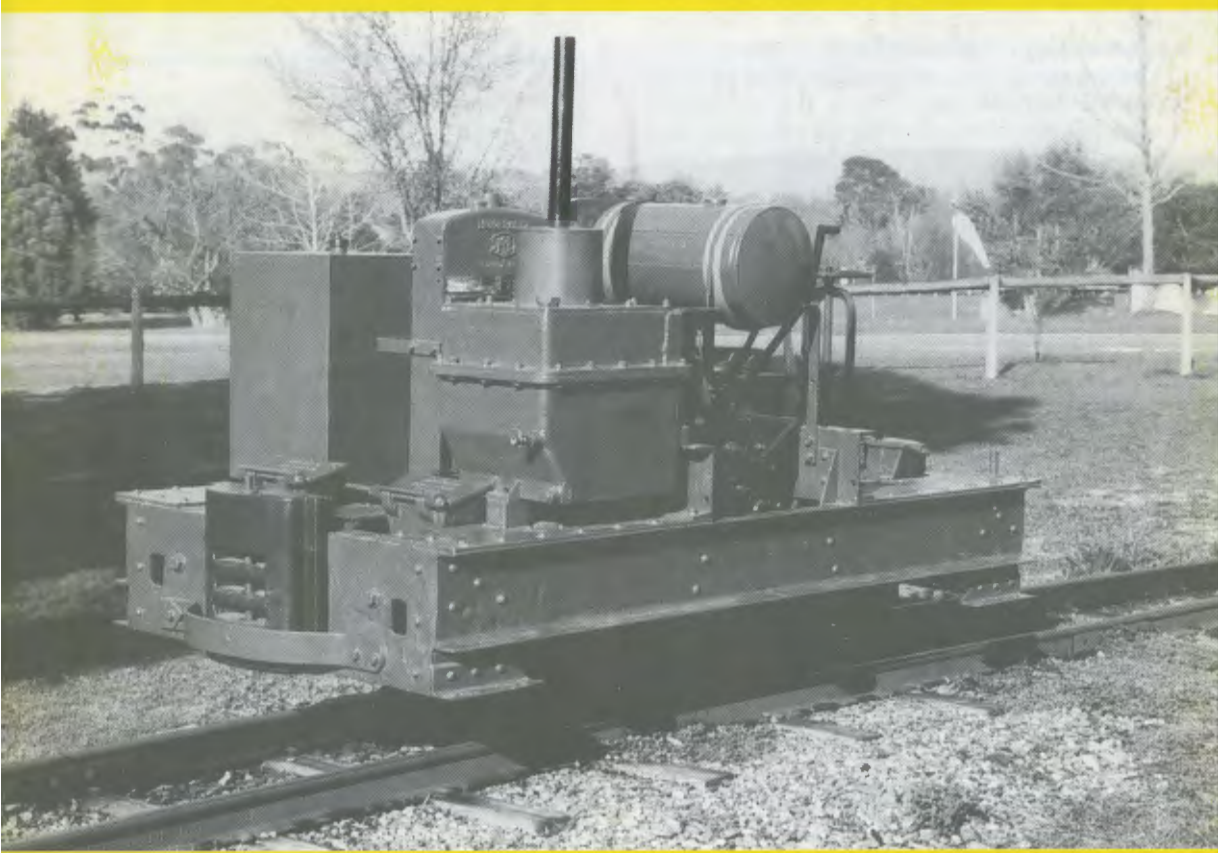
LIGHT RAILWAYS

Number 137 July 1997

Tarago Aqueduct Tram
Trial Bay Tram
Warburton Walk

ISSN 0 727 8101



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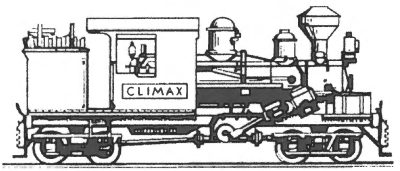

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Light Railway Research Society of Australia Inc.

PO Box 21, Surrey Hills, Vic 3127

COUNCIL

President: Bill Hanks (03) 5944 3839
Secretary: Phil Rickard (03) 9870 2285

New South Wales Division

Address: 18 Rodney Avenue, Beecroft, NSW 2119
President: Jeff Moonie (047) 53 6302
Secretary: Craig Wilson (02) 9484 7984

Tasmanian Division

Address: 11 Ruthwell Street, Montrose, Tasmania 7010
Secretary: Ken Milbourne (03) 6272 2823

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Cover Photo:

Motor Rail Simplex 10058 of 1948 as it is in 1997 at the Alexandra Timber Tramway and Museum. Photograph: Peter Evans.

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Light Railways Editor: Norm Houghton, PO Box 1128, Geelong 3213. Phone (03) 5221 7007 or Home (03) 5229 4805.

The Light Railway Research Society of Australia was formed in 1961 and caters for those interested in all facets of industrial, private, tourist and narrow gauge railways in this country and its off-shore territories, past and present.

Members are actively involved in researching light railways in libraries and archives, interviewing knowledgeable first-hand participants and undertaking field work at industrial sites and in the forests.

Articles, letters and photographs of historical and current interest are welcome. Contributions should be double spaced if typed or written. Electronic formats accepted in the common standards.

CONVERSIONS:

1 inch (in)	25.40 millimetres
1 foot (ft)	0.30 metre
1 yard (yd)	0.91 metre
1 chain	20.11 metres
1 mile	1.60 kilometres
1 super foot	0.00236 cubic metre
1 ton	1.01 tonnes
1 pound (£)	$2.00 (in 1966)
1 pound (lb)	0.454 kilogram
1 acre	0.4 hectare
1 horsepower (hp)	746 Watts
1 gallon	4.536 litres
1 cubic yard	0.765 cubic metres

THE TARAGO AQUEDUCT TUNNEL, VICTORIA

by Peter Evans

INTRODUCTION

This article describes the construction of the Tarago* aqueduct tunnel near Jindivick in Victoria and, in particular, the rail-borne equipment used in excavation of the tunnel. My interest in this subject was aroused when I was fortunate in being able to purchase one of the locomotives, used in the construction of the scheme, from its subsequent owner, Cheetham Salt Limited, in June 1986. The locomotive, Motor Rail Simplex builder's number 10058 of 1948, was obtained from the Cheetham Salt's Laverton works in an engineless, derelict condition: work had already started on cutting-up the locomotive for scrap. The Simplex was subsequently fitted with the engine from sister locomotive 7351 of 1938, and returned to service in early 1992 at the Alexandra Timber Tramway & Museum in north-east Victoria.

In searching for details of 10058's history, a large amount of information was uncovered relating to the light railway system used in the construction of the Tarago aqueduct tunnel. What was originally intended to be the history of a single locomotive had now taken on a wider scope. The author wishes to acknowledge the generous assistance provided by the staff of the Rural Water Corporation library and the RWC Survey & Hydrographic Branch photographic section, without whose help the following account could not have been written.

HISTORICAL BACKGROUND

The State Rivers and Water Supply Commission of Victoria (SR&WSC), was constituted in May 1906 by the amalgamation of many of the small rural water supply and irrigation trusts in Victoria. It then controlled most of the water supply outside the metropolitan area, including that of the Mornington Peninsula. The boundaries of the Mornington Peninsula water supply area were approximately defined by Portsea and Stony Point in the south; Carrum, Dandenong and Springvale in the north; and Longwarry in the east. After 1925, most of the supply for this area came from the headwaters of the Bunyip River. Additional supplies were obtained from the catchment of the Lysterfield reservoir which was completed in 1929. No new water supplies were constructed during the years of the Second World War and, by 1945, water restrictions in the area were necessary during the summer months. Although the fifteen square miles of the existing Bunyip catchment has an annual rainfall of around 1000 mm, stream flow was inadequate to meet the rising demands of post-war expansion. Accordingly, planning was begun on a scheme to augment the supply utilising the waters of the Tarago River.

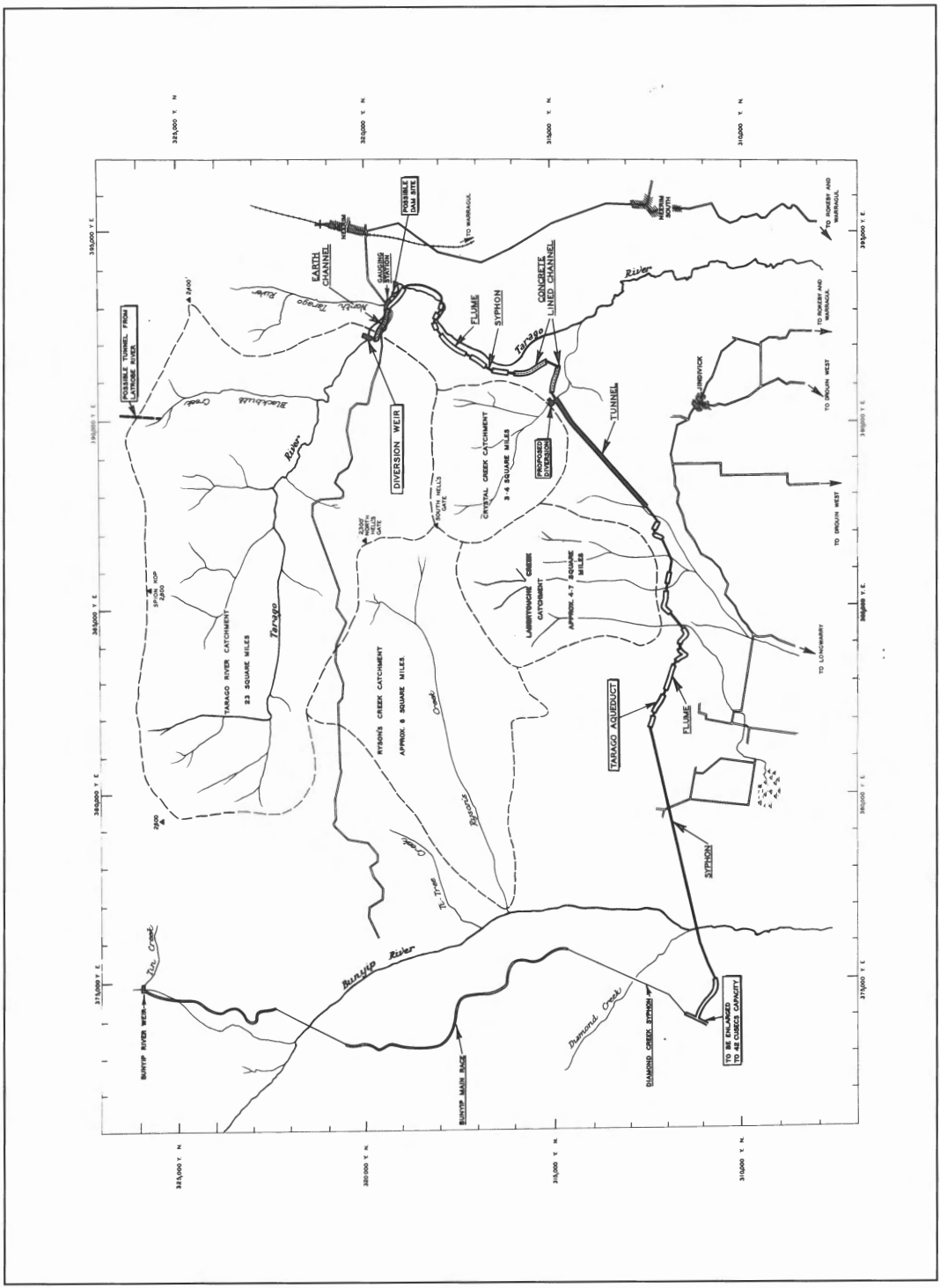
The attention of the SR&WSC engineers first focussed on the Tarago River, a tributary of the Bunyip, in 1944. The heavily timbered Tarago catchment, like the Bunyip catchment, has an annual rainfall of approximately 1000 mm and produced water of very high purity. To utilise the existing water-mains feeding the Mornington Peninsula, it was decided to divert a part of the Tarago River upstream of the river flats near Neerim. The water would be carried by aqueduct along the eastern fall of the divide between the Tarago and Bunyip rivers before being turned into the Bunyip system.

SURVEY OF THE SCHEME

Trial surveys for the Tarago scheme were carried out between 1945 and 1947. These indicated that many miles of aqueduct could be saved by tunnelling through the ridge dividing the Tarago and Bunyip Rivers, near the small township of Jindivick. This would save on future maintenance costs and, by reducing the length of exposed aqueduct, would lessen the risk of pollution of the water supply. The route over which the water had to be carried would consist of sections of aqueduct and inverted syphon as well as the tunnel. The surveyed route had an average fall of one foot per mile and the scheme was to have a maximum flow of sixteen cusecs (cubic feet per second).

Provision was made to enlarge the supply over time when demand increased. As the smallest practical tunnel (for construction purposes) would pass 100 cusecs, well above the maximum future flow to be diverted, it would not have to be enlarged. The open channel sections would be constructed for a maximum flow of 32 cusecs but,

*Pronounced Tara-Go, not Ta-rah-go.



to save on first cost, the inverted syphon stages would have only a 16 cusec capability. Later, duplication of the syphons would raise the capacity of the whole system to 32 cusecs.

The location of the tunnel was critical to the design of the whole scheme. Vertical bores were drilled to test the rock; these revealed that the course of the proposed tunnel would pass through granitic rock which was mostly sound, but the route did contain some sections of decomposed rock through which the tunnel would have to be lined. To minimise the length of lining required, the final surveyed route involved a deviation of thirty degrees at a point 1426ft from the upstream portal. The maximum depth of the tunnel below the natural surface would be approximately 450ft. Detailed surveys of the aqueduct were commenced in January 1949.

CONSTRUCTION

Construction commenced in 1950 and involved a small timber diversion weir on the Tarago River, 3.75 miles of open aqueduct, 10.5 miles of pipeline and inverted syphon, and two miles of tunnel. The upstream portal of the tunnel was started in July 1950 and the downstream portal in July 1951, the work being carried out by SR&WSC staff and day-labour. A restriction on the loan funds available to the Commission slowed the work soon after it had begun, and tunnel construction ceased altogether in June 1952. By this time, 4388 feet had been driven from the upstream portal and 1174 feet from the downstream portal. In addition, a large amount of infrastructure had been provided as part of the works.

A base camp was built at the upstream portal to accommodate around 150 men in two-man cubicles with four cubicles per building. Kitchens and messes were provided as well as buildings for offices, stores, magazines, workshops and nine houses for married staff and foremen. Water for the camp was supplied from nearby Crystal Creek via four 2000-gallon tanks erected on the hillside. After the scheme was completed this water supply was diverted into the aqueduct at the upstream portal of the tunnel.

Diesel-engined power-houses were erected at each end of the tunnel to supply electricity and compressed air for tunnelling purposes.

Funds again became available in early 1954, and the SR&WSC let a contract to Sainrapt & Bruce (Aust.) Pty Ltd for the excavation of the remaining 4920ft of tunnel from the downstream portal, while Commission employees proceeded with the concrete lining of the upstream section already excavated.

RAIL PLANT USED IN THE TUNNEL

All rail operations on the project were confined to the tunnel and short sections outside each portal for muck disposal. The one exception was a monorail used to lay concrete on the inverted syphon crossing the Tarago River.

The draft contract for the completion of the excavation listed the following rail-borne plant as available to the contractor:

Four Ruston & Hornsby Diesel mine-locomotives type 3VHSL

One Malcolm Moore locomotive with Hercules Diesel engine

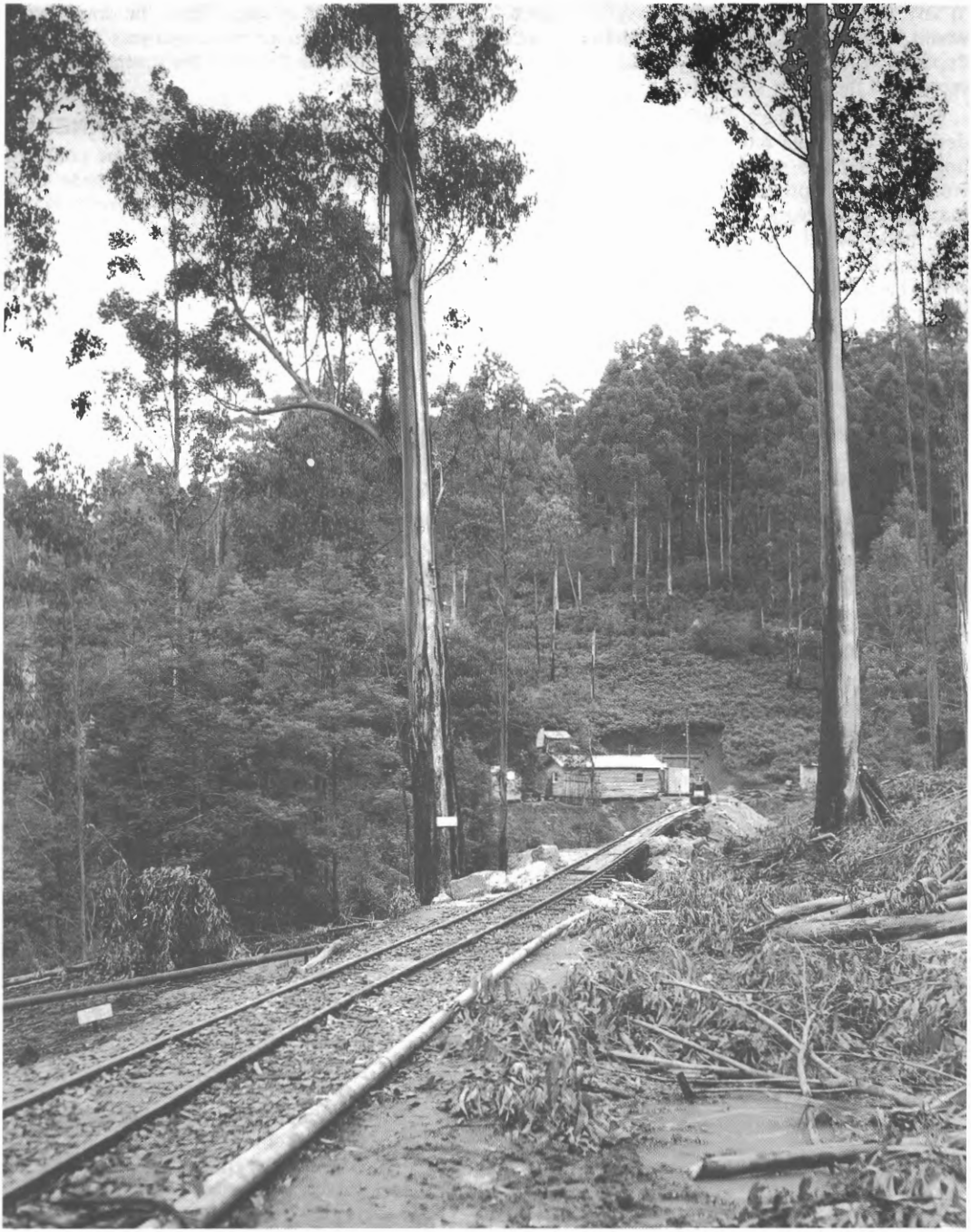
Fourteen Granby-type mine cars each of three cubic yard's capacity

One Joy Sullivan HL20 Mine Car Loader

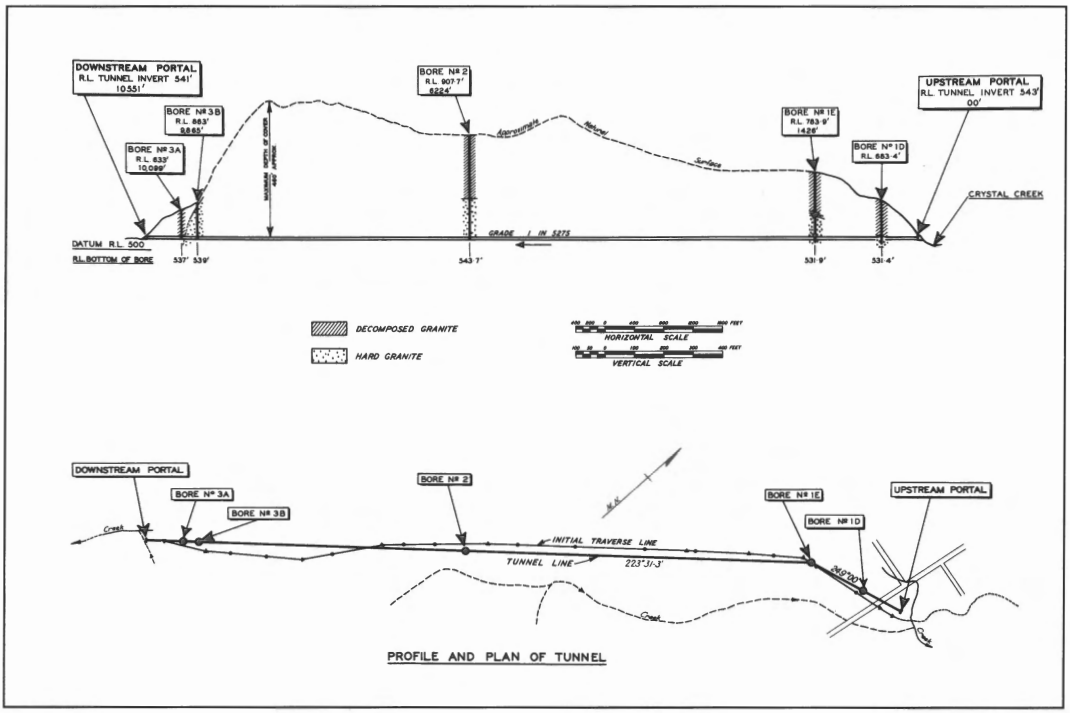
Two Gardner Denver GD9L Mine Car Loaders

Three Joy hydraulically-operated boom jibs mounted on rail cars.

No mention of Simplex 10058! This locomotive is known to have been ordered by Marfleet and Weight for the SR&WSC specifically for this project, and still carries a large exhaust conditioner for the tunnelling work.[1] It was purchased by Cheetham Salt Ltd in August 1957 at an auction held following completion of the scheme. Cheetham's paid £320 for the locomotive.[2] That 10058 was at Jindivick is beyond doubt: an orange-painted engine cover complete with maker's nameplate was recovered by the author from the tramway formation outside the upstream portal of the tunnel in mid 1987. This matches the 'home-made' engine cover, minus maker's nameplate, obtained with the locomotive from the Laverton saltworks. During restoration, the bottom layer of paint before the primer on the frame of 10058 was observed to be the same orange colour. Why was the locomotive not listed with the plant available for the completion of the tunnelling work? There seems to be no definite reason, except that, as demonstrated by the drawings accompanying the draft contract, clearances were very tight in the tunnel. The Ruston locomotives were only 3ft 5½ in wide,[3] but the Simplex is a relatively broad 4ft 10 in width. This would have precluded its safe use on the double-track section of line at the 'California' switch in the tunnel. The tunnel



The upstream portal of the tunnel as seen from the workshops area on 25 April 1951. One of the Ruston & Hornsby locomotives exits the tunnel and proceeds to the spoil dump. Although overgrown, the formation of the tramway in the foreground still exists. Courtesy RWC, negative #9591.



was only 9ft high and 10ft wide in the unlined section. It is most likely that the SR&WSC retained the loco for use by their own workers at the upstream portal for the completion of concreting work there. Rolling stock did not have to pass in this section of the tunnel and the extra width of the Simplex would not have presented a problem.

The Ruston & Hornsby locomotives probably carried builder's numbers in the block 285338 to 285343[4] If this is so, they were part of a lot despatched from the maker's Boultham Works, England, between December 1949 and January 1951.[5] They were fitted with 30 hp VSHL four-cycle compression-ignition engines, three-speed constant-mesh gearboxes and final drive by roller chains to each axle.[6] Exhaust conditioners were fitted to enable them to safely work underground.

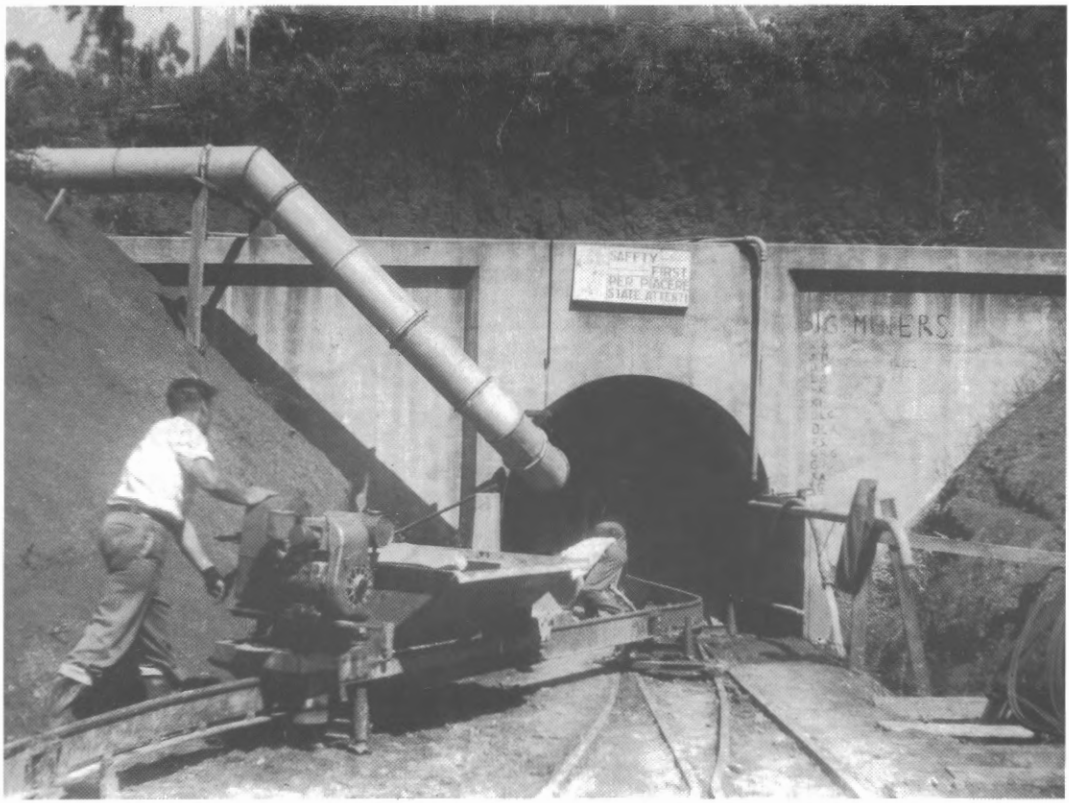
The identity of the Malcolm Moore locomotive is unknown, but it may previously have been used by the SR&WSC at Redcliffs and was possibly one of the maker's *1xxx* series built for the Department of Defence in 1943. As these locomotives did not normally carry exhaust conditioners, the Malcolm Moore at Tarago probably saw little, if any, use.

One of the 'Granby' cars is preserved at the Puffing Billy steam museum at Menzies Creek, and carries a plate showing it to have been built by W.G. Allen & Sons of Tipton, Staffordshire, England. A wheel, located on the side of the car, ran up on a suitably shaped ramp and tipped the contents automatically.

The track used for rail operations was built to a gauge of 2ft using 35 lb/yd and 40 lb/yd rail with seven timber sleepers and three steel spreaders for every 30ft of track.

RAIL OPERATIONS IN THE TUNNEL

The tunnel face was advanced by blasting. A pattern of about fifty holes was drilled for each blast. One hundred and forty pounds of gelignite was placed in the holes and fired electrically. This method produced an advance of 7ft to 8ft with each charge, with each 4lbs of explosive producing around one cubic yard of broken rock. After each blast at the tunnel face, the spoil was loaded into the mine cars using the Gardner Denver GD9L loaders and, later, by the larger Joy HL20 loader which had a bucket capacity of seven cubic feet. It took an average of four minutes to load each three-cubic-yard mine car,

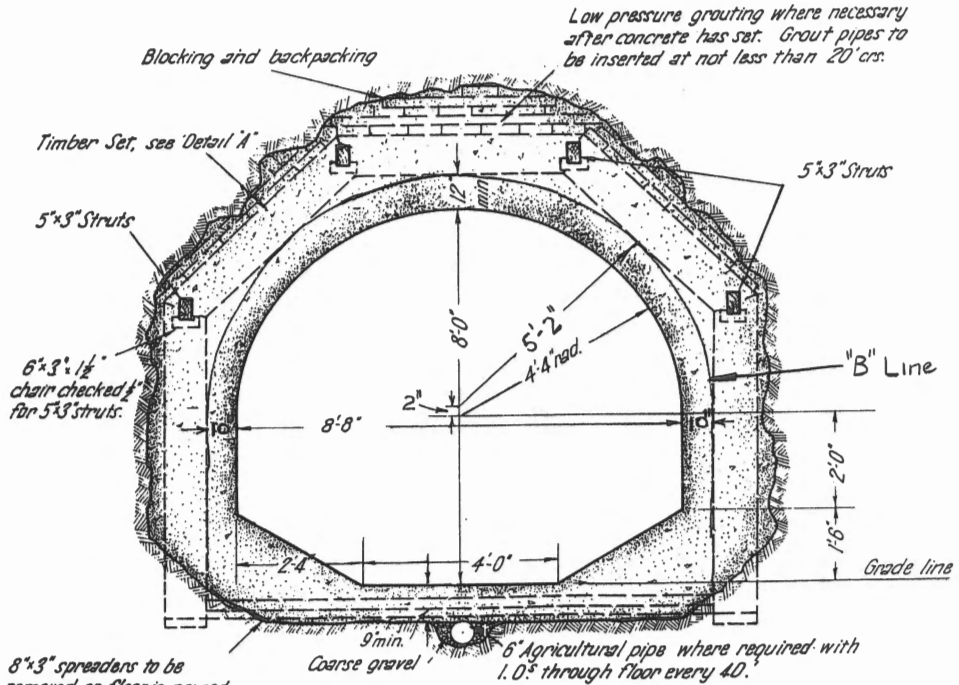


Concreting the first ten feet of the upstream portal floor using a monorail track to transport the concrete on 1 March 1954. The transporter is similar to those shown in Light Railways No. 112, pages 22-25, and as such was probably made by Road Machines (Drayton) Limited in Buckinghamshire, England. Courtesy RWC, negative #17494.

with the complete mucking operation for each 8ft round taking 150 minutes. As the mucking proceeded, the mine car loader was advanced on sliding rails moved forward as required.

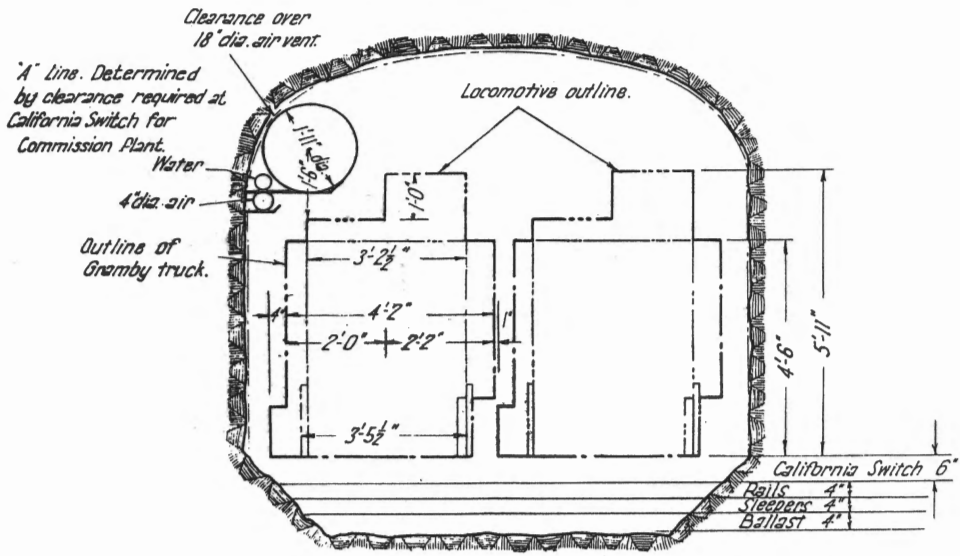
The loaded train of cars was removed from the tunnel by one of the Ruston & Hornsby locomotives. Once outside the tunnel, the train was run past a ramp that tipped the cars to release the waste rock. Once dumped, the rock was moved away and spread by bulldozers in the valleys adjoining each portal. The process of blast and stone removal would be repeated as the face advanced.

Car transfer in the tunnel was accomplished using a 'California' double-track portable switch that moved along the top of the fixed track. This method was an improvement on the pneumatic-winch operated lifter which was originally employed for the task. The latter method had required periodic enlargement of the tunnel beyond the required profile, whereas the California switch only required that the foot of the tunnel be excavated completely to a width of 10ft. Eventually, a semi-permanent double-track switch was installed 2900ft from the upstream portal. Similar crossing switches were installed by the contractors at 2000ft and, later, 3800ft from the downstream portal. Near the face, trucks were switched using a spur line large enough to hold a single empty mine car. Additional space for this spur was excavated from the wall of the tunnel. The car on this spur was retrieved by cable after the locomotive had moved a full car back from the loader. The empty car was then pushed forward to the loader and another empty car shunted onto the spur.



LINED SECTION OF TUNNEL

Reinforcement not shown.



CLEARANCE DIAGRAM FOR UNLINED SECTION AT CALIFORNIA SWITCH

Employees of contractors Sainrapt & Bruce preparing to fire the first charge at the downstream portal on 28 May 1954. A Ruston & Hornsby locomotive bearing the number 19-C-22 is on the right hand track while a mine car loader and mine cars occupy the left hand track. Courtesy RWC, negative #17500.

RATE OF ADVANCE

Two 'short' rounds of 5ft could be fired in each shift, or one longer round of 7ft to 8ft with some time to prepare for the next:

OPERATION	5ft ROUND	8ft ROUND
Drill	80 minutes	105 minutes
Load and fire	20 minutes	30 minutes
Exhaust the smoke	20 minutes	30 minutes
Muck	80 minutes	150 minutes
Bar down and rig	20 minutes	30 minutes
Miscellaneous	10 minutes	15 minutes
TOTAL	230 minutes	360 minutes

An average advance of 8.7ft per shift was achieved, with the greatest advance in any one week being 181ft. This was achieved with a seven-day week of three shifts per day. The downstream heading broke through into the upstream heading in November 1955.

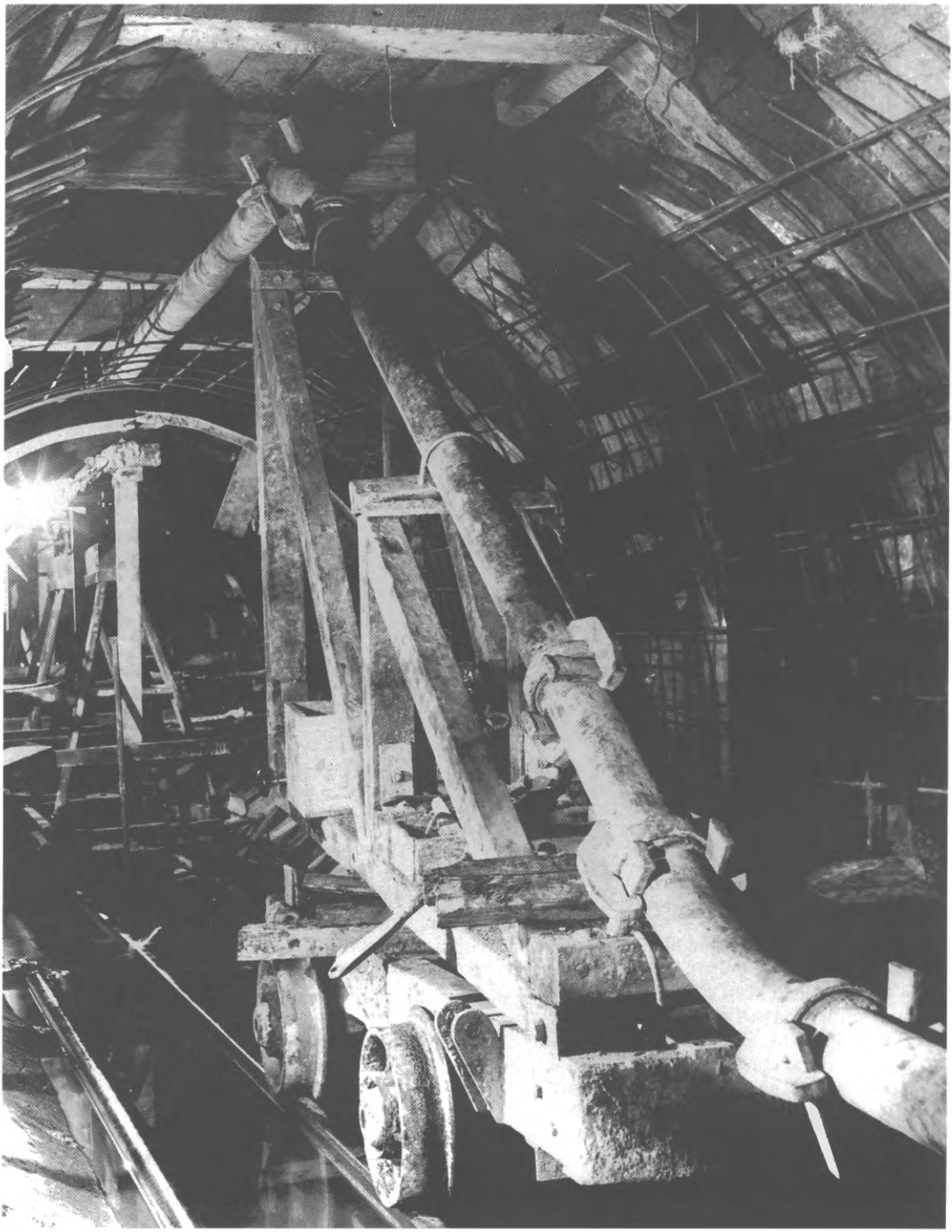
The tunnel cost a total of £382,000 to excavate, including the cost of temporary support where necessary. Based on the tunnel length of 10,482ft, this equates to an average cost per foot of £36 12s 0d.

CONCRETE LINING

Where the tunnel required support during excavation, temporary "sets" made from timber or old 60lb/yd rails were erected. The areas requiring support were the first 860ft at the upstream portal, the first 450ft at the downstream portal, and twenty-four other sections in the body of the tunnel with lengths ranging from 5ft to 200ft.

One section of decomposed rock in the downstream heading flowed extensively during excavation and eventually filled the tunnel for a distance of 120ft. The tunnel had to be deviated about 60ft to the north to bypass this collapse, and required close timbering for some 200ft and a curve to return the tunnel to an alignment suitable to meet the upstream heading.

These supported sections were lined with concrete after excavation. For a distance up to 600ft from each portal, a monorail transporter was used. From this distance onwards, a concrete pump delivered the concrete through a 4½-inch-diameter discharge line at rates up to eight to ten cubic yards per hour for short distances and four cubic yards per hour for the maximum pumping distance of 900ft. After the distance of 900ft had been exceeded, the electrically-driven pump was moved inside the tunnel and the concrete transported to the pump hopper using one-cubic-yard side-tipping mine cars.



Lining the tunnel. A moveable jumbo supporting a 4½ inch diameter 'pumpcrete' line over the crown and wall forms is being used to direct the concrete. Courtesy RWC, negative #18733

A Ruston & Hornsby locomotive with three trucks of spoil from the downstream heading of the tunnel in July 1955. A ramp on the far side of the track operated the tipping mechanism of the trucks. Courtesy RWC, negative #17718.

A travelling steel form was provided to facilitate pouring of the concrete. Sections of up to 32ft were poured at one time, consuming from ¾ to 1¼ cubic yards of concrete per lineal foot of lining.

COMPLETION OF THE SCHEME

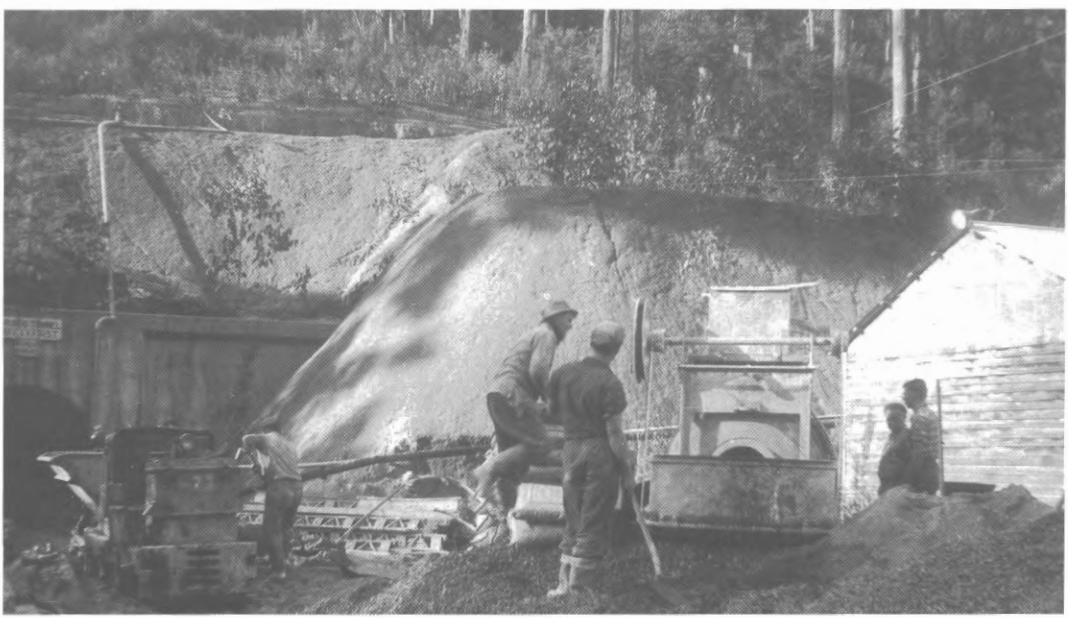
The diversion dam, aqueduct, syphons and tunnel making up the scheme were completed in 1957. The work had been carried out by both day-labour and contract, with the SR&WSC employing up to sixteen officers and 210 workmen and the contractors a maximum of fifty men at a time. The contracts had been let for such diverse purposes as tunnelling, clearing, excavation, road construction and pipe laying, and ranged in value from £700 up to £120,000.

The additional water drawn from the Tarago River did not satisfy demand for long. Both the Bunyip and Tarago off-takes relied almost totally on stream flow as only minimal storage was supplied on each river. It soon became clear that some type of larger storage scheme would have to be built to meet the maximum demand, at the time of minimum stream flow, in summer.

A site was eventually selected for a storage dam on the Tarago River near the upstream portal of the tunnel. Work on construction of the dam began in 1965, less than ten years after the completion of excavation of the aqueduct tunnel. The dam was officially opened by the Victorian Premier Henry (later Sir Henry) Bolte on 6 March 1969. The outlet from the dam was at a lower level than the aqueduct and, rather than pump the water up to the aqueduct, it was fed into the distribution system at a lower level. This meant that the Tarago aqueduct scheme had a useful life of only twelve years at its full capacity.

Today, the Tarago aqueduct system serves to collect only the flow from the Crystal Creek feeder and for this reason the tunnel is still in use.[7] However, all the aqueducts and inverted syphons of the system are still in place. Remains of the construction era at the upstream portal is

The tunnelling crew 5300ft from the downstream portal. They are perched on top of one of the Ruston & Hornsby locomotives, which is daubed with the name 'Rolla' – a clue to its driver's identity? Courtesy RWC, negative #17738.



Mixing cement near the downstream portal on 11 July 1956. The capacity of the mixer is ten cubic feet, and that of the truck behind the Ruston & Hornsby locomotive is nine cubic feet. The number painted on the front of the locomotive is simply '22'. Courtesy RWC, negative #18429.

limited to two timber buildings and the tramway formation, which is easily identified between these buildings and the tunnel mouth. Access to the site is now restricted to protect water quality, but the small dam on the upper Tarago that fed the scheme is readily reached from Elton Road. At the downstream portal are the extensive foundations of the power house and workshops, but no trace remains of the tramway formation. As the aqueduct and tunnel lie within the protected Tarago dam catchment and still have limited use, they are likely to remain in place as permanent reminders of this short-lived but, at the time, very important addition to the water supply for the Mornington Peninsula.

SOURCES

Except where noted below, all of the above information was obtained from three documents, copies of which were held in the now defunct Rural Water Corporation Library:

Location and design of the Tarago River Aqueduct. K.D. Green BCE, AMICE, PMIE (Aust), AMSCE. (A paper presented before a meeting of the Civil Engineering branch of the Melbourne division of the Institution of Engineers on 26 September 1952.)

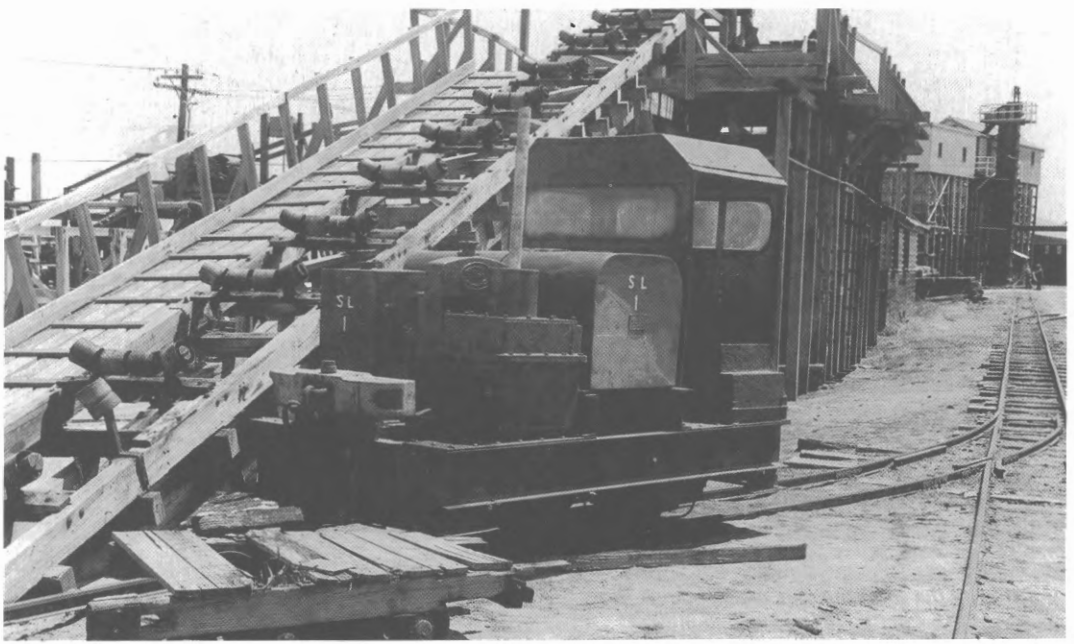
Construction of the Tarago River Aqueduct. J.L. Maver MCE, PIME (Aust). (A paper presented before a meeting of the Civil Engineering Branch of the Melbourne division of the Institution of Engineers on 31 August 1956.)

Tarago River Diversion Project – Excavation and Construction of Tunnel. Draft contract drawn up by the SR&WSC.

OTHER REFERENCES

1. Personal communication, John Browning.
2. Letter from auctioneers J. W. Styles to Cheetham Salt Ltd, 30 August 1957. Copy kindly supplied by Norm Houghton via John Browning.
3. *Underground Haulage* (Ruston & Hornsby sales catalogue), undated. Copy in the possession of the author.
4. *Victorian Tramway Register,* A. P. Winzenreid, third edition, page 49.
5. *Ruston & Hornsby locomotives,* Eric S. Tonks, page 82.
6. *Underground Haulage*
7. Personal communication from Melbourne Water officer Tony Shappendonk.

Motor Rail Simplex 10058 of 1948, purchased by the SR&WSC for construction of the Tarago tunnel. The locomotive is shown at subsequent owner Cheetham Salt's Laverton works. The exhaust conditioner fitted for the tunnelling work is prominent on the front corner. Photograph: LRRSA collection.



TRIAL BAY FIASCO, NSW

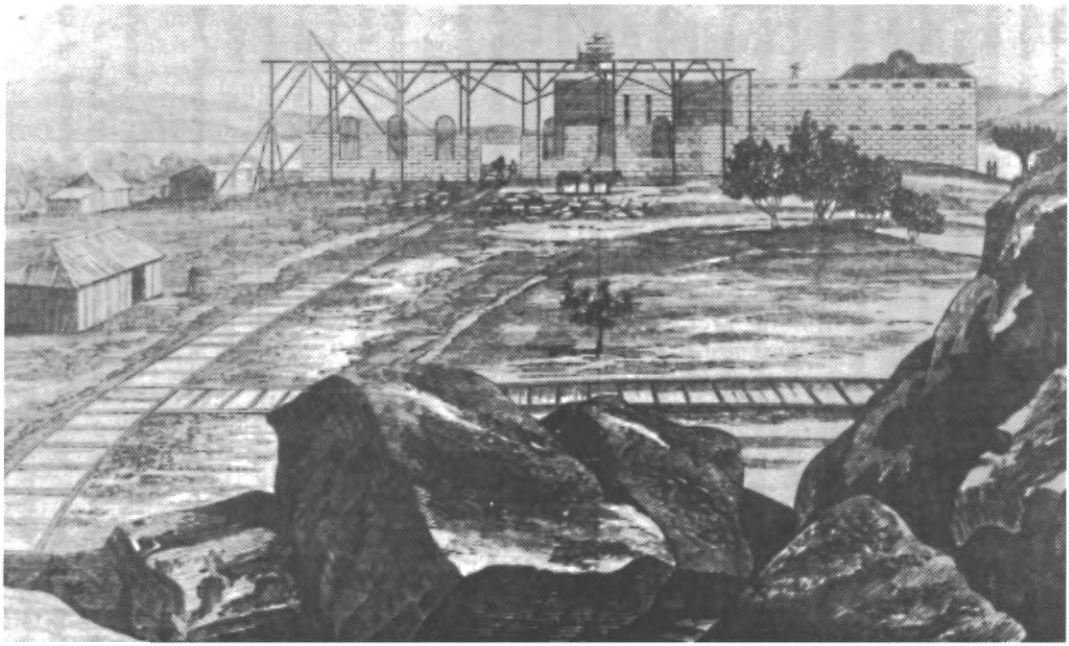
Trial Bay, at the mouth of the Macleay River, 30 km north-east of Kempsey in northern New South Wales, was the scene of an unsuccessful experiment in penology and breakwater construction from 1876 to 1903. Tramways figured prominently in the experiment.

In 1874, when Laggers Point at the southern end of Trial Bay was suggested as a site for a prison, little did Harold McLean, then Comptroller-General of Prisons in New South Wales, expect that such an extensive, costly and permanent structure as Trial Bay gaol would be erected. His planning envisaged the application of humanitarian principles in accommodation and administration, and provided for a prison camp consisting of huts to house fit and well-behaved prisoners who were within seven years of the end of their sentences. These men were to be capable of useful employment on construction work which would enable them to learn skilled trades. Their rehabilitation on discharge was also to be assisted by their accumulated daily wages. They would, he hoped, spend the last period of their imprisonment living almost as free men, working and spending their leisure hours without armed guards overseeing them.

McLean believed that the type of work involved in the construction of a breakwater to form a harbour of refuge at Trial Bay would be ideal for his experiment in prison reform. The Government of the day was prepared to adopt this idea, but decided that the men should be housed in a conventional gaol. A sum of £10,000 was voted towards its erection. In 1876 the contract for its construction was given to D. McQuarie and it was announced that the first prisoners would arrive at Trial Bay in some fifteen months.

In 1877 work commenced on the prison buildings to house the men (who were to construct the breakwater) but at a slow rate

General view of Trial Bay Gaol and unfinished breakwater. The quarry is to the left background. The tramways ran along the level ledge below the gaol. Photo: E. McNeil.



Building the gaol in 1878. Illustration from Town & Country Journal, Mitchell Library.

because of various delays. Eventually, in 1879, the first wing and entrance hall were completed. Plans were then prepared for the second wing and the governor's residence at a further cost of £25,000. A further £500 was allocated for a residence for the District Superintendent of Harbours and Rivers who was to be in charge of the breakwater scheme.

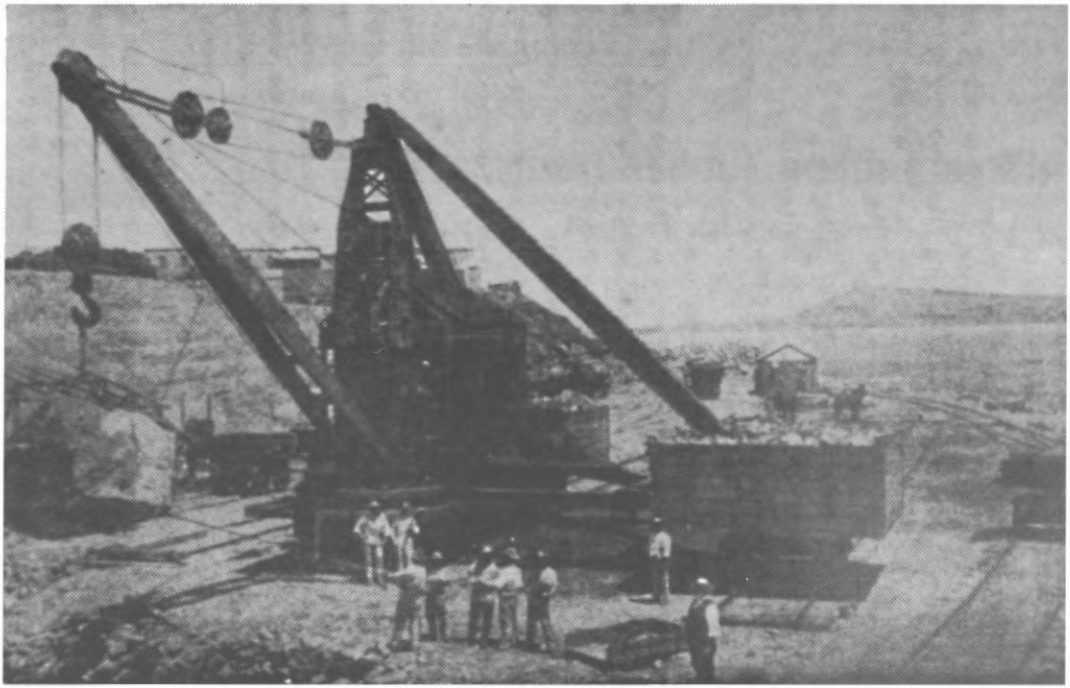
It was 1886 however, before the gaol was ready for occupation and, not only had it taken ten years to build but it had cost £60,000. Building stone for the gaol was obtained from a quarry, opened up immediately inland from the gaol site on the point, and conveyed along a tramway. A second wing was added to the gaol and other alterations and additions were completed in 1900.

Plans for the development of Trial Bay as a harbour were prepared as early as 1861. These plans provided for the construction of a breakwater which would enclose one-and-a-half square miles of smooth water for the safe anchorage of ships.

Work on the breakwater was carried out under the supervision of four overseers of the Department of Public Works. Work proceeded slowly and it seems as fast as the breakwater was built storms washed it away. A particularly vicious gale in 1893 ripped apart 120 feet of stonework. By 1897 the breakwater had progressed to such an extent that vessels of large size could shelter safely in forty feet of water during heavy weather.

The huge blocks of granite for the breakwater were cut from the original quarry, using steam drills and explosives. A steam crane lifted the blocks, each weighing from 12 to 15 tons, on to tramway trucks which were drawn along the tramline, by horses, to a weighbridge and weighed. From here the blocks were drawn on to the breakwater and tipped into the sea.

By 1903, seventeen years after work commenced on the breakwater, less than one thousand feet had been completed. This was about one fifth of the planned length. There were now many doubts about the need for a harbour of refuge at Trial Bay because of the better class of vessel running along the coast. For some years the system in operation at the gaol had been viewed with disfavour by the prison authorities. When, in July 1903, a decision was made to abandon the breakwater scheme, it was followed by the disestablishment of the gaol. In the following year the cottages and outer buildings connected with it were sold by public auction.



Quarry work for the breakwater in 1897. Illustration from Town & Country Journal, Mitchell Library.

The gaol came into use again in 1915 when it became an internment camp for enemy aliens during World War 1. In 1917 rumours of a plan for a German landing party to release the Trial Bay internees were received. When it was learned, early in 1918, that the German raider 'Wolf' had been off the northern coast of New South Wales some months before, it was considered advisable to move the internees from Trial Bay to Holdsworthy. The gaol was not used again. In 1922 the roof, gates and other metal parts were sold by auction. The sale brought equally low prices for the ancillary buildings inside and outside the walls.

Contributed by the Macleay River Historical Society.

Advertisement in Cameran, Sutherland, Seward Pty. Ltd. catalogue 1924. The firm was based in South Melbourne and Ultimo and specialised in the supply of new and second hand compressors, chain blocks, wire rope, pumps, belting, winches, light railway material, locomotives and boilers.

FROM WARBURTON TO POWELLTOWN, VICTORIA

A Tramp along Timber Tramways

by W. R. B. Johnson and John Buckland

On a holiday weekend in 1941 we investigated the timber tramways existing in the area between Warburton and Powelltown – via Starlings Gap, New Federal Mill and High Lead.

Commencing at Warburton (La La Extension Siding) there is a 3ft gauge steel line (originally owned and operated by Mr Hermon of Warburton with two steam locomotives – 0-4-2 tanks at present stored in the engine shed at La La) which crosses the Yarra River on a timber trestle and follows the river for about three miles to the site of the Brimbonga Timber Co. seasoning works. This line is now owned by the Federal Timber Co. of Warburton and operated by three six-coupled Day's Fordson-type tractors. These are shedded at a depot about two miles from Warburton.

The line again crosses the Yarra on a monumental timber bridge just before reaching the seasoning works at the junction of Mississippi Creek and the Yarra. Here, originally, the two extensions of Hermon's line, started, one continuing up the Mississippi Creek to serve Richards' and other mills, and originally owned by Richards. The other followed the present course to Big Pats Creek village and thence towards Starlings Gap. This latter line, extended and rebuilt, is at present owned and operated by the Federal Timber Co.

At the seasoning works there are piles of abandoned equipment – timber bogies, wheels, axles, rails etc, and the remains of an engine shed which has housed at least one steam locomotive. A derelict and rudimentary passenger car lies here, together with a fourth tractor, disused. All this gear apparently belonged to Richards' line, dismantled since 1935. The two lines originally followed different routes to Big Pats Creek, Richards' line via Mississippi Creek, and the present Federal line following the road. At Big Pats, Richards' line continued up the Mississippi, whilst the Federal line turns up the valley of Big Pats Creek. Soon after, the line climbs at an almost unbroken gradient of about 1 in 15 and easing to 1 in 29, with sharp reverse curves, for about 7½ miles to the summit at Starlings Gap (2250ft). This portion was reconstructed partly in steel after bushfires had destroyed the old line in 1935.

Portions of the grade have wooden rails, reinforced with steel on the outer rails of curves; in many cases old slotted tramway rails being used back-to-front. About half way to the summit is the site of Porta's Mill where formerly a wooden railed branch operated in the valley of Big Pats Creek to the now abandoned Lucknow Mill. At Starlings Gap is the site of a former Ada Mill. This mill and one further down the Ada River were served by a steel and wood tramway off the Victorian Hardwood Co. line over High Lead and worked at one time, it is stated, by the first 'Coffee Pot' Kerr Stuart. [See end notes – Ed]

From the Gap the Federal line follows a new location roughly parallel to the Ada River, built new in 1935 with wooden rails. Several miles further on there is a level crossing of the Federal line, (with steel rails at this point), over a wooden-railed connection from near High Lead to Old Ada No. 1 mill of the V.H. Co. This is all that remains in use of the line formerly reaching to Starlings and is now worked by tractor. The level crossing is of interest in that the Federal crosses over the other by means of hinged rails laid on longitudinal sleepers.

The Federal line ends in about another mile-and-a-half at the New Federal Mill (Starvation Creek Post Office officially, although not on that creek – when the old mill off the Mississippi Creek line was abandoned following the 1934 fires, it was then on that creek). New Federal Mill is 16 miles by rail from Warburton. From the mill a steel haulage extends to the edge of the range about ¾ mile south, but not at present used for logging. Timber supplies for the mill are coming in over a 3ft gauge wooden railed line going back along a ridge towards the Ada River. This has been recently constructed as part of the timber salvage plan and is operated by one of the tractors

from Warburton. Several wooden-railed sidings are in use on this branch which is about one mile long.

The Federal Mill settlement is at over 2000ft elevation and is notable for its water supply from triple tanks erected on a tank stand formed by the dead trunks of three close growing trees 120ft high; the tanks are filled from a gravity pipe upstream. From the mail notice at the Post Office it was ascertained that trams operate as follows:

8 am M-F inc	Lv Warburton	—
3.30 pm Sunday only	Lv Depot	Arr 4 pm M-F inc
12 noon M-F inc	Arr Fed. Mill	Lv 1 pm M-F inc
6 pm Sunday only	Arr Fed. Mill	—

Notices displayed on buildings at both termini indicate:
"Riding on vehicles is Prohibited"
"Persons riding on vehicles may do so at their own risk."

The upper incline of the V.H. Co. is steel, single track and 3ft gauge. At the site of Ada No. 2 mill, burnt out in 1939 bushfires, are the remains of Powelltown Tramway's First No. 3 Kerr Stuart 'Coffee Pot' [see end notes] a little 0-4-2ST scrapped but for boiler and water tank. A former branch line from this mill, down the Ada Valley, is being reconstructed for timber salvage.

From the Ada River, crossed on a long timber trestle, another haulage incline carries the line up to the summit of High Lead at 2250ft. Half-way up this incline is the branch line to Old Ada No. 1 where the little 'Coffee Pot' used to operate. This line is worked by a Malcolm Moore non-coupled six wheel tractor. The winch operating this haulage is at the High Lead summit together with that working the High Lead Incline itself. Before the summit is reached there is a curious wooden-railed siding and another branch line with wooden rails. Both branches and siding are on the west side.

At High Lead summit the two inclines meet like the gable of a roof top. There is a series of four short tracks and hard by are the winches for operating the cables either side of the summit. The High Lead incline descends to the valley of Big Creek, a branch of the Latrobe River, a descent of 1500 to 1700 feet in under one mile, with an inclination of 1 in 5 to 8 with three short stretches where the grade eases to 1 in 10. The incline is laid in steel, very uneven, but straight, with a crossing loop about half-way down.

At the foot of the incline is Splitter's Camp, the bush terminal of the V.H. Co. 3ft gauge Powelltown Tramway. A steel-railed extension is in course of construction further up the Big Creek, whilst there are a number of loops and sidings. This is the limit of operation of the Shay locomotives from Powelltown, 8½ miles by rail. The line is well kept here, with sawn sleepers and gravel ballast. Rails are mostly second-hand steel, sometimes slotted tramway rails. There are several deep cuttings, but the line is generally level as it follows down the Bit Creek valley to the Latrobe Valley before turning west towards Powelltown.

Before leaving Big Creek, the site of Knott's Old Mill is passed. This was formerly connected with the Goodwood Tramway line from Noojee now dismantled) by a line which can be seen coming in from the east. Apparently there was a short section (1½ miles) of three-rail track, but no evidence of it today.

Leaving Knott's the line turns north over a slight spur and then turns up the Latrobe. A branch line, now disused, formerly extended alongside the Noojee road several miles from this point, but the junction cannot now be located.

In the Latrobe valley the line parallels the main road and crosses the river on low bridges eight times. Half way from Knott's to West Nayook is a long crossing loop with short spur lines serving a wooden railed branch to Armistead's Mill across the river. This is not now in use, though it was in May 1940. From Armistead's Junction the line commences to climb and crosses the road on the level. A siding and three loading stages for pulp wood, obtained from timber salvage, occur hereabouts. There is also a water pipe for filling loco tanks.

Nayook West is the site of a large abandoned mill and immediately beyond is the Bump Tunnel through the watershed into the Little Yarra River valley. The tunnel is single tracked, wooden lined and about 300 yards long. Over the summit the descent is rapid and continuous at 1 in 25 ruling grade and sharp curves. There are three high, curved, wooden trestles and a level crossing in this section. In Powelltown yard the present Kerr Stuart 'Coffee Pot' is stored although it was in use some time last year. 'Powellite' and 'Little Yarra'

are both in use, the latter recently overhauled and painted dull green lined out with polished fittings. It looks in fine shape. 'Shay' 2576 is in service, partially repaired and painted red. The other is under repair in the shed.

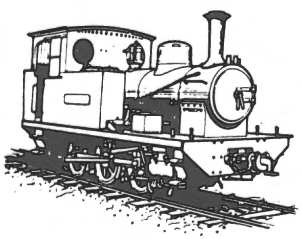
The timetable from Powelltown beyond to the end of the steel is approximately:

Leave Powelltown	5 am Monday; 7 am T-S; 1 pm M-F
Arrive Splitters	7.30; 9.30; 2.30
Leave Splitters	10 am M-S; 3 pm M-F
Arrive Powelltown	12 noon; 5 pm.

Timetables for the Yarra junction to Powelltown section are contained in VR Suburban folder and the fare is one shilling and one penny single. Return tickets are not issued. A passenger car and seated trucks are provided.

Contributed by Ian Barkla from ARHS Victorian Archives.

Editor's Note: The first 'Coffee Pot' Kerr Stuart referred to is in fact Andrew Barclay 311 of 1888. The reference to Splitter's Camp should be Powelltown Bush.



BOOK REVIEW

J. Branagan
Bush Tramways and Private Railways of Tasmania 1850-1960
Regal Publications, Launceston
174 pages, soft cover. RRP $29.95.

To most mainland tramway enthusiasts the Tasmanian tramway scene is a source of fascination so it was with more than usual enthusiasm that this reviewer spied this book on the rack in a Melbourne shop and bought a copy.

The book purports to be an overview of all the non-government railways and tramways in Tasmania. Unfortunately the reality is a long way from the cover blurb. For starters the author readily admits that he knew 'very little' about tramways when starting the research. This shows itself in the text and even on the front cover where the running gear of a TGR 'M' Class is featured, apparently for its tramway connotations.

The treatment is geographical, looking at Tasmania in 10 sections with a final section on museums and steam societies.

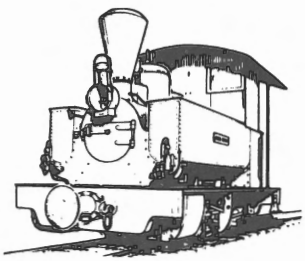
The author has done a fair amount of work for the publication in interviews and library work but all data has been included in an indiscriminate manner. Some of the references quoted are of dubious authority, others are outdated and yet others of a local history nature so general as to be useless. The construction of each chapter is confusing and is neither uniformly chronologic, alphabetic nor geographic.

There are maps provided to many chapters. Unfortunately these are a grab bag of formats and styles lifted from other publications and reproduced in so small a size as to be almost incomprehensible.

The photographs are uniformly small and almost as hard to fathom as the maps.

The publication has some value for an overview of the complex tramway picture prevailing in Tasmania but its aims are too ambitious and its execution leaves a lot to be desired.

E.L.



LETTERS

Dear Sir,

Narrow Gauge Question LR 135

I beg to differ with the location of the photograph featured on page 4 of LR 135.

The photo in question is of course at Upper Ferntree Gully, not Belgrave as stated. and was taken on the day the Victorian Railways' publicity photographer John Hirons rode the cab with myself to Gembrook. We made him very welcome and the date was 8 May 1950. The VR printed numerous sets of this batch and Len Whalley told me they had to make another batch of negs due to the originals getting worn out with use. It is in the M series of VR negatives and of course the credit is PTC photo.

By the way that is me leaning out of the cab keeping an alert eye during shunting. The left hand injector steam valve was blowing back and not nearly shut off by me. If we ever had water coming out with steam from the overflow this usually denoted the check valve blowing back and not from the injector steam valve. Both faults frequently gave problems with overheating but we always had a bucket handy.

Ian Barkla
Gembrook Vic

* * *

Dear Sir,

O'Shannassy Water Scheme LR 135

This article in LR 135 at p. 19 notes that the conduit comprises amongst other things 37 km of steel pies. Ah yes, here we have an historical inkling into that great Aussie icon, the humble pie. Decades of research obviously occurred with these steel pies prior to inflicting them onto the trapped patrons of railway refreshment rooms and, more lately, milk bars.

Was part of that research to test these steel pies by running Melbourne's water supply through them, or were their obvious engineering qualities appreciated by the government of the time, hence their use in construction of water conduit?

Maybe the 37 km of steel pies were to keep the workmen so tough they'd rust as they hand mixed concrete on the trolleys!

No doubt the tradition of dowsing tomato sauce on the humble pie originated in the culinary habits of these hardy men. Even their stomachs needed the lubrication and corrosive action of tomato sauce to digest these steel pies.

Yes, for cast-iron stomachs, you can't beat a steel pie!

John Robin
Meander, Tas

* * *

Dear Sir,

What is a light railway?

Would the term 'light railway' encompass rooftop railways such as the ones in the accompanying pictures? These railways have points and a 'loco shed' and even though they do not fall within one's usual conception of a light railway I feel that they fall within the definition of what is called a light railway. What do other readers think?

The first picture is of the roof on the city centre building on the SW corner of Pitt and Market Streets, Sydney. The second one is the roof of the Hooker building, 55 King Street. Both photos were taken from the Centrepoint tower.

I noticed while I was up there that the Reserve Bank building in Martin Place has a similar rail system with what appears to be four turntables, one at each corner! Unfortunately I had run out of film at that moment so cannot delight the readers with an image.

Enzo Smith
Cammeray NSW

Editor's Note: See also LR31, Autumn 1970.

Dear Sir,

Dreamworld Loco

The loco on the front cover of LR 135 was built by the Baldwin Locomotive Works of Philadelphia, PA, USA as part of a total order for 495 identical locomotives for the British War Department for use on light, semi-permanent 60 cm gauge lines in the actual war zone during the 1914-1918 conflict. They were ordered in March 1916 and were delivered between October of that year and April 1917.

It took two years from the outbreak of the war for the British to realise that narrow-wheeled horse vehicles, cumbrous steam traction engines and primitive motor lorries were impractical for maintaining supply lines in the war zone conditions. The German system of light railways established in their war office policy even before the war was proving embarrassingly effective.

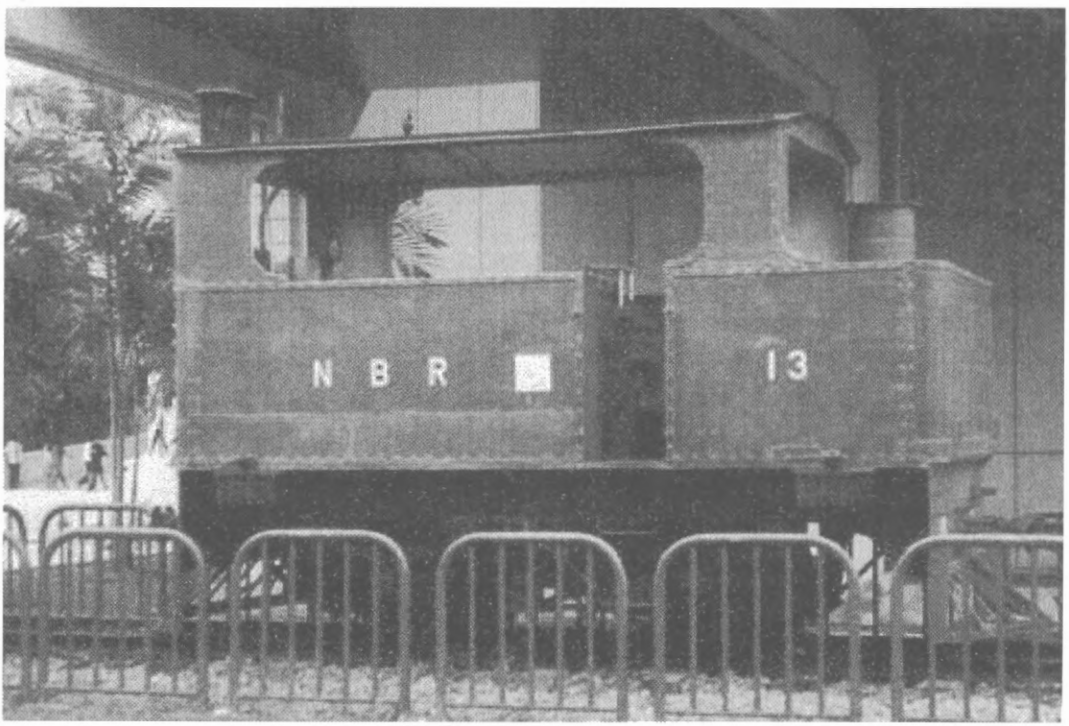
After the war, large numbers of surplus locomotives were disposed of to various industrial narrow gauge railways throughout the world. However, as built, they were 4-6-0 tank locomotives and it was in that form that they survived their working lives.

Baldwin No. 45215, one of the last delivered, was initially given War Department number 1083 and later renumbered to 634. Around 1920 it was purchased by the Racecourse Co-operative Sugar Milling Company located near Mackay Queensland, for use on their lines. By 1963 it was rendered redundant by the new diesel locos and so was discarded behind the mill with other locos.

It was purchased by myself in 1972 and transported to Goulburn NSW for eventual use on a museum type railway. However, prior to its restoration it was spotted by Mr John Longhurst who told me about his plans for the proposed 'Dreamworld' and I was persuaded to part with the loco. The 4-6-0 was then professionally overhauled in Sydney and superficially rebuilt as a 4-6-0 tender engine in the style of an American 1880s loco.

Bruce Macdonald
Chapman ACT

The Sentinel steam loco No. 13 mentioned in LR 135 is currently on display at the Sabah Museum. The loco was purchased in 1927 and operated until 1964. Photo: Dr Franz Wimmer.



BRITISH-AUSTRALIAN MACHINERY COMPANY, LIMITED.

IMPROVED DOUBLE SIDE L.S. TIP TRUCKS

WITH RIBBED SCOOPS.

THE STRONGEST TIP TRUCKS USED IN AUSTRALIA.

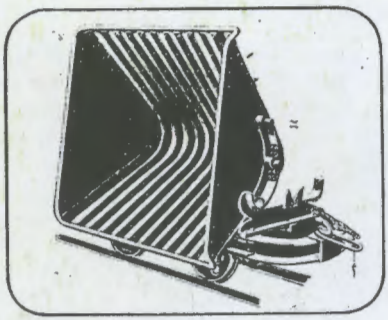


Fig. 10. Without Brake.
(Scoop in Tipping Position.)

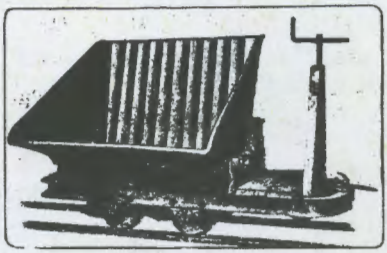


Fig. 135. With Brake.
(Scoop slightly tilted towards Tipping Position.)

TIPS FOR USERS.

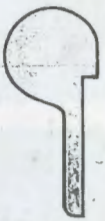


Fig. 118.

(1) **Our Low Standard Truck Scoops** have Bulb Iron Rims, thus,—Bulb Iron Rims are worth considerably more than Angle Iron Rims. Watch this when buying Trucks.

(2) **Our Low Standard Truck Scoops** are ribbed with Steel Bars rivetted to the Plate. This makes them the favourite Truck in Quarries and other works handling heavy lumps of stone, &c.

(3) **Our Low Standrd Trucks** run EASY on Self-oiling Roller Bearing Axleboxes, as illustrated on page 16.

(4) **Our Low Standard Trucks** are LOW for loading, and LOW for unloading. (See Fig. 10.)

(5) **Our Low Standard Trucks** are of specially strong design, well finished, and lower in cost of upkeep than "cheap" trucks of light design.

APPROX. DIMENSIONS, &c., OF STOCK TRUCKS.

Size.	Rail Gauge.	Approx. Overall Dimensions.			Extra Length with Brake.	Rail Wheels.	Axles.
		Height.	Length.	Width.		Diameter.	Diameter.
¾ cub. yd.	2′	38″	66″	58″	18″	12″	1¾″
1 „ „	2′	43″	72″	59″	18″	12″	1¾″

Dimensions are subject to alteration without notice.

Larger Sizes supplied when required. Rail Gauge altered when required.

LARGE STOCKS ALWAYS IN HAND.

B.N.Z. Chambers, 6 Wynyard Street, Sydney.

Catalogue A (copyrighted). Page 19

Page from British-Australian Machinery Co. catalogue.
Photo: Courtesy Roger Persson from Colin Wear Collection.