillop, lOA The Bulwark, Castlecrag, NSW 2068.
(Phone 02 958-4516)

Glossary of Terms

Adit: Horizontal entrance to a mine.
Bogger: A power driven shovelling machine.
Cyclone: A cone shaped tank used for centrifugally sizing minerals.
Grizzley: Bar grating for screening ore.
Reichert cone and spirals: A hydraulic ore classifier.
Ruoss jig: Classifying jig for fine ores.
Stope: A cavity from which ore is removed.
Trommel: A revolving sieve.
Wilfley table: A vibrating table that separates gold from finely crushed ore.
Winze: A small underground shaft downwards from a level.
One cord of wood: 8' long x 4' high x 4' wide = 128 cubic feet
20 pennyweights (dwt) = 1 ounce (troy)
1 gram = 0.0322 ounces (troy)
1 kilowatt =1.34 horsepower.

Cover: A 3-tonne *Gemco* battery locomotive on the NEAM Eleanora No. 9 level adit tramway at Hillgrove, March, 1985. Photo: R Mainwaring

CONTENTS:

EDITORIAL

The Hillgrove mining field celebrates its centenary in 1987 and this issue of *Light Railways* marks this event. The early mining period through to 1921, with its capital intensive gold mines, spectacular incline tramways and boom towns of Hillgrove and Metz, was covered in *Light Railways* No. 94 of October 1986. A mining revival commenced in 1937 and operations have continued to this day.

Part II of the Hillgrove story covers the mining operations of the past fifty years. Initially operations were of an intermittent nature, but since 1968 an era of permanency has been brought to the field through exploitation of antimony lodes. Improved technology has overcome the processing problems which plagued the early mines on the field and Hillgrove is still a significant gold producer. New development work means that mining operations will continue into the field's second century. Changes in technology have rendered the incline tramways, which provided transport access down into the gorge, redundant However, railed transport still plays an important role in underground operations.

ERRATUM

In Part I of the article *(LR 94)* the following corrections apply:

p. 6 column B "intransient" should read "transient"
p. 17 column A "manilla ropes" should read "manila ropes"
p. 34 column B "secrety" should read "secrecy".

TRAMWAYS DOWN THE GORGE: THE STORY OF HILLGROVE, 1937-1987

by Ross Mainwaring

1. INTRODUCTION

Part 1 of the history of the Hillgrove goldfield revealed that the expectations of the mining companies were not realised, a situation by no means unique. By 1900 the field was in decline with the end coming in 1921 when the Baker's Creek mine finally closed. The field was retarded by high mining costs associated with depth, expensive fuel and metallurgical problems. Antimony prices fluctuated widely but the price of gold did not rise in line with spiralling labour costs.

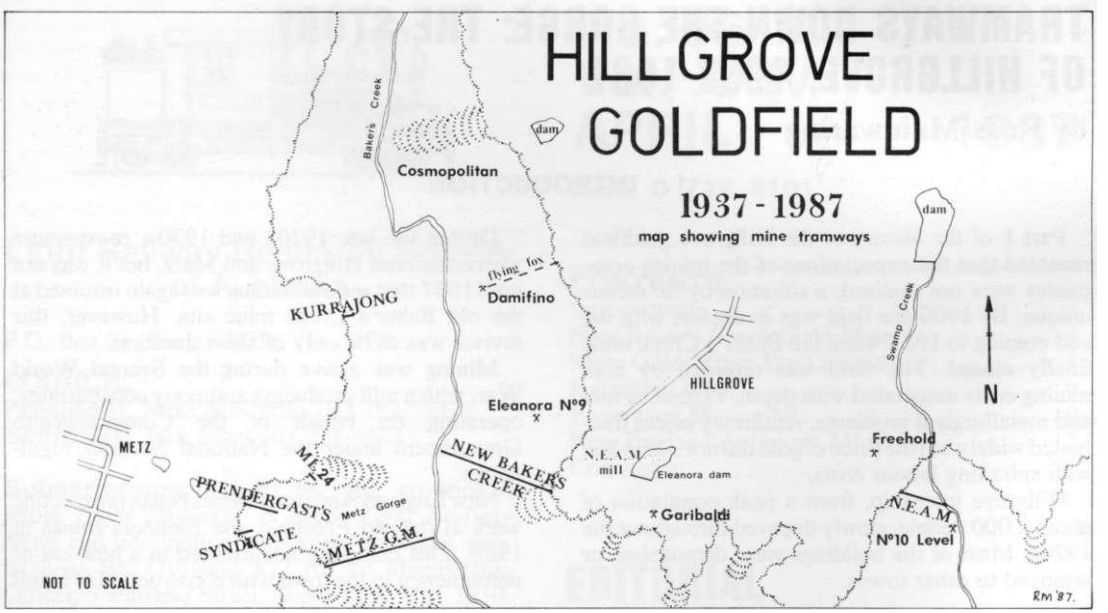
Hillgrove township, from a peak population of about 3,000 people, slowly decayed throughout the 1920s. Most of the buildings were demolished or removed to other towns.

During the late 1920s and 1930s, prospectors worked around Hillgrove and Metz, but it was not until 1937 that serious mining was again resumed at the old Baker's Creek mine site. However, this revival was to be only of short duration.

Mining was active during the Second World War, with a mill producing antimony concentrates, operating on behalf of the Commonwealth Government under the National Security regulations.

New England Antimony Mines began prospecting work at the old Freehold and Eleanora mines in 1968. This company has ushered in a new era of permanency to the town with construction of a mill

Ruins of another era: Faint's mill lies derelict on the old Garibaldi property, 1978.
Photo: R Mainwaring



and vigorous development work in association with opening up of new lodes.

Tramlines down into the gorges no longer play a transport role on the Hillgrove mining field: economic factors have mitigated against their further use.

2. NEW BAKER'S CREEK GOLD MINE

New Baker's Creek Gold Mine (1937) NL

Apart from minor activity in 1930, the Baker's Creek property lay neglected until 1937, when Mr Thomas Snow began prospecting the old Consols mine. Mr Snow had a long association with Hillgrove: at one time he was Manager of the Golden Gate, Sunlight and Baker's Creek mines, and he sat on the hospital committee and borough council.

The Consols had sunk shafts on both sides of the creek, and worked portions of the Baalgammon, Little and Middle reefs. The miners lost the reefs when a fault was met, but Snow, prospecting on the West side of the fault, relocated them.

Snow sunk a winze 50 feet down in the end of the old company's workings, then cross cut North 20', where he intersected Smith's reef. Gold values were up to two ounces.[1] Snow initially formed a syndicate issued with £10 shares, to operate the mine.

It was later decided to float a company, known as New Baker's Creek Gold Mine (1937) NL, with capital of £5,000, divided into 40,000 2/6d. shares. Incorporation was on 15 February 1938. Options were taken up by JK Williams and CR Coote of the Sydney Stock Exchange.

The inaugural shareholders' meeting was conducted in the lounge of the Tattersalls Hotel, Armidale on 30 October 1937.[2] Thomas Snow was appointed Mine Manager and JK Williams, the Chairman. The registered office was in far away Queanbeyan, NSW.

Mine Development

Work began in November 1937, with the sinking of a shaft, 200 ft (61 m) above the old workings on the western side of Baker's Creek. An inspection of the mine, which was on a 22 acre lease, was undertaken by Mr Stanley Senior, formerly of East Rand Proprietory Mines, Johannesburg. He was favourably impressed.

Snow purchased the old Baker's Creek property so that more economical working of the new mine could result. The old North shaft was unwatered to the No. 5 level, retimbered to three compartments then a poppet head and steam winding engine installed.

In mid-December, 1937, 10 tons of quartz were sent to Port Kembla, NSW, for crushing and

assaying.[3] It realized 24 dwts a ton. Labour conditions were suspended in March, 1938, for six months, as machinery valued at £2,000 was awaiting delivery.

Incline Tramway

The first priority for the new company was rebuilding the incline tramline down to the mine. Sleepers were bought second hand from the Government Railway at Armidale.[4] They were simply turned upside down and the 14 pound rail spiked down. Relaying the rails began on 28 February 1938. The three rail system, with a mid-way passing loop was used A gauge of 30 in (762 mm) was chosen. By early April the tramline was down 2000 ft (610 m).

To secure the sleepers on the steep hillside, both round and square steel bars were hammered into the ground. After a period of time, the 1 in (25.4 mm) diameter plough steel winding rope, which was 3,000 ft (915 m) long, would begin to wear a groove in the sleepers, where it sagged down after the passing of a tram. To prevent this from occurring, a piece of hardwood was nailed onto the sleeper where the rope would run.[5] Thus the wooden block would be grooved and not the sleeper.

A secure foundation for the engine was essential for safety and reliability. This was provided by 3 longitudinal bed logs which rested on two 20 in diameter logs. The engine was bolted to this structure.

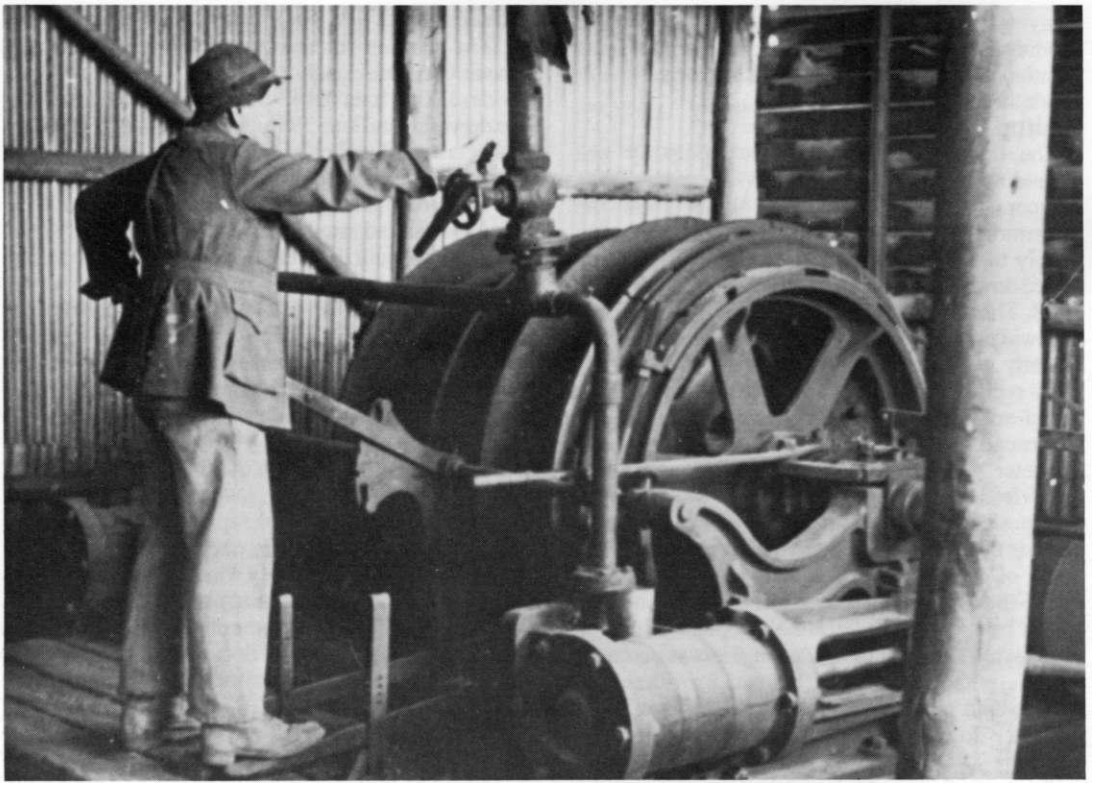
The wooden trams were of a similar design to those used previously *(LR. 94).* They were 45 in wide, 120 in long (1143 x 3048 mm) and the front, or downhill end was 39 in (965 mm) high.[6] The four wheels are 18 inches in diameter. All the angle iron was drilled with hand braces.

Tangye's built the Cornish boiler, which was 72 in in diameter and rated at 40 hp. A Roberts and Sons, of Bendigo, built the winding engine. It has two 12 in (305 mm) diameter cylinders, which imparted motion to two 48 in (1219 mm) diameter drums. Rated hp was 25.

The engine was purchased from an arsenic mine at Valla, south of Coffs Harbour. It is believed that this engine originally came from the old Eleanora Company.

An interesting example of bush engineering now unfolds. To reduce the length of winding rope required, and, therefore, keep costs to a minimum, it was decided to use only one winding drum. The rope would simultaneously wind and unwind on the right hand drum, leaving only a few turns wrapped around. Each end was secured to a tram. Because the original drums were flat, it was necessary to have a casting made at an Armidale foundry. The casting had a concave centre and the whole assembly bolted into the centre of the original flat

The only known photograph of the New Baker's Creek Gold Mine (1937) NL tramline Mr Tom Snow is in the centre foreground, with Mr Bill Goodfellow on the right. Photo: Mr N Goodfellow, Dorrigo



Tom Faint at the controls of the New Baker's Creek company's tramline winding engine, c.1940s.
Photo: Mr C Faint, Hillgrove

drum. This reduced the width to 11 in by 6 in deep. Unfortunately, when the casting was delivered the width was greater than specified, so a whole week was spent chipping off the excess metal, so it would fit Truly a laborious task.

Tramway Operation

Mr Bill Goodfellow was both winding engine driver and boiler attendant He was a long time Hillgrove resident and was previously the engineer for the Tyringham Sawmilling Company.

Firewood was carted by motor lorry from Long Point It was then cut into 6 foot lengths; the tramline boiler consumed about one ton per day.

A 3 in diameter steam pipe from the boiler dome branched into two 2 in pipes, one to each cylinder, after the steam stop cock. These pipes came down in front of the driver. Mr Goodfellow specially fitted a wooden handle to the stop cock, so he would avoid burning his hands. The used steam from the left cylinder exhausted through the side of the shed via a 3 in diameter pipe.[7]

A push button battery powered signalling system was used for the tramline bellcode. Telephones were also installed.[8]

The brake blocks fitted to the engine were made of wood. Naturally, with the great forces and weights involved, the blocks would protest by giving off copious volumes of smoke; sometimes even catching fire. Life as an engine driver must have been very interesting.

Mr Goodfellow would begin his working day at 6 am, with the raising of steam. At this period of time, he had a son boarding at Hillgrove, so at 7 am a 'cock-a-doodle' would be blown on the whistle to wake him from his slumber. That whistle must have echoed for miles up and down the gorges.

At the conclusion of the working day, the fire was banked for the night. The engine and boiler are housed in the same wood and iron shed, quite cosy in winter if there was snow around.

One night the safety valves jammed on the boiler, filling the shed completely with condensed steam.

Bill Goodfellow was invisible as he worked on the stubborn valve, with water constantly dripping from the roof. It was Bill's job to set the slide valves on the engine.

Employees of the Company were not the only ones to use the tramline. Mr Herb McGlashen and his wife led a lonely life in a small dwelling down beside Baker's Creek. He operated a 3-head battery. His wife would ride up and down the tramline on her shopping trips to Hillgrove.

Another time a shooting party descended for an expedition down the creek. At a place known as Vinegar Flat, one of the men accidentally shot himself in the leg. He was carried back to the tram where Bill Goodfellow had to hurriedly raise steam to pull the unfortunate chap to the top.

If it was necessary to raise steam in a hurry, Bill would light another fire in the base of the brick chimney, thus creating an additional drafting action on the boiler. The water supply came from the Eleanora dam.[9]

Mining Operations

Plant installed by the New Baker's Creek Company included a 40 hp Cornish boiler, 30 hp horizontal steam engine and an air compressor.[10] A Crossley diesel engine suitably connected supplied electric light. One Marshall portable steam engine was also used.

Mine development continued until Gabriel's Lode, named after the local Inspector of Mines, was intersected 70 ft (21 m) below the bed of the creek, on the 120 ft (37 m) level in the North shaft. Driving on this level was continued until, in 1940, funds were exhausted. A decision was made to increase capital value to £7,500.[11]

Mr Hugh Trestrail of Captains Flat was invited to inspect and sample Gabriel's Reef and the mullock dump. His report was submitted on 22 January 1940. He advised purchasing a new plant for £18,326 as the present machinery was unprofitable. This was well beyond the financial means of the Company, so a second hand plant was bought for £4,400. Quite a saving. Labour conditions were suspended to allow re-erection of the machinery.[12]

Closure

A grant of £75 had been forthcoming from the Government, but a further application for aid of £20,000 was refused on the grounds that insufficient prospecting had been carried out. Income was only £42.12s.7d. from the sale of gold ore, while the fuel

New Baker's Creek Gold Mine tramline truck, 1978. Photo: R Mainwaring

bill amounted to £115.14s.0d, which was second only to wages. Capital was still insufficient so all work ceased.

Since 1938, over £7,000 had been spent with little to show for their efforts. The mullock dump was sold to Hillgrove Mines Pty in late 1940. It was not until 11 May 1954 that a liquidator was appointed to wind up the affairs of the New Baker's Creek Company.

A Brief Revival

The mullock dump was variously estimated to contain up to 200,000 tons of stone, of unknown value. In the early days, low value stone was simply tipped from the main shaft onto this dump, which stretched all the way down to the creek. The Department of Mines did a costing for Hillgrove Mines to permit a scientific sampling of the dump to be undertaken. This was in early 1947.

The costs were broken down as follows:

Engine driver employed for 3 days at 30s. getting up steam, etc	£4-10-0
Firewood, 10 cords at 25s	£12-10-0
Preparing tramline, 2 men for one week at £5-5-0 weekly	£10-10-0

The Department concluded that it would be cheaper to pack samples on horseback to Ushers mine (Damifino) then by flying fox to the top, rather than rehabilitate the disused tramline.[13]

However, the tramline was to have a third revival. Materials for shaft sinking were lowered on the 21 April 1947. Other dates when the tram was used were 26 April, 19 May and 11 and 24 June 1947. Messrs T and J Faint were paid for steam raising, carting water and engine driving at the rate of £2 and £1, respectively. Mr G Mayers and George Smith cleared the tramline of foliage and weeds. Mr Mayers' wages for the week were £6-5-0.

An adit was excavated at the northern-most toe of the dump and from this led an 18 in gauge tramway towards the incline tram. The sampling was duly done; bagged samples were taken to Armidale then by train to Sydney. Results were disappointing. Of 12 samples the highest value was only 1 dwt 15 grams a ton.

Finale

Further expenditure was not recommended. All equipment was later removed and sold; the tramline lay intact until 1966 when the rails were pulled to the top by bulldozer for re-use at the Kurrajong mine.[14] Both boiler and winding engine are still intact.

Today the brick chimney of the Baker's Creek North Company stands like a memorial over the site of what was once one of the richest gold mines in New South Wales.

3. METZ GOLD MINES PTY LIMITED

This Company was formed by Mr John Dale with the objective to mine scheelite and antimony lodes in the old Sunlight property at Metz. Registration of the company was on 25 March 1937 with a share capital of £2,100 divided into 8,400 5s. shares.[15]

Incline Tramway

In 1937, it was reported that 2,000 ft (610 m) of single track tramline had been constructed down the western side of Baker's Creek gorge, on the formation of the original Sunlight tram.[16]

Wooden rails, measuring 3 in x 3 in (76 x 76 mm) were nailed through their centres onto wooden sleepers.[17] Track gauge was 3 ft 6 in (1067 mm). Timber for the sleepers was cut locally, while Mr Tom Faint of Hillgrove supplied the rails from his own sawmill. Four employees were engaged on tramway construction, which took about six months, although construction work was not continuous.

A 32 in (813 mm) diameter winding drum was powered by a 24 hp tractor engine. One inch diameter steel bolts fastened the winding engine to brick foundations. A wooden tipper was built of 7 in diameter logs elevated up off the ground.

The tram was of wooden construction, with four steel wheels. It discharged the ore from the front or uphill end. No passengers were officially allowed to ride in the tram, so employees had to walk up a gruelling track to the North of the tramline.

Mining Operations

Old No. 4 and No. 5 levels were cleaned out for prospecting work. The tramline terminated some distance above No. 5 level, so to move the ore from the adit up to the tram, a flying fox was built Ore was then loaded into a tram for the long, slow pull to the top. This occupied about 40 minutes.

The mill consisted of a two-head stamping battery, driven by a small steam engine. Rollers were used to further grind the ore to the correct size before passing over a Wilfley table.[18]

The expense of the tramline and mining preparations seriously depleted the company's finances, so in 1939 they began to work the Syndicate reef for antimony. About 212 tons were mined up until 1945. The concentrates were sent to OT Lempriere of Sydney.

During World War 2, an application to erect an

antimony smelter at Metz was made to the Mines Department, but as reserves were considered insufficient, aid was refused. The tramline was last used around 1946 or 1947.

By 1952, the company was on hard times, and when the price of antimony fell, it was reduced to tributing. Winding up formalities had begun on 11 October 1950. No further references appear at this time.

Today, the upper tramline sections have completely disappeared, but a lower section is still well preserved.

4. KURRAJONG MINE

This small mine was begun by Mr. Bill Tassell in 1958. An adit was developed on the western side of the gorge. The lode, known as Johnson's Reef, is up to 600 mm wide and dips at 80 degrees or steeper, it contains stibnite, although a narrow quartz — calcite — scheelite vein has been observed.[19]

The 1966 Incline Tramway

In the winter of 1966, Mr Sypkens subleased the mine. He constructed an access track down the steep hillside, and salvaged 185 metres of rail from the old Baker's Creek mine. This rail was used to construct an incline tramline and was also laid in the adit. Total length of the incline from the adit up to the access track is about 26 metres. The gauge was 381 mm with the rails being spiked onto the logs, which acted as sleepers.[20]

The method of operation was as follows. A 0.7 cubic metres capacity mine skip was pushed out of the adit, where the contents were tipped onto a grizzley, with two inch hole spacings. The undersize pieces of ore then fell through into a four wheel 0.6 cubic metres capacity skip, which ran on the tramline. The larger pieces of ore were shovelled up again to the adit level where they were napped and bagged. Any waste rock was simply tipped down the hillside. The skip was then hoisted up the incline by an air winch. This skip, which had a hinged front to allow for discharging, tipped the contents over a 9.5 mm screen.

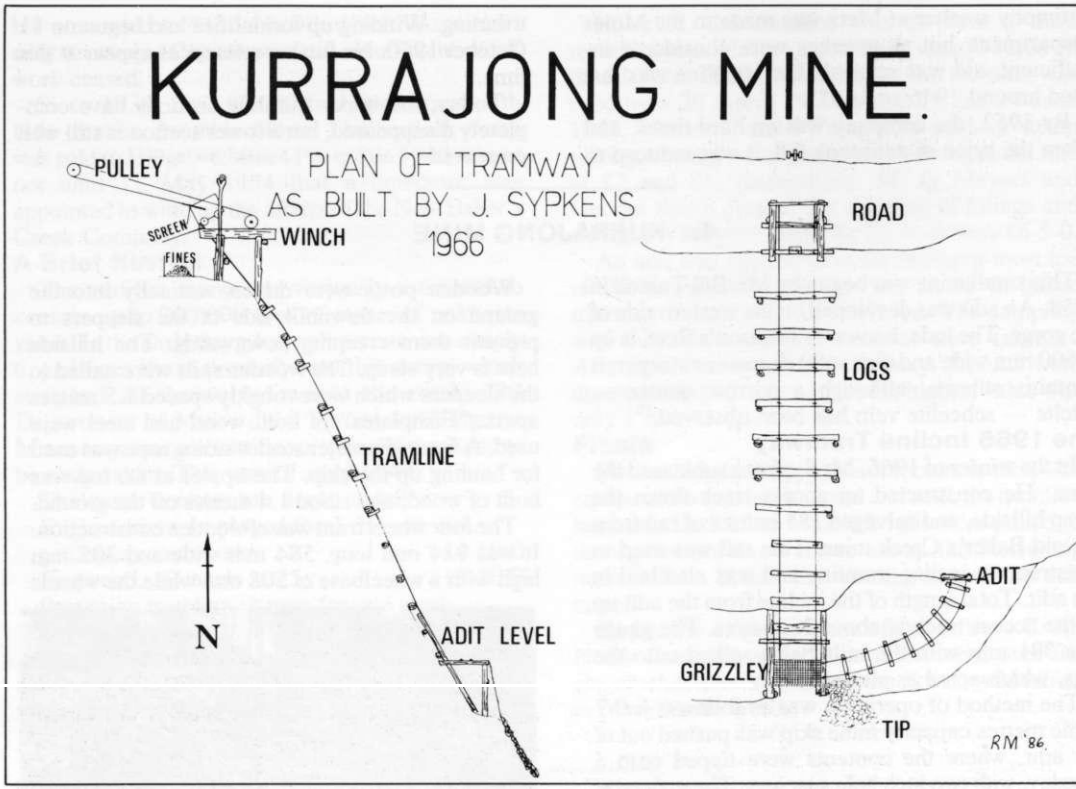
The fines fell through into a bin; from there they fell straight to a Ruoss jig. The oversize ore was crushed in an impact crusher. Contractors carted the impure ore to New England Antimony Mines mill at Fishington. The 9.5 mm diameter winding rope which was attached to the skip, passes over the road, around a pulley, then back to the winch, which was secured above the tippler. Upon the exhaustion of the ore above the adit level, Mr Sypkens ceased mining in 1968. He removed all the rails.

When Mr Tassell resumed working the reef below the adit level, he relaid the tramway with wooden rails. He used 51 x 76 mm section in 2.6 m lengths. The gauge was 457 mm and round logs were used as rudimentary sleepers. The grade was very irregular.[21]

Wooden posts were driven vertically into the ground on the downhill side of the sleepers to prevent them creeping downwards. The hillside here is very steep. The wooden rails were nailed to the sleepers which were roughly spaced 1.5 metres apart "Fishplates" of both wood and steel were used. A 6 mm diameter steel winding rope was used for hauling up the skip. The tippler at the top was built of wood, and stood 1.4 metres off the ground.

The four wheel tram was of wooden construction. It was 914 mm long, 584 mm wide and 305 mm high with a wheelbase of 508 mm while the wheels

The Kurrajong mine steel railed tramline as built in 1966 by Mr J Sypkens of Armidale.
Photo: J Sypkens



were 200 mm in diameter. Wood slats, spaced equally apart, were used as decking.

Th adit level was laid with wooden rails, 152 x 51 mm forming a 457 mm gauge. The adit was approximately 5 metres North of the tramline, and was driven in a SW direction.

Mr Tassell worked the mine intermittently until he sold it to New England Antimony Mines in 1980. No further work has been done, although the tramline is still intact.

5. ENDURANCE MINING NL

This company worked leases immediately East of the old township of Metz, on the edge of Metz gorge. The company intended to mine McNamara's lode, a high grade scheelite and stibnite ore body. The reef strikes N 40 degrees W and was originally worked way back around 1900. The lode is also known as the Syndicate reef.

Syndicate Tramline

The Syndicate lode was diamond drilled to a depth of 200 metres in July 1970. In October, 1970 the Company cleaned out and began to retimber an old adit, known amongst other names as the Syndicate tunnel. This had been driven in the direction S 16 degrees W, and was about 55 metres below the summit of the gorge.

Work started in early November, 1970 on an incline tramway down the face of the Metz Gorge to connect with the Syndicate adit. The tramway was completed by 22 December. The track was of the portable type, with pressed steel sleepers, being obtained secondhand from a Queensland sugar mill. The gauge was 610 mm and the rail weight was 5.6 kg/m. The tramline was spiked down to logs on the steep hillside, which were held in position by steel spikes. Cast iron rollers were fixed in the centre of the track, to reduce wear on the winding rope. An air operated winch was used to hoist up the skip, which took the form of a four wheel flat frame with vertical boards at the lower end. The capacity was about one tonne. The adit end of the tramline

terminated on a 1170 mm diameter turntable, which was bolted to an elevated wooden trestle. The tram would have to be turned 90 degrees, then pushed about 20 metres South to the adit

The last 6 m were on an embankment, 1.2 m wide and 2 metres high on the downhill side.[22] The tram was mainly used to send down timber for the Syndicate tunnel reclamation. Employees had to walk up and down the steep hillside to get to the adit

While working in this adit, an old stope was encountered, and as conditions became dangerous, work ceased. The Company began sinking a vertical shaft 10 metres to the South West side of the lode.[23]

The Company lodged an application for aid to drive 250 metres on the lodge. The drive measured 2.1 metres high by 1.5 metres and the contracted price was $45 a foot Assays revealed an average of 2% scheelite and 8% antimony, while an estimate of the expected gold return was from 4 to 10 dwt a tonne.

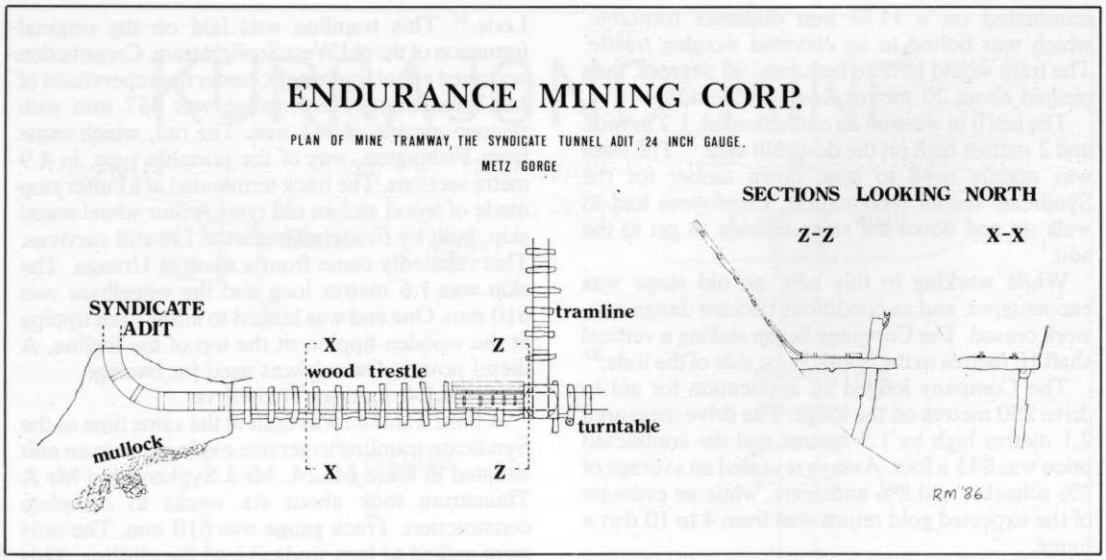
Prendergast Reef Tramline

By May, 1971, the company had laid down 200 metres of incline tramway to Prendergrast's reef, which is about 400 metres North of the Black Lode.[24] This tramline was laid on the original formation of the old West Sunlight tram Construction occupied about four weeks, under the supervision of Mr Thunstrom. Track gauge was 457 mm with sleeper spacing of 965 mm. The rail, which came from Fishington, was of the portable type, in 4.9 metre sections. The track terminated at a buffer stop made of wood and an old tyre. A four wheel metal skip, built by Francis Theakston Ltd still survives. This reputedly came from a mine at Urunga. The skip was 1.6 metres long and the wheelbase was 610 mm. One end was hinged to allow front tipping at the wooden tippler, at the top of the incline. A diesel powered winch was used for haulage.

The ML24 Lease Tramline

A third tramline was built at the same time as the Syndicate tramline to service exploration in an adit situated in lease ML24. Mr J Sypkens and Mr A Thunstrom took about six weeks to complete construction. Track gauge was 610 mm. The rails were spiked to logs wedged into the cliffline. This timber was cut locally. An elevated wooden four legged frame supported a pulley wheel, over which the steel winding rope ran to an air winch. The tramline which was very nearly vertical, was about

Endurance Mining Corporation: Syndicate tunnel tramway in Metz gorge showing skip turntable (April, 1982). Photo: R Mainwaring



100 metres long. Production amounted to only two to three tonnes daily but operations continued for only a short period.[25]

Milling Operations

By June, 1972 the mill was almost finished. A Mirrless 300 hp diesel generator set supplied the required electricity. The main vertical shaft was fitted with a steel headframe, and a double drum electric winder, but this did not meet departmental requirements. Mill throughput in October attained 50 tonnes a week, although difficulties arose with the electrostatic separator. This involves the process of ore concentration which is based upon the electrostatic principle that like charges repel and unlike charges attract Ore is dropped between two electrodes, the minus "—" mineral was scheelite and the plus "+" was stibnite. The non repelled mineral drops vertically while the repelled mineral falls in another position. The mill never operated successfully and was the subject of adverse criticism by the Mines Department[26]

On the 16th of March, 1973, operations were suspended because of financial and technical difficulties. Additionally, the price of antimony had dropped. By the end of the year, all materials had been removed.

6. NEW ENGLAND ANTIMONY MINES NL

New England Antimony Mines (NEAM) originally owned an antimony mine at Fishington, 60 km east of Guyra, which had been in production since 1950.

In the late 1960s, attention was turned to re-opening the Hillgrove field, which had long lay dormant. Prospecting began at the Freehold and Eleanora properties.

In 1969, NEAM was taken over by Victorian Antimony Mines. During this year China stopped exporting antimony, resulting in the price of this metal rising dramatically. Macdonald Mining and Engineering Pty Ltd were appointed project managers for Hillgrove and mining operations commenced. However after a legal dispute, control of the project reverted to NEAM. Approximately 30 tonnes of ore a day was trucked to the Magword plant at Fishington.[27]

The Hillgrove Antimony Mill

An announcement was made in March 1970, that $2.5 million was to be expended on a new plant at Hillgrove. Construction proceeded apace with two hundred men employed. In addition to the plant, changehouses, offices and general accommodation were also built The official opening was performed by the then Minister for Mines, Mr W Fife on 6 November, 1970. Fishington closed in September, 1971, and all the equipment was removed to Hillgrove.

The old Eleanora company was not able to successfully master the metallurgical problems associated with the gold — stibnite ore bodies.

Where refractory ores are milled, the mercury becomes coated with iron oxide, preventing intimate contact by the gold particles with the mercury. Thus most of the gold is lost in the tailings. Mercury is also lost, estimated at the rate of 0.454 kgs (1 pound) for every 30 tonnes of crushed ore. Chlorination processes were tried but stibnite ignites when placed in an atmosphere of chlorine.[28]

The mill, which was built on part of the old Eleanora mine site, initially began solely as an antimony flotation plant. With new developments in metallurgical techniques gold recovery has greatly improved. NEAM's milling process is as follows:

> Crushed ore is fed from a 1500 tonne storage bin to a ball mill, from which the discharge goes to a Reichert cone and spirals to produce a rough gold concentrate. Reichert cone tailings and trommel oversize are classified by a 375 mm cyclone. Cyclone overflow is fed to the antimony flotation circuit. The antimony cleaner concentrate then has fine free gold removed on a table, also arsenic levels are reduced as well. A low-grade arsenopyrite/gold concentrate is sent overseas for treatment Gold and antimony recoveries are between 90 and 95 per cent.

About 10 per cent of the gold remains in the antimony flotation concentrate, so this concentrate is leached using an acidic thiourea solution. The gold so extracted is recovered by powdered activated carbon. This leach process, recently developed by NEAM recovers about 50 per cent of the gold previously lost Gold extraction has come a long way since the days of the old Eleanora Company **(see LR. *94*).** The ore for the mill is currently won from the Freehold and Eleanora mines and yields from 7-12 grammes a tonne.[29]

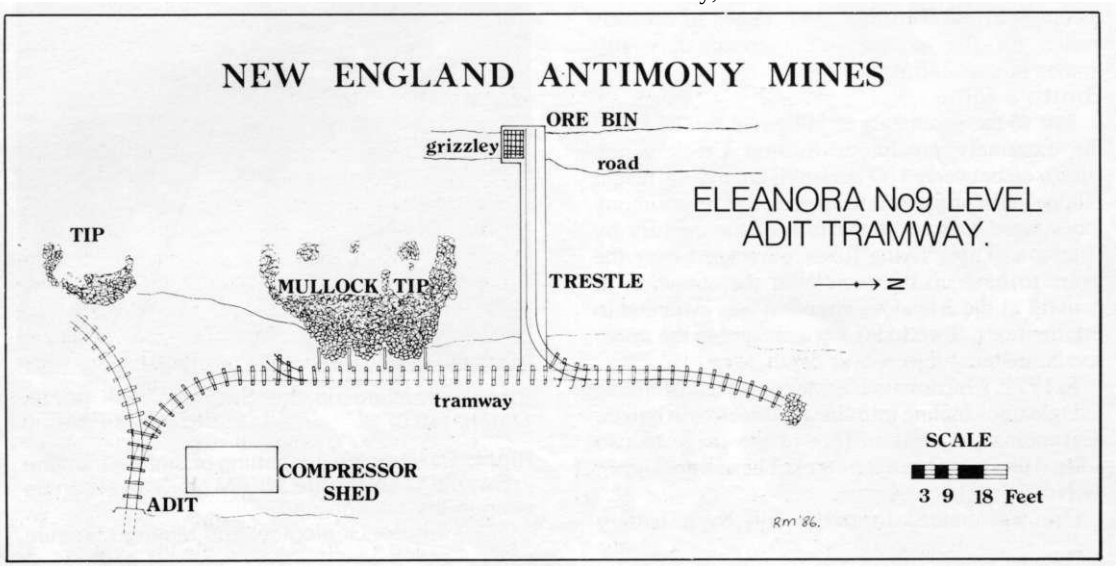
The Eleanora Mine

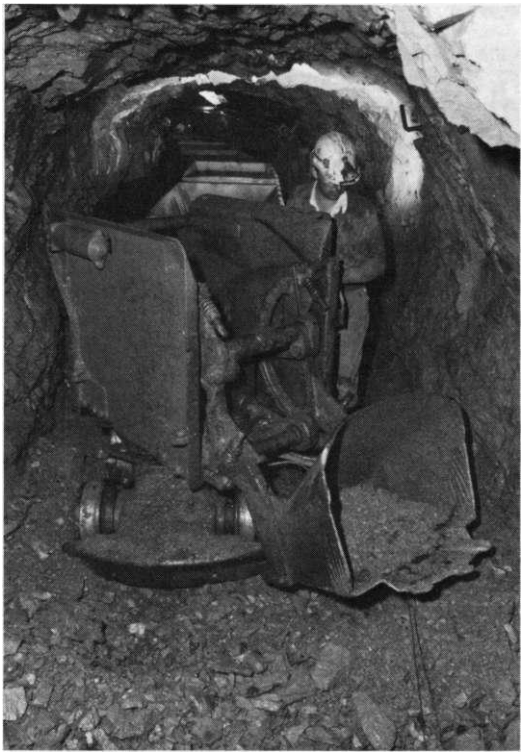
In 1969, NEAM began driving an adit in Baker's Creek gorge, which is known as Eleanora No. 9 level. The adit is about 250 metres below the tableland, the idea was to pick up the lowest level of the old Eleanora workings. This was duly achieved, after driving for 466 metres. The lode was intersected 330 metres from the adit while present development is for about 660 metres to the S.E.

To transport the ore a 610 mm gauge tramway was laid. Battery electric locomotives, known as *Gemco Trammers* are used. They are rated at 3 kw (4 hp) with a 48 volt electric motor. Drawbar pull is 136 kg. 3 tonne Gemco's can pull 6 to 8 ore trucks while 1.5 tonne locomotives manage four. George Moss Pty Ltd of Western Australia, were the builders.

The ore trucks are a four wheeled design with a 762 mm wheel base. They are of a side tipping variety and are 2.06 metres long. These trucks, marshalled in rakes, are hauled from the adit, then reversed at a set of points which led to a dead end track over an ore bin. A long rope stretched from the point lever to the buffer stop, so the locomotive driver could pull this rope to reverse the points without dismounting from his steed. Motor lorries face a long and gruelling climb to the summit

In January, 1971, China re-entered the metal market, precipitating a fall in prices. This factor, unfortunately, caused the curtailment of work on





"Bogger" shovelling stone on Eleanora No. 9 level drive, 950 metres from adit.
Photo: NEAM

No. 9 level, on 22 January 1971. Only 40 men were then employed. Ten thousand tonnes of ore was milled for the recovery of approximately 100 tonnes of concentrates.

Smith's Mine

Just to the south east of Hillgrove can be found the extremely preciptous Swamp Creek gorge. Bluffs of between 180 and 300 metres in height plunge vertically down to the creek. The antimony lodes were worked at the turn of the century by Brereton. Three flying foxes were used over the years to haul up the ore. With the cessation of activity at the Eleanora attention was switched to Smiths Lode. Two lodes were present in the upper levels, merging into one at depth.

In 1971, Macdonald Engineering began building a single track incline tramline, 460 metres in length, descending the western face of the gorge to two adits, a few feet above the creek. These were known as No. 3 level.

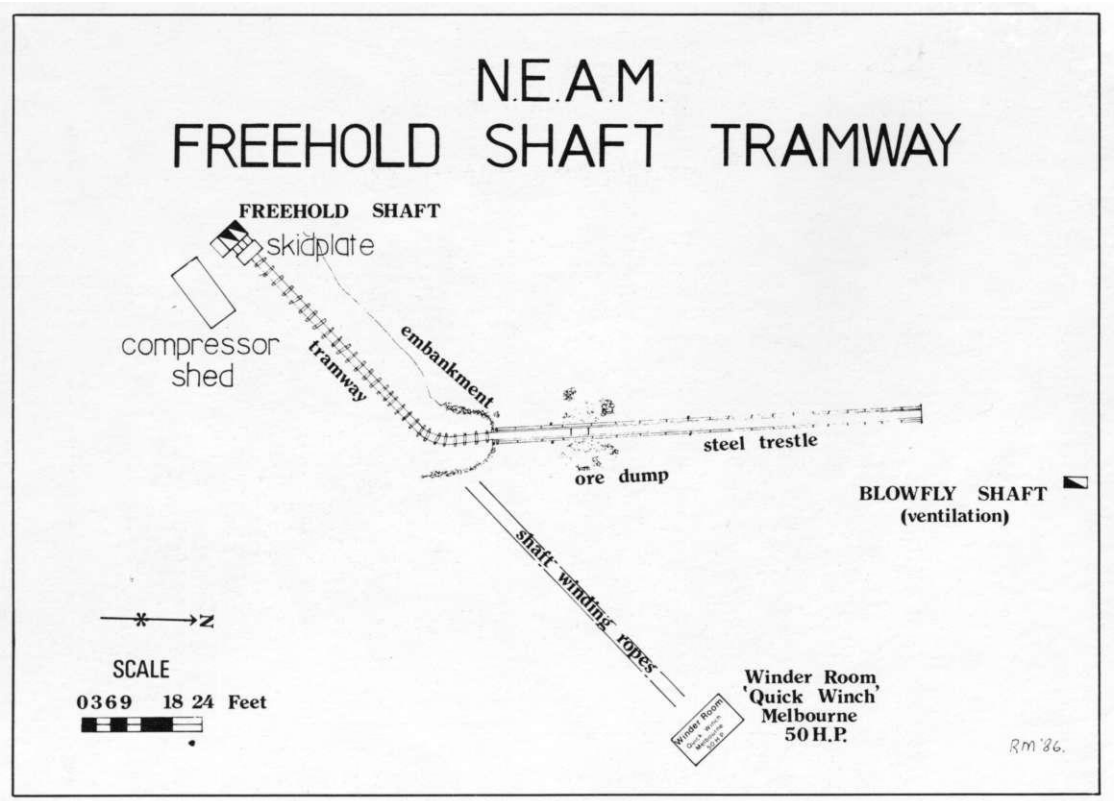
Ore was hauled from the adit by a battery locomotive onto a steel trestle, which was perched above the creek. The points were reversed after which the ore trucks were pushed about 50 metres along a stone embankment to a grizzley above an ore bin. The gauge of this tramway was 457 mm. The tramline skip was lowered beneath the ore bin, a load of rock discharged into it, then hoisted to the top.

Because of the extreme angle of the tramline — 43 degrees and steeper — the trackbed was concreted in situ, during 1972. A specially built rear (or downhill) discharging skip was used to facilitate the concrete pouring. This job was necessary to aid track stability.

Upon the two tonne capacity skip being pulled up from No. 3 level, the track immediately passed over a gully on a steel trestle. Antimony reefs are visible

Smith's tramline up the Swamp Creek gorge, March, 1978. Photo: R Mainwaring

Right: The spectacular setting of Smith's tramline in Swamp Creek gorge. NEAM No. 3 level can be seen in the background.
Photo: Geological and Mining Museum



in the rock. The concrete track section is then gained, and this continues all the way to the automatic tippler at the summit The gauge of the track is 838 mm. Rails were manufactured by Landore Siemens Steel. Wooden sleepers are used, using approximately one metre spacing. The sleepers are additionally secured to the hillside by steel cables, to prevent any downward creeping of the trackbed. On the lower section, a chain wire safety fence was erected each side of the tram to prevent falling rocks from obstructing the rails. Rollers, measuring 406 mm by 125 mm diameter are strategically located in the centre of the track to prevent the winding rope from dragging along the concrete.

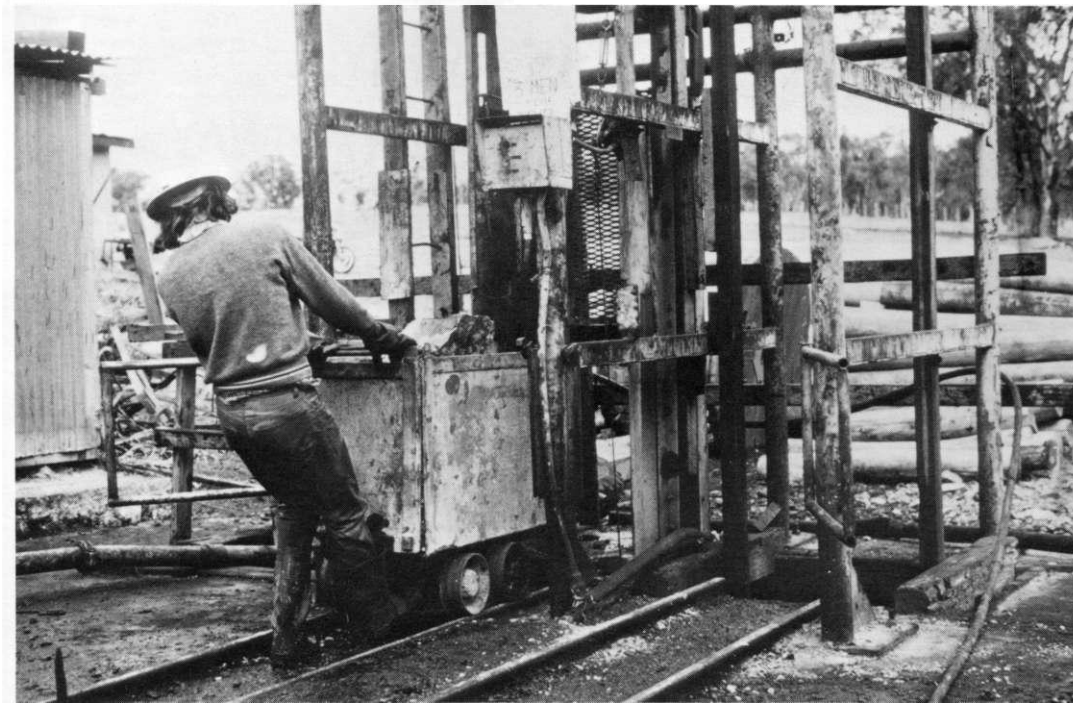
The tramway skip has the following dimensions:

Wheelbase	1524 mm
Length	2946 mm
Height	1083 mm
Width	762 mm

The uphill end was open, to allow for filling and discharging of ore and materials. To permit front end tipping, an additional pair of rear wheels project 254 mm further out from the side of the skip. Upon approaching the elevated ore bin beneath the tippler the two additional rear wheels engaged a set of rails set further apart than the gauge. This set of rails then rose upwards at a steeper angle, causing the rear of the skip to become higher than the front, thus discharging the ore into the bin. An indicator is provided for the widning engine driver to enable him to know the exact position of the skip. The rails on the tippler were welded onto 254 mm by 143 mm RSJ's. The 25 mm diameter steel winding rope, which was attached to the skip, passed over a sheaf wheel, then over another intermediate roller mounted on a separate tower. This additional roller supported the slack rope before it entered the galvanised iron winding engine shed. Of course, consistant with today's practice the winding engine was a 415 volt, electric type. Not nearly as interesting as bygone types of steam engines.

By 1974, antimony prices were again rising, enabling a three year sales contract to be signed

Right: George Moss catalogue specifications for 3-tonne *Gemco* battery locomotive.
Courtesy Keith McDonald



Removing a skip from the shaft cage at the Freehold mine, August, 1978. Photo: R Mainwaring

with a French company. To meet this demand the Smith's incline was extended past the No. 4 level, known as the Waterfall level, another 40 metres to the No. 5 level. From No. 3 level downwards, the tramline was in an underlay shaft beneath the creek bed. The tramline was again lengthened in 1976, and an ore bin excavated below No. 5 level. A BEV battery electric loco was used on this level.

Antimony prices fell again in 1978, due to the substitution of calcium instead of antimony in wet cell storage batteries. Exploration on the No. 6 level was not encouraging as the lode had split up, so it was decided to close Smith's mine and place it on a care and maintenance basis. With the cessation of mining here the final chapter in the use of tramlines from the tableland down into the gorge came to an end. Work was now only proceeding at the Freehold.

Freehold Mine

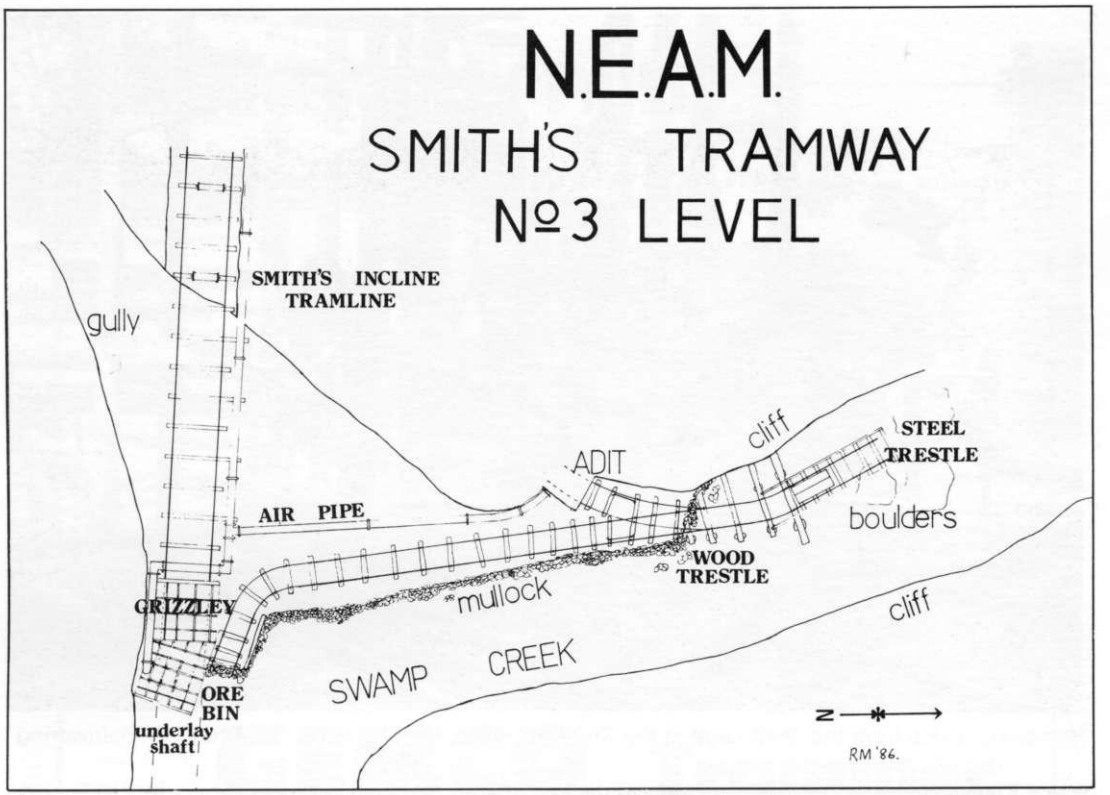
This property, one kilometre SE of Hillgrove was originally owned by The Hillgrove Antimony Mining and Smelting Company. In 1897 work ceased when the price of antimony fell. The property was later purchased by Mr George Smith, the discoverer of the Baker's Creek mine, who then leased it to a syndicate, himself retaining a quarter interest Two reverbatory furnaces were part of the original plant

In 1968, NEAM dewatered the old vertical shaft to the 94 metre level (No. 5) then applied for aid to drive. Production began in 1974.

The original two compartment shaft is served by an 457 mm gauge tramway, about 40 metres long, which terminates on a steel trestle, some 4.6 metres high. The half tonne capacity ore trucks after ascending the shaft were hand trucked to the mid way point on the trestle, where the ore was dumped onto a stockpile. A front end loader then filled motor lorries for the haul to the mill. The ore trucks are of a standard design with the following dimensions:

Height	610 mm
Length	838 mm
Width	559 mm
Wheelbase	305 mm
Wheel Diameter	229 mm

Left: George Moss catalogue specifications for 1.5 tonne *Gemco Trammer* locomotive.
Courtesy: Keith McDonald

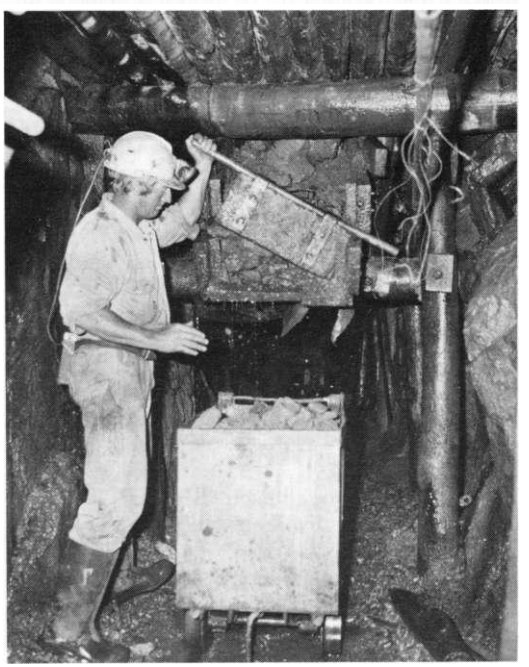


Limited by the small size of the shaft, very little ore now comes up the shaft, and it is now mainly used for men and materials. Most of the ore is hauled by 610 mm gauge battery electric locomotives to the No. 10 level adit in Swamp Creek gorge. This adit is only a few hundred metres south of Smith's No. 4 level, although at a lower elevation.

Number 10 level drive intersects the lode 183 metres from the adit, from which further cross cuts follow the lode in a NW direction.

Drives are 2 metres wide by 2.3 metres high and are developed by drilling a pattern of 32 holes up to 2 metres long. The prilled ammonium nitrate charge is set off by electric detonators; each series of holes detonates at half second intervals.

Broken rock is loaded into one tonne ore trucks by Atlas Copco "boggers", of which the company has 11 in operation. These have 6.4 kw (8.7 hp) pneumatic traction motors and a bucket capacity of 09.14 m^3 (5 cubic feet).



Right: Loading ore from an ore pass on No. 7 level, Freehold mine. Photo: NEAM

NEAM No. 10 level tramway in Swamp Creek gorge, March, 1985. A *Gemco* 1.5 tonne battery locomotive rests in the foreground. Photo: R Mainwaring

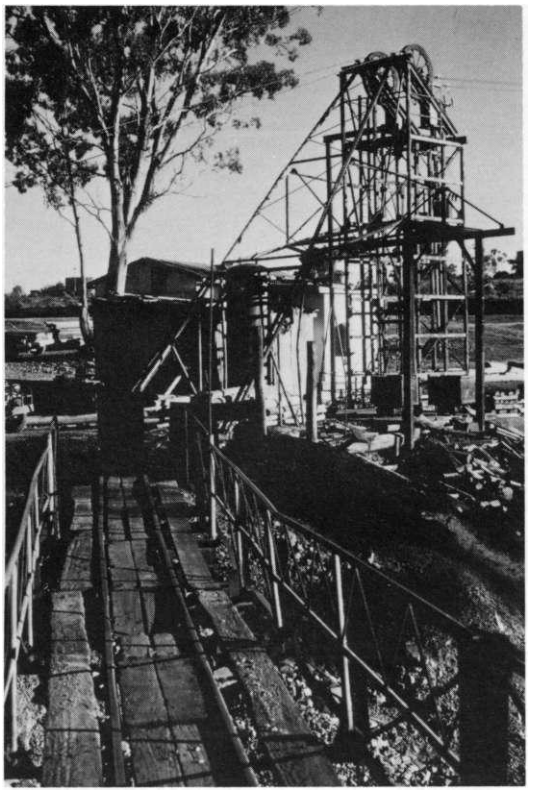
The upper 9 levels use 457 mm (18 in) gauge tramways for which there are three "boggers" and three, 1.5 tonne Gemco battery electric locomotives.

For stope development in good ground the backs of the drive are stripped out to a height of 3 metres, timber decking containing ore chutes is then erected, above which the stope is developed. These chutes are built at 4 to 5 metre intervals. Gemcos push the ore trucks beneath them for loading with either ore or mullock.

Shrinkage stoping is practised, whereby the broken ore is progressively removed as the stope extends upwards toward the next level. Levels are 40 to 50 metres apart, while the stoping width is between 1.4 to 1.6 metres. Two shifts are currently worked.

An *Alimak* raise borer is now used for new rise development.

7. CONCLUSION



Freehold shaft and tramway, looking south (March, 1985). Photo: R Mainwaring

Exploitation of the Hillgrove mining field continues to be active into its centenary year. The Eleanora was re-opened early in 1983 in response to diminishing ore reserves in the Freehold mine. A newly commissioned shaft on the old Garibaldi property will supersede the Eleanora No. 9 haulage. In future stone will be wound up this shaft then trucked straight to the mill.

Development work is proceeding at the old Cosmopolitan with a 300 metre tunnel being driven to intersect the South Cosmopolitan ore zone. Work is also progressing in the old Sunlight No. 5 level to evaluate the ore reserves and gold values of the property.

Hillgrove is currently the second largest producer of stibnite in NSW, which is one per cent of world production. So far, total production of this ore is 15,000 tonnes while the gold produced exceeds 18,000 kgs.

The history of the Hillgrove mining field is by no means concluded.

Acknowledgements

I wish to thank the following people who have assisted my research into the Hillgrove mining field and the preparation of the two articles published in *Light Railways:*

Staff of the Historical Resources Centre, College of Advanced Education, Armidale.
Mr J Sypkens, Armidale.
Mr C Faint, Hillgrove.
Mr J Welch, Company Surveyor, NEAM.
Mr L Goodfellow, Woolgoolga.
Mr and Mrs N Goodfellow, Dorrigo.

Kurrajong mine incline tramway, May, 1986. Photo: R Mainwaring

Staff of the Department of Mineral Resources Library.
Mr R Inks, Armidale.
Mr RD Olifent, Mortlock Library of South Australia, Adelaide.

My mother for the typing.
Mr O Mueller, photographer, Department of Mineral Resources.

References

1. *Armidale Chronicle,* 4 October 1937.
2. *Ibid.,* 29 October 1937.
3. *Ibid.,* 17 December 1937.
4. Information from Mr L Goodfellow, Woolgoolga.
5. Author's observation.
6. Author's observation.
7. Author's observation.
8. Information from Mr C Faint, Hillgrove.
9. Information from Mr L Goodfellow, Woolgoolga.
10. Geological Survey, 1938 Annual Report.
11. Corporate Affairs Commission files, No. 017631.
12. *Ibid.*
13. Geological Survey Report, MR 0151, Baker's Creek.
14. Information from Mr J Sypkens, Armidale.
15. Corporate Affairs Commission File, No. 018837.
16. Geological Survey Annual Report, 1937.
17. Author's measurements.
18. Information from Mr R Inks, Armidale (ex-employee).
19. *The Mineral Industry of New South Wales,* No. 2 Antimony.
20. Information from Mr J Sypkens, Armidale.
21. Author's measurements.
22. Author's observations.
23. Geological Survey, MR 3461.
24. Information from Mr J Sypkens, Armidale.
25. *Armidale Express,* 14 May 1971.
26. Geological Survey, 1969 and 1970 Annual Reports.
28. *Metallurgy of Gold,* M Eissler 1889.
29. *Minfo,* Department of Mineral Resources, July 1985.