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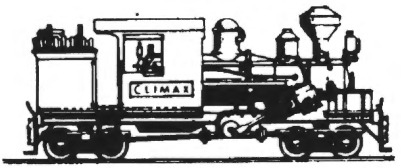

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Cover Photo: *Manning Wardle loco on the saiths running over the coal bunkers at West Ryde Pumping Station.*
Photo: Sydney Water Board

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CONTENTS

EDITORIAL

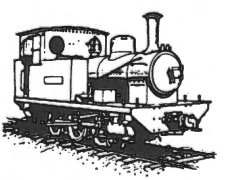
This issue of the journal has a diverse mix of articles covering railways, tramways and locomotives at West Ryde in Sydney and at Lochiel in South Australia. The letters section looks at a range of loco and site identification problems.

The scope of this issue indicates vigorous research activity being undertaken by members. Keep up the good work, readers.

The West Ryde Pumping Station is an interesting example of an owner shunted siding; a very short route that used four locomotives for 60 years to move coal trucks to and fro.

The Cheetham Chronicles continue, this time looking at the salt works at Lochiel. Even though the tramway operation here was very small, the works was, and is, a colossal salt producer. The site employed one steam loco and one small internal combustion loco.

Norm Houghton



COAL TO FEED THE FIRES

A BRIEF HISTORY OF THE UNUSUAL SIDING ARRANGEMENTS AT THE WEST RYDE WATER PUMPING STATION

by Jim Longworth

Introduction

Prior to 1888, the residents of Sydney's fledgling northern suburbs relied on what water they could collect themselves from roofs and creeks. A single 9" main from Dawes to Milson's Point supplied sections of the North Shore (now North Sydney) area only. To adequately supply the large territory north of the harbor and Parramatta River, a pumping station with direct supply from the bulk water supply at Potts Hill Reservoir was necessary.

The first pumping station at Ryde was built by the Harbours and Rivers Department, and handed over to the newly formed MBWS&S (Metropolitan Board of Water Supply and Sewerage) in 1891 (AR 1891). Water was delivered from Potts Hill Reservoir to a balance reservoir at Ryde railway station. From here a pair of 146HP vertical, compound, direct-acting, surface-condensing pumping engines (by J. Watts & Co. Birmingham), lifted 3,400 gal/min of water to Ryde tank and Chatswood, to supply Sydney's northern distribution system (MBWS&S 1913).

Later the equipment at Ryde was supplemented by further boilers and pumps (Doring 1991). Further coal storage was provided, giving a total of 1,000 tons of coal bunker capacity mostly in elevated towers.

By 1916 the need to further increase pumping capacity could no longer be accommodated in the existing station. Land on the eastern boundary of the old station was acquired, and a second much larger pumping station built. See CE (1912) for technical details. The new station was completed during 1921 and commissioned on the 15th September. Gradually the new station took over the pumping duties of the old until the old pumping station ceased to operate at all during November 1930. Thereafter the old station was used as a store until it was demolished in 1916 (Doring 1991).

The new pumping station went through continual upgrades and amplifications to raise its pumping capacity from 20 mg/day (including the old pumping station) in 1921, to 66 mg/day in 1956, to 90 mg/day (410 mg/day) in 1973, to 590 mg/day in 19 82 (Doring 1991).`

RAILWAY SIDINGS

Sidings arrangements at the second Pumping Station presented a rare Australian example of a siding without internal function, shunted by the owner's own locomotive. The sidings were of standard gauge (4'8 ½").

Grounds of the pumping station abut the Main Northern Railway Line Up track just south of West Ryde railway station. There was no great length of connecting line as there had been at Nepean Dam or Bunnerong Power Station. Neither did the works comprise a large multifaceted industrial complex where locomotives were required to move rolling stock around and between various on-line production areas, as at the Wollongong Steel mills.

Unlike England, Australia had very few owner shunted sidings. Purchase of a locomotive was costly, usually involving further expenditure on a stabling structure, and employment staff (Wilson 1991).

The sidings at Ryde were operated for only one purpose. That purpose was to supply coal to the boilers, which supplied steam to the pumps, pumping the potable water to the various distribution reservoirs scattered around Sydney's northern suburbs. History of the sidings is therefore intimately dependent on the history of the station's use of coal as a source of power during the last one hundred years.

Investigations into the advisability of continued use of steam as the prime power source were carried out during 1936, 1954 and again in 1972. During 1930 two electrically driven pumps were installed. However, they drew so much power that Bunnerong Power Station had to be given two hours notice prior to starting up the pumps. The 1936 investigation concluded that steam still had safety and economic advantages (MofM 17/6/1937). The 1954 investigation concluded that steam provided greater independence of the pumping station from the vagaries of the electricity supply. A blackout the night before the Board discussion may have influenced its outcome. On 12 July 1972 the board finally decided to convert the pumping station to electric ity, with the last turbine being shut down on 19 March 1981.

The original pumping station. Note the gantry, the loco shed and the receiving hopper cover to the right and the siding to the open-air coal stack and maintenance trolley to the left.
Photo: Sydney Water Board

OLD PUMPING STATION SIDING (1891 - 1921)

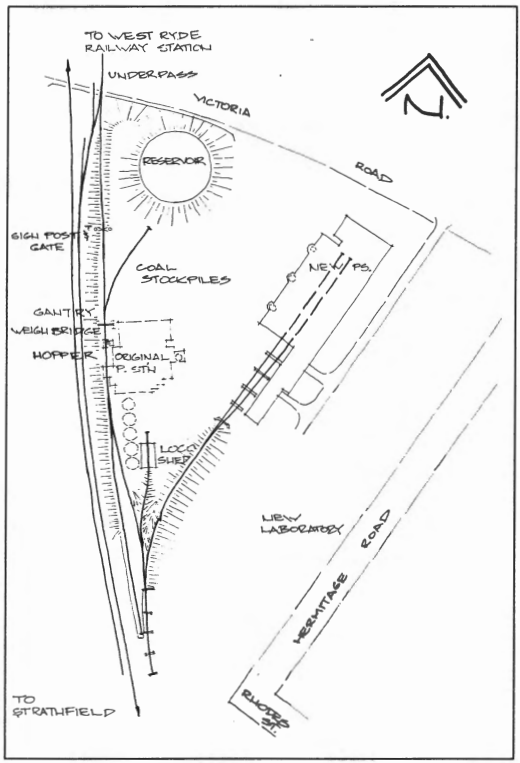
During 1891 the first of the two Ryde Pumping Stations was opened at what was named 'Ryde' railway station on the Main Northern Railway. Ryde station had been opened on September 17 1886 with the completion of the Sydney-Newcastle Link. The following year the goods loop siding was extended into the pumping station then under construction. (Singleton 1965)

Coal was delivered in NSWGR (New South Wales Government Railways) trucks, from which it was dumped into a receiving hopper beside the pumping station, and taken by a crossplate conveyor into a gravity bucket elevator to nine elevated storage bins at 20 tons/hour (MBWS&S 1913). In about 1915 a 5 ton crane was installed over the station's then single siding.

NEW PUMPING STATION SIDINGS (1921 - 1981)

During September 1921 the new pumping station at Ryde was opened to boost pumping capacity to the northern suburbs. A feature of the station was the reinforced concrete saith built by the State Monier Works (AR 1918) at the south end of the boiler room. The saith raised the railway tracks up and over coal bunkers, above the station boilers. Construction of the sidings was by the NSWGR at charge to the Board.

Coal for the new station was delivered in wagons by NSWGR locomotives to the siding adjacent to the old pumping station only (the work's No 1 siding), and the wagons properly secured. Locomotives were not to proceed to any other siding (WN 448-14, 1928; 575-55, 1936). In later years a signpost at the entry gate warned NSWGR engine drivers not to pass this point.



From here the MWS&DB (Metropolitan Water, Sewerage & Drainage Board) work's locomotive propelled the trucks up over the saith to one of the two parallel tracks over the coal bunker (CE 1921). Design of the coal delivery system (directly from railway wagons to coal bunkers) is an eminently simple system and it eliminated multiple handling and maintenance of complex conveyor and elevator systems, plaguing most coal-fired steam-raising installations. The conveyor system at the old station had failed continuously and lead to claims for demurrage on Railway coal trucks (AR various, Doring 1991).

On the 14 June 1921 the NSWGR suggested that the work's (yet to be delivered) Purcell loco would be incapable of safely controlling loaded trucks left in the siding past the old pumping station due to the line's 1:33 grade, and the locomotive's hauling capacity being only twenty tons (WB).

To provide storage space for additional stock and a suitable hand over point, a 217 foot extension was planned (MofM 6/7/1921). Trucks were to be positioned up the siding by NSWGR locos, from where they could be coasted out down grade, as required, to the old pumping station and/or picked up by the Board's loco for hauling to the new pumping station. Unfortunately the NSWGR laid the track with the grade falling towards the buffer stop, from which the Board loco could not remove them. This necessitated relaying the track with the grade falling away from the buffer stop and construction of a retaining wall to support the permanent way. Points to this siding were removed during 1968, as the siding was by then no longer used for shunting trucks (WB).

Concern over expenditure incurred in connection with the extension prompted the Auditor General to hold an inquiry into the matter during late 1923. The Colonial Treasurer authorised Mr H. V. Swain (Officer-In-Charge of the Technical College, Engineering Department), to carry out the inquiry (MofM 26/3/1924). His report concluded that "... the coal handling at Ryde Pumping Station does not reflect credit on the Water Board ..." (WB).

This conclusion seems to evince a spirit of harping criticism. The design was for the best of intent, being to deliver coal to over the bunkers without breaking bulk, which it did successfully for some sixty years. The improper laying of this siding seems to have resulted from a misunderstanding on the Board's part of normal NSWGR practise. Usual practise of the period was for the owner to be responsible for the earthworks, with the NSWGR only laying the track.

The railway embankment leading up to the coal saith had been partially constructed from spoil from the new power station's substructure (AR 1917), and ash from the old station.

During 1923 remnant coal in the ash ignited spontaneously. The fire was smothered with a blanket of soil. Concern was expressed over loss of so much fine coal through riddling between the links of the grates. (AR 1923).

A coal strike during 1927 prompted construction of a new siding to a reserve coal stack between the old power station and reservoir. This stack could also have served other pumping stations which did not have their own reserve coal storage. (AR 1926 -27).

Until 1936 Victoria Road crossed the pumping station siding connection to Ryde goods yard by level crossing, and during 1937 the level crossing was replaced by a road underpass, requiring extensive adjustments to water mains in front of the pumping station. The Board was required to pay for the additional expense incurred by the Railway Department, having to install a second double track bridge to

accommodate the Board's siding connection, rather than a single track bridge that the Railway's required for their own line only (WB, MofM 20/11/1935).

Ongoing routine maintenance such as replacing sleepers, lifting, packing, and rail replacement along the siding connection located on railway property outside the pumping station gate, was carried out by the NSWGR at charge to the Board. Maintenance inside the grounds was performed by the Board using new and second hand materials from the NSWGR or Thornley.

By 1940 the wood trestling at the southern end of the shunting line was deteriorating from white-ant damage. Further deterioration in the trestle was dealt with by reconstructing the northern three spans and shortening the structure by blocking off of the last southern-most span during 1955. Sleepers on the coal saith were also replaced during 1947.

'Ryde' station was renamed 'West Ryde' station on 8 October 1945, to distinguish it from 'Top Ryde' to the east (Singleton 1965). Coal wagons were sometimes shunted as far as the last coal bin in the pumping station (there being no boiler under this bin), which emptied into road trucks underneath for transfer of coal to an open-air stockpile within the station grounds.

Here the coal was reloaded into railway wagons by front-end loader when required, and brought around to be over the boilers.

Use of steam for pumping at Ryde ceased with the shutting down of the last turbine on 19 March 1981 (Doring 1991). So the sidings became redundant.

LOCO SHED

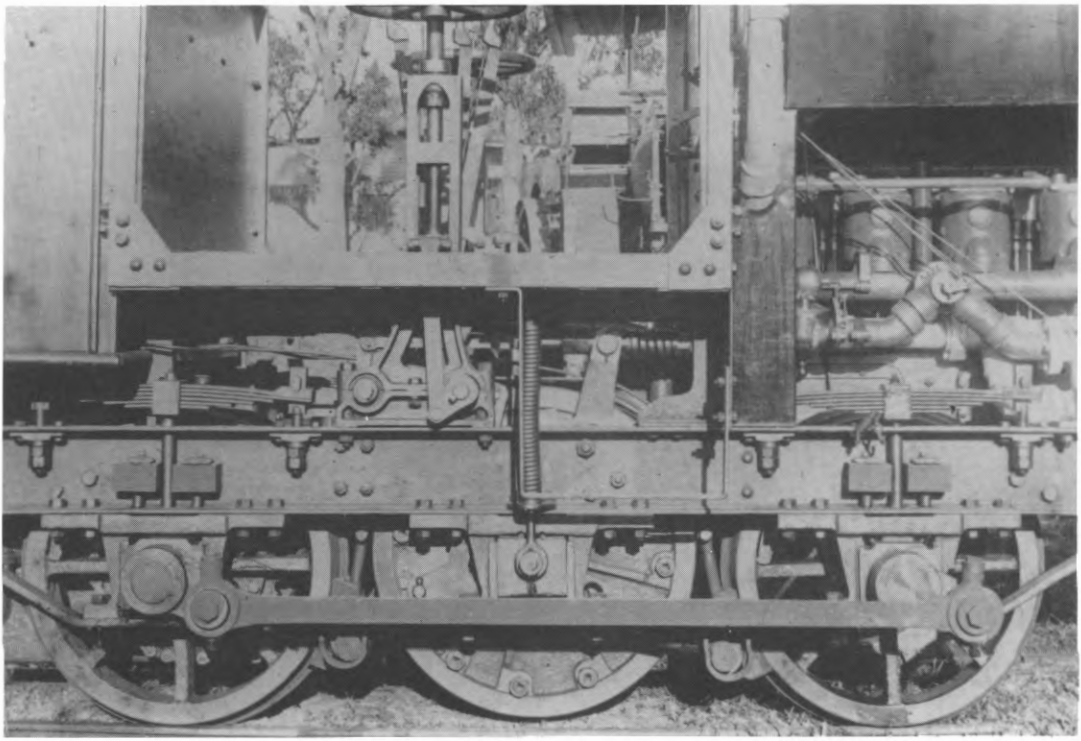
The original loco shed for operation of the first pumping station is thought to have come from Potts Hill No 2 Reservoir (MofM 26/5/1923). Its location is not precisely known, though it could have been located over the receiving hopper adjacent to the superstructure.

The now extant former loco shed has been reclad several times (Doring 1991). The original structure probably came from the Rockdale Sewage Farm (MofM 7/11/1934, 17/7/1935, 17/7/1935), and was placed over a siding laid by the Department of Railways during September 1935 (Dept of R. plan). Doring (1991) notes that the steel frame appears to have been built from second hand structural sections.

WEIGHBRIDGE

Accurately assessing the weight of coal received at Ryde was considered for some years from 1918. However it was not considered worthwhile until 1930, when consultation with the State Metal Quarries Ltd., Carson Bros and the Electricity Department at Bunnerong, revealed that they had recorded significant differences between the manifested weight (on the railway wagons) and the

Purcell loco on siding parallel to main line. *Photo: Sydney Water Board*



Close up of Purcell showing lowerable friction wheels between ordinary driving wheels. Note screwdown wheels for adjusting friction wheels. *Photo: N. Thorpe Collection*

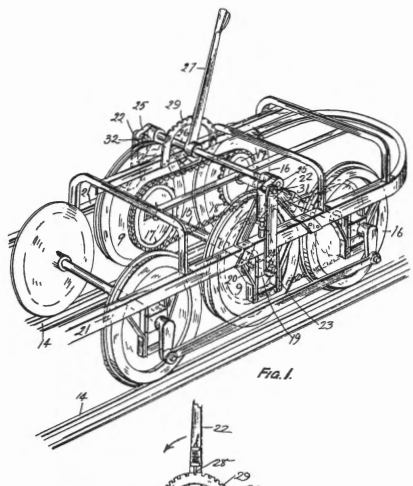
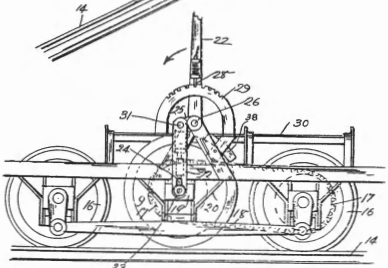


Fig.1.



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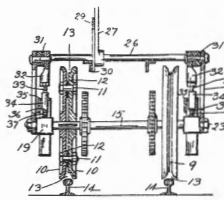
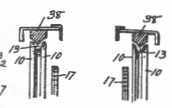


Fig.3.



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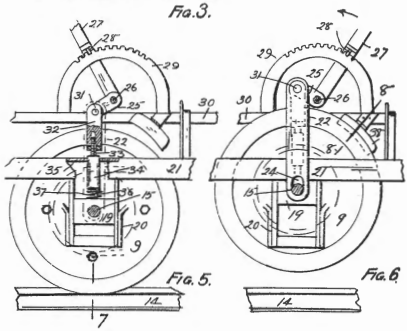


Fig.5. Fig.6.

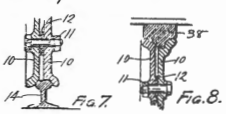


Fig.7. Fig.8.

recipient's weighing. It should be noted that railway weighings are only for calculation of freight charges, NOT for buying and selling purposes (NSWGR Regulation No. P. 24 April 1920, WB).

During 1930 W. & T. Avery supplied one 36 ton capacity 'ASCO' TYPE 467 RAILWAY TRUCK WEIGHBRIDGE to Ryde pumping station. Payment for coal, based on the Board's weighbridge figures, amounted to a saving of 250 to 300 pounds per annum, during the initial years. Subsequently a similar weighbridge was installed at Potts Hill Reservoir Pumping Station during 1931. Potts Hill Pumping Station ceased steam operation in May 1965.

Maintenance of the weighbridge was taken over from Avery by H. & H. Cox from 1937 until 1965, when Standard Scale Pty Ltd assumed the maintenance task.

The bridge was tested each year and overhauled every second year. During 1973 the weighbridge was converted to metric units, and sold with the disposal of steam assets during late 1983.

COAL SUPPLIES

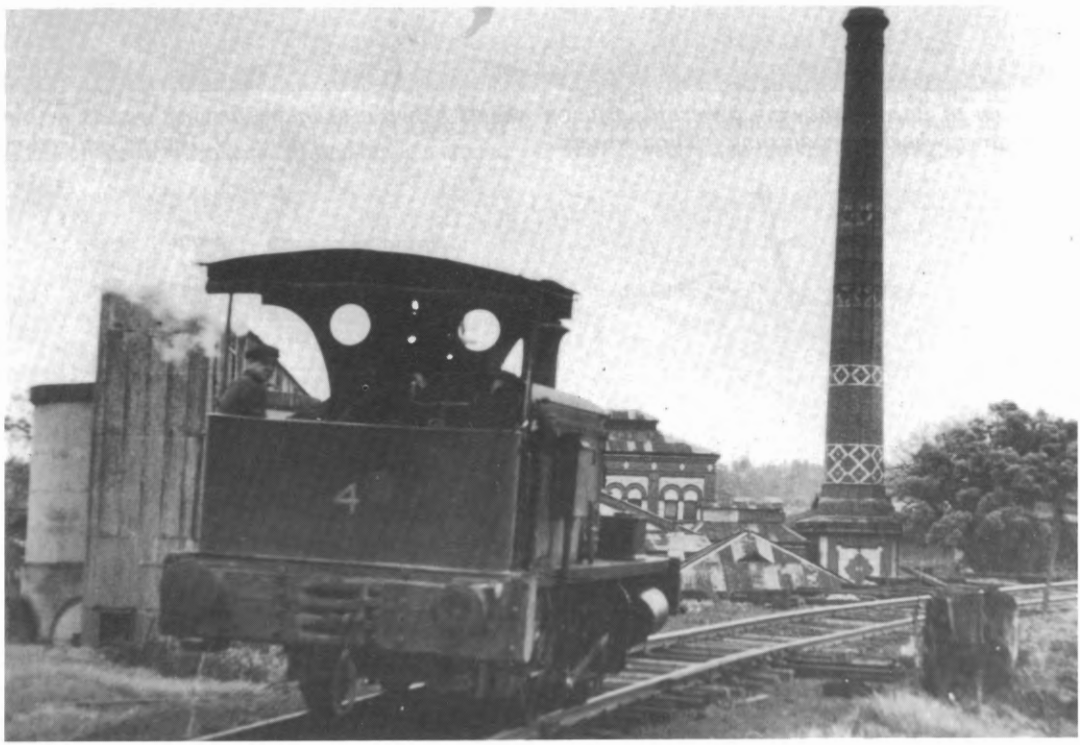
Management of the Pumping Station had a policy of maintaining a six week supply of coal on site. The stockpile for the second station was located about and on the site of the first Pumping Station. Special small coal from the western coal fields was the preferred fuel for these boilers.

Typical coal consumption of the two pumping stations is given in Appendix 'A'.

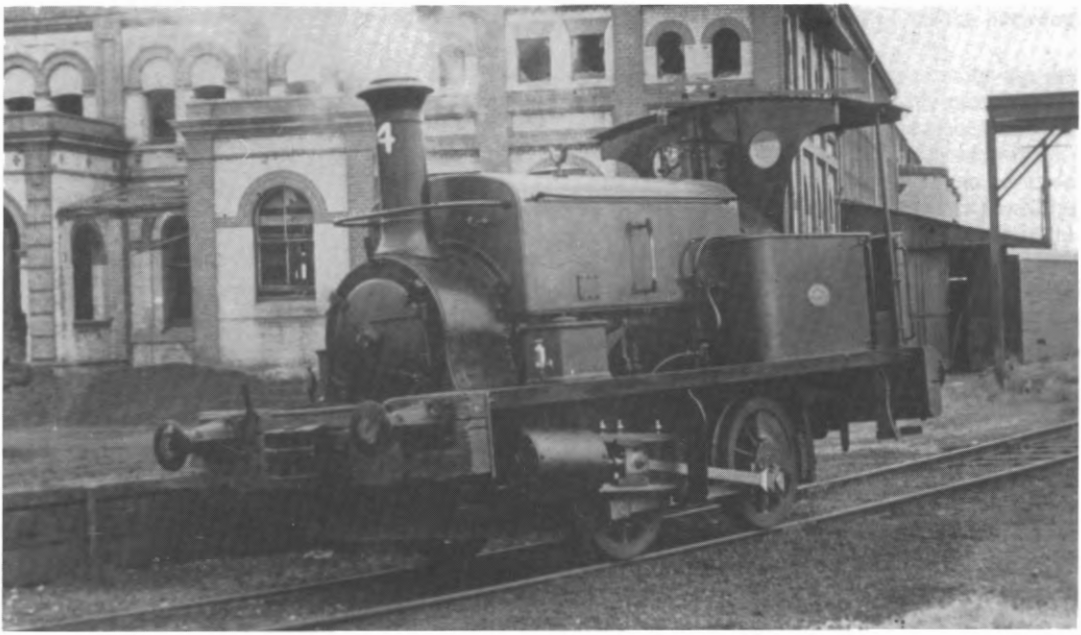
LOCOMOTIVES

Over the years, four different MWS&DB locomotives have worked the sidings. Of the four, only one was purchased new especially for the work. All three others had worked previously on various MSW&DB construction projects prior to their transfer to Ryde.

First to arrive was a 60 horsepower, six cylinder, oil engined, six wheeler, by Purcell Engineering Co. Ltd. Auburn, Makers No 936 (Anon nd., Sadler 1985). Lyell Scott supplied the locomotive during 1921 (MofM 15/2/1961) for a price of 1,885 pounds (MofM 6/10/1920, 14/9/1921), not 1931 as given



Loco No 4 shunting at the old No 1 pumping station *Photo: P. Sellars Collection*



Loco No 4 in very clean condition outside the No. 1 pumping station. Photo: A. Pain Collection

by Doring (1991) and Simpson (1984), nor did the locomotive come from Nepean Dam as given by Cleaver (1976). The loco probably started work at Ryde on the 5 September 1921 (WN 37-1927). This locomotive was an example of Purcell's friction wheel locomotives as described in Appendix 'B'. WN (8/9/1921) gives the loco as weighing about 10 tons, and being capable of moving twenty tons on a rising grade of 1:33. Purcell's advertising material of the early 1920s gives the loco as hauling forty tons (Horne 1991).

Mr E. Green was employed to drive the locomotive at an initial 19s. 2d. per day (MofM 13/4/1921), and instructed in driving technique by Purcell Engineering Co. Ltd (MofM 16/11/1921).

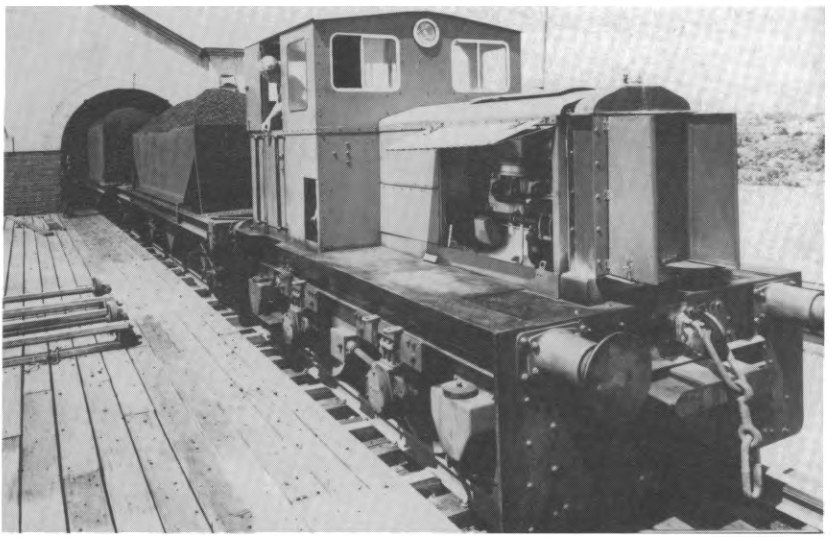
By 1923 construction of Potts Hill No 2 Reservoir was complete. A manning Wardle 0-4-0 saddle tank, Plant No 4, B/N 1781 of 1911, used during construction of the reservoir, was now out of use there. Transfer of this loco to Ryde to shunt coal trucks was approved on 26/4/1923 (MofM), and the loco was transferred in May of that year (AR 1923). Contrary to Wright (1987), MW No 1781 was built in 1911, and did not leave Ryde till 1966 (Anon nd., Kramer 1987, Simpson 1984), nor did it come to Ryde Pumping Station via Moruya as claimed by XN (1949). See Simpson (1984) and WB for a maintenance history of the loco while in service at Ryde.

On arrival of the second locomotive during 1923, the Purcell was laid off for repairs (AR 1923) and retained as a standby unit (AR 1924) till 1959. In 1954 its petrol engine was replaced by a Gardiner 5LW diesel engine. During 1959 the third locomotive was transferred to Ryde, whereupon the Purcell was stripped of its replacement engine. The chassis was donated to the army welfare organisation ,'Toc H', Beecroft Branch, for use in the Church of England Boys' Home, Carlingford (15/2/1961).

During the last few major overhauls of No 4, a replacement loco, a Hibberd Planet from Warragamba Dam, was used temporarily to operate the sidings. By September 1959 a four wheel Planet had been permanently transferred from Warragamba Dam to Ryde and arrival of this third locomotive allowed No 4 to be put on standby.

Several preservation bodies sought to acquire No 4 but it was eventually donated to the Museum of Applied Arts and Sciences (MofM 15/21961). The locomotive was loaded onto a low loader, and moved to its store during May 1966 (Simpson 1984).

The third Locomotive to operate the Ryde sidings was the Hibberd Planet, Plant No 51, B/N 3570 of



Planet loco No 51 placing coal hoppers in the bins above the boilers. Photo: Sydney Water Board

Unloading coal into the bunkers in No 2 pumping station. Photo: Sydney Water Board

1952 (Wilson 1991, McCarthy 1973, Doring 1991, Simpson 1974) which had arrived by September 1959. Twelve months later No 51 needed repair, so the fourth and final locomotive was transferred to Ryde (Simpson 1984).

This final locomotive was another Hibberd Planet, again from Warragamba Dam, Plant No 52, B/Ns 3570 and 3575 (Wilson 1991, McCarthy 1973, Doring 1991, Simpson 1974), Browning (1991) agree that B/Ns 3570 and 3575 are the correct maker's B/Ns for the units that were at Ryde.

By 1981 neither Planet was required any longer due to electrifcation of the pumping plant. Several preservation organisations sought to purchase the locomotives, with a preference for P/N 51. Due to incorrect identification at the time of sale, the purchasers bought the wrong locomotives, which may explain the swapped B/N of LRN (1984). Number

51 (B/N 3570) was sold to the Hunter Valley Steam Railway and Museum, now the Dorrigo Steam Railway and Museum (LRN 1986), and No 52 (B/N 3575) was bought by the Lachlan Valley Railway.

ROLLING STOCK

Coal was delivered in NSWGR wagons to the sidings for transfer in the coal bunkers inside the new Pumping Station. However, to transfer coal from the open air stockpile to the bins, the MWS&DB made two hopper dump cars, reminiscent of NSWGR gravel hoppers, and these remained in use until being ultimately scrapped on site during conversion of the station to electricity.

A collection of various NSWGR discarded hopper wagons and obsolete D wagons appears to have been stabled on the sidings during the 1960s. The D wagons were also used by the MWS&DB, to transfer coal from the open-air stockpiles to over the coal bunkers. Air operated dump H wagons appear in several photos of the site, probably used for internal handling of coal.

The line's only other piece of rolling stock was a small four wheeled trolley used for moving supplies around the sidings.

LACHLAN VALLEY RAILWAY SOCIETY USAGE

During early 1982 the Lachlan Valley Railway Society approached the MWS&DB seeking approval to store two locomotives and a few carriages on the unused PS sidings as the SRA had no siding space available close to Sydney. Approval was granted on the basis of a permit that was extended, and finally formalised by license in mid 1985.

Several MWS&DB staff were members of the LVR Society (Aquarian 1982). Locomotives known to have been stabled on the sidings during this period include 5367, 3026, 5917 and 4204 (Elerton 1991). As there were no coaling facilities nearby, a timber ramp was constructed beside the siding. Hiring a Water Board front end loader, the Lachlan Valley Railway loaded coal by driving up the ramp beside the loco's tender. Regrettably, along with the usual break-ins and graffiti attacks, a First Class end platform carriage and HG brake van were destroyed by fire during August 1986 (NDT 1986). The lease was terminated during November 1987 (wb).

EXTANT REMAINS

Closure of the sidings was precipitated by the SRA's tracklaying works at West Ryde station as part of the quadruplication of tracks between Epping and West Ryde stations.

As at June 1991 the only extant remains are the much rebuilt loco shed, with rails still intact but disappearing into the dirt just outside and the coal saith with both tracks still in place. Various embankments and permanent-way subgrades can be made out, together with the retaining wall from the extended regraded siding. Remnants of the burnt out carriage also remain.

Doring (1991) ascribes a HIGH cultural (heritage) significance to the coal saith and associated railway embankments. Assessment is based on the siding arrangement's clear visibility and ready understandability as representing the crucial link between rail transport of coal and the coal-fired pumping station.

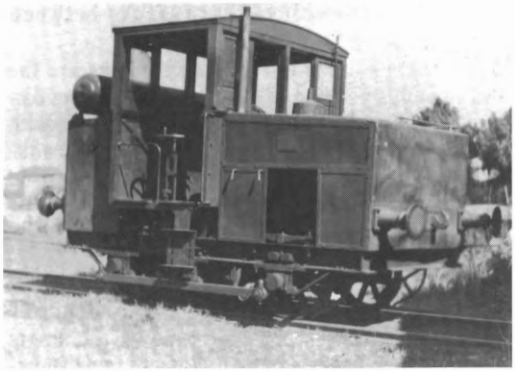
The railway provides material evidence of engineering design for the period. Remains of the infrastructure are a potentially long lasting testimony to the organisation's investment in production technology. The system was designed within the context of pumping water by steam produced from burning coal. The railway was designed and maintained by Water Board staff and it linked coal mine to receiving hopper. The sidings have great significance as a crucial part of an industrial landscape and an industry that influenced the settlement pattern of the entire northern half of Sydney.

CONCLUSION

Ryde's sidings existed for the single, simple, and very ordinary purpose. of shunting incoming coal wagons. While stockpiling coal for the second station gave the sidings internal function,. it is doubtful if this justified the owner's locomotive.

Management of the sidings was by Pumping Station Engineers, and reflected a microsum of the much larger state railway system. The arrangement faithfully preformed its designed intent for over ninety years. Locomotives were mainly second hand, with steam doing the bulk of the work, but eventually giving way to internal combustion. While preservation has conserved three of the four locomotives, and parts of the fourth, the system has now been superseded by electric power.

Had the Board not adopted the high level bunkers, horses or rope and capstan could have moved the coal wagons on a flatter layout. Even given a preference for the elevated bunkers, a rope incline would have been cheaper. Readers are asked to consider whether the decision to use private locomotives was a good or bad decision, and on what basis? (Wilson 1991)



Purcell loco at West Ryde 11.2.1948. Note the added air reservoir. Photo: H.V. Palmer

APPENDIX 'A'

Year	Coal consumed	Ref
1892	506 ton	(AR)
1902	1,990 ton	(AR)
1910	5,730 ton	(AR)
1920	24,371 ton	(AR)
1925	23,942ton	(AR)
1976	45,000 ton	(Cleaver 1976)

APPENDIX 'B'

Purcell Engineering's friction wheel locomotives were a series of six wheeled internal combustion locos, built generally in accordance with Patent Application No. 4958/12, by Felix Caldwell, Engineer, of Queen Street, Auburn NSW, applied for on 15th May 1912.

Caldwell's basis for the patent was to increase the tractive effort of the driving wheels. Increased TE was to be by temporarily increasing the loco's adhesive factor through reduced slippage of the driving wheels, by use of driven friction wheels applied to the rail head, as shown in the attached figures.

The friction wheels were chain driven for synchronous rotation with the ordinary driving wheels, and suspended on an axle between the driving wheels. Composed of two vertical halves, held together by bolts and kept apart by variable thickness distance washers, the wheel's peripheral groove was tapered outwardly, approximating a 'U' in section, to effect a wedge grip on the rail head. The patent application shows a quadrant lever for lowering the friction wheels and their axle. Photographic evidence indicates that a pair of screwdown wheels, not levers, were used to lower the friction wheels on the Ryde PS Purcell.

Locomotive braking could also be enhanced by raising the friction wheels well up off the rails till the peripheral groove contacted special brake blocks rigidly suspended from the loco's frame (D of P 1912).

ACKNOWLEDGEMENTS

Assistance from Mr Franklyn Pain is especially appreciated, also those individuals referred to in the Bibliography.

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THE CHEETHAM CHRONICLES PART IV — LOCHIEL SALTWORKS

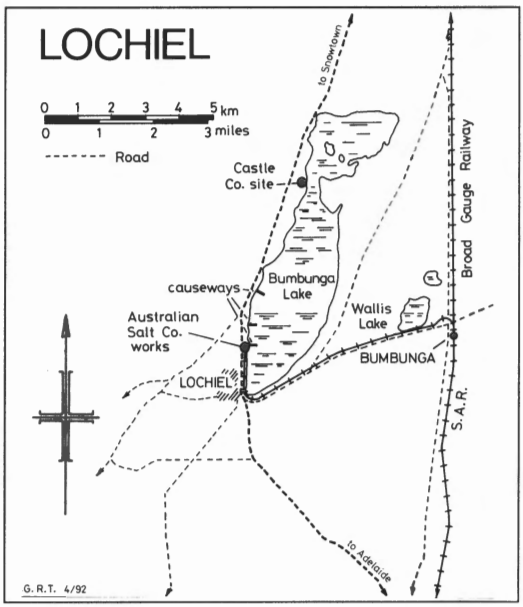
by Norm Houghton

The large salt bearing deposits known as Lake Bumbunga, comprising 1400 hectares near Lochiel and Snowtown, have been commercially worked since the 1880's. The two major harvesters of the lake have been the Castle Salt Co-operative and the Australian Salt Co.

The Castle Co. (based at Edithburgh) operated at the northern end of the lake from 1910 on a lease of 880 hectares. The Company used a couple of different methods of salt extraction during its 20 year occupancy. The salt was scarified, scooped into winrows and then shovelled into vehicles, either rail or road, and taken to the bank where it was stacked before being washed and bagged. A large labour force was employed at Lochiel and nearby Lake Curtis comprising around 70 permanents and 30 harvest casuals. A manager's house, boarding house, messroom and huts were provided at the lake.

Lake Bumbunga has a firm bottom out from the bank and this hardness has enabled some quite heavy machinery to be put onto the salt crust. Nearer the bank, though, the surface and sub-surface are relatively soft and solid earth causeways have been built out into the lake to overcome the access problem.

During the period 1910 to about 1923 the company used a Caillet type monorail to bring the salt to the bank. Four trucks, the larger of which were 13 ft 6 inches x 5 ft (4114 mm x 1524 mm), were employed on this task. This method must have involved a great deal of shovelling first onto, and then off, the flat bottomed slab sided trucks. A 1921 report described the monorail as 'peculiarly flexible and well adapted for keeping up to the salt'. The mono-rail was replaced by a belt conveyor 210 metres in length running direct from near the crushing plant straight out into the lake on a causeway. The conveyor was of wooden construction, mounted on tall wooden legs and fitted with a 460 mm wide rubber belt. At the end of the conveyor was a take-up belt for the salt that was delivered by tramway hoppers on portable lines. The conveyor

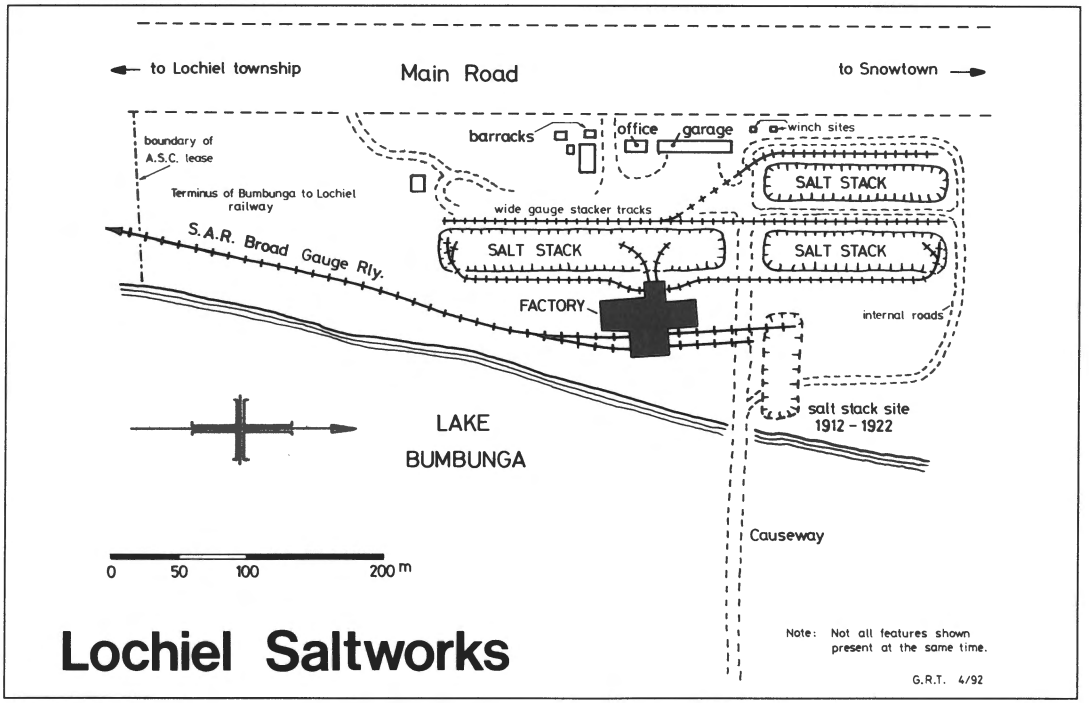


was a masterpiece in construction technique, being built from squared oregon beams and braced with metal rods and plates. The remains of it were visible in 1992.

The Castle operation on the bank was very simple and comprised two oil and one kerosine engines to drive the conveyor and the washing, rolling and crushing equipment. The bagged salt was carted by drays 10 kms to the Snowtown railway station where the company had a large storage shed for transit to Wallaroo and export markets.

When Cheetham took over the Castle operation, through the Australian Salt Co. in 1930, the northern end of the lake was abandoned because Jack Cunningham thought it had too irregular a shape and too many islands to allow a broad sweep harvest and was subject to wind generated water drift from the southern end of the lake. At this time the Castle Lake plant comprised the conveyer, three tractors, one A.E.C. truck, two trailers, four road wagons, six drays, four monorail trucks, 11 iron tip trucks and several thousand second hand sleepers. The inventories do not mention any rails (although the author saw several large rusting stockpiles still on site in 1992) nor explain the stockpile of sleepers that were mostly at Lake Curtis. These sleepers were used for years afterwards to supply requirements at Price, Kangaroo Island and Edithburgh.

The Australian Salt Co. (the major operator at



Lochiel) was formed in 1912 by Adelaide and Yorketown investors to harvest the southern end of the lake. Harvesting commenced in 1913 and the lake was worked as a stacking and bagging site only with the raw salt being conveyed from the stacks on the bank by road to the company's works at Port Wakefield, 32 kms south, for processing. At this time the annual harvest was around 6000 tonnes. At Port Wakefield the company had a small salt field but used the site primarily for refining Lochiel salt and shipping the product out on ketches.

The company experienced a turbulent start and had a succession of management and operational changes throughout what proved to be difficult marketing times and by 1921 had all but collapsed. The company was reconstructed with Joseph Timms, J. Mosely and G. Ritchie as the guiding directors through to 1924. Timms was a railway building contractor and was responsible for introducing the heavy steam machinery (traction engine and locomotive) to Lochiel.

Following Timms' death in 1924 there was a boardroom shake out and David Innes, William Innes and L. Ferres took control. D. Innes was an extremely practical man with a good grasp of the salt trade and he pulled the company back on track. Four years later Cheetham assumed control and the new directors were J. Cunningham, H. Bechervaise and A. Gray (all Geelong men). Innes stayed on as state manager for Australian Salt.

Salt harvesting at Lochiel was carried out with surface tramways during the period 1913 to 1926 using a variety of systems and techniques. The salt was first scarified then picked up with horse scoops and hauled to an elevated ramp over the tramline, from where the salt was tipped into the trucks and then taken to the bank. The ramp was mobile and could be moved with the rails as harvesting warranted. The company had an extensive range of 2 ft (610 mm) tramway plant with harness for 16 horses and a little over 2000 metres of track. The track comprised around 470 sets of rails in 3600 mm to 5400 mm length panels as well as 8 crossings. Rolling stock totalled 35 trucks and one rail carrying trolley.

The salt trucks were hauled by horse to the end of a causeway built east out into the lake, near the present works, and then pulled up the steep slope to the bank, either by winch or, in 1916 and 1917, by a

steam traction engine. There were two winch sites at this location. Later, there were two more causeways built to the north.

In 1917 the company introduced a steam locomotive, a Krauss 0-4-0, B/N 2591 of 1891. Local memories of the locomotive are very dim so it is not known how it was used. The most northerly causeway was laid with a double line of permanent rails so it is likely that the loco worked here and possibly south along to the main stacking site near the present works, a distance of 1450 metres. The working environment for the locomotive must have been harsh, with all the salt and sand about, and after two years it was disposed of. In addition, loco haulage was probably an extravagance in such a flat, seasonally worked operations area.

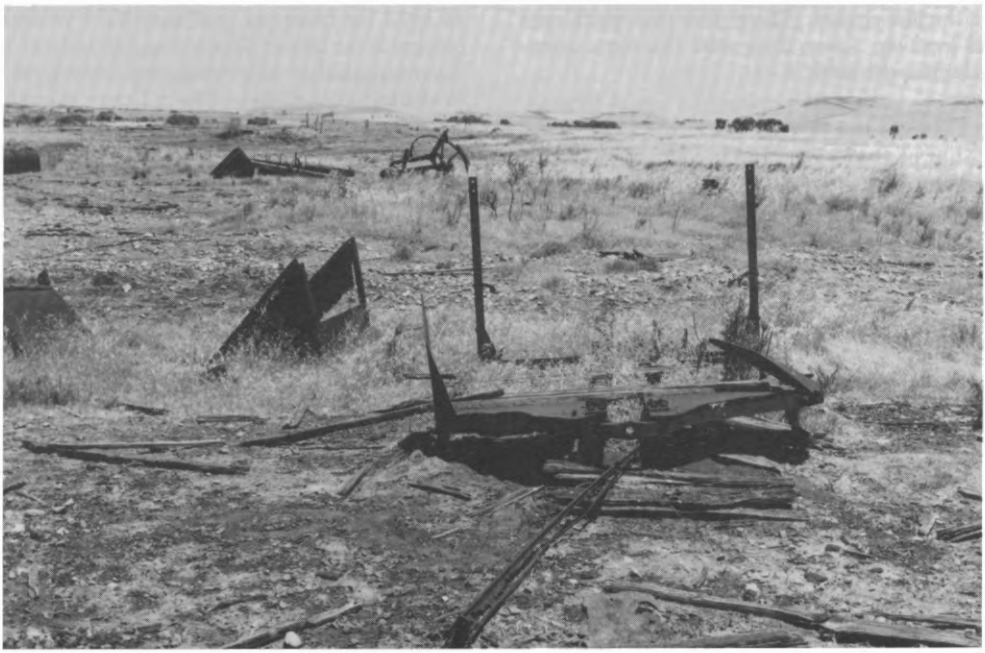
The cartage to Port Wakefield became a nuisance as time went on especially since the port facilities were allowed to run down. Some relief was gained following the opening of the state railway to Bumbunga, six kms from the site. Later, strenuous representations to the state government by salt and local interests resulted in a branch railway being opened from Bumbunga to Lochiel in November 1926.

In 1923 the company had installed a washer and crusher at the lake and following the successful railway negotiation moved the refinery from Port Wakefield to Lochiel. The refinery was erected right alongside the lake, one kilometre north of the Lochiel township. The head office remained at Port Wakefield, latterly in the railway station building, before being moved to Adelaide in 1938.

In 1926, at Innes' initiative, the first of several motor trucks for harvest work was acquired and mechanical scraping and elevating introduced. Innes devised a salt scraper and elevator feeding to bins or dobbins mounted on truck chassis. In 1927 Innes told Jack Cunningham his methods enabled a dobbin to be filled, run to the stack, tip the load and return over 1.6 kms in six minutes. Using six trucks, Innes could handle one tonne of salt per minute and harvest 2000 tonnes per week with 8 to 10 men. Under these conditions the harvest tramway became redundant overnight.

When Cheetham took over it immediately undertook a review of all aspects of salt gathering and processing as Jack Cunningham was not impressed with the refining side of the operation. At that time the lake surface was harvested by Fordson tractor

Remains of Castle Co conveyor at northern end of Lake Bumbunga, January 1992.
Photo: N. Houghton



Remains of monorail truck and conventional hopper truck tops at Castle Co site, Lake Bumbunga, January 1992. *Photo: N. Houghton*

scarifiers and scoops feeding large capacity (one tonne) dobbins mounted on motor trucks (an A.E.C. and a Reo). The motor trucks took the raw salt to stacks near the refinery. One, and later two, conveyor stackers running on a very wide gauge rail line were used to form the 10 metre high stacks. The raw salt was then fed into the mill from the stacks via a hand operated tramway line and the finished product despatched by broad gauge rail through the company's siding.

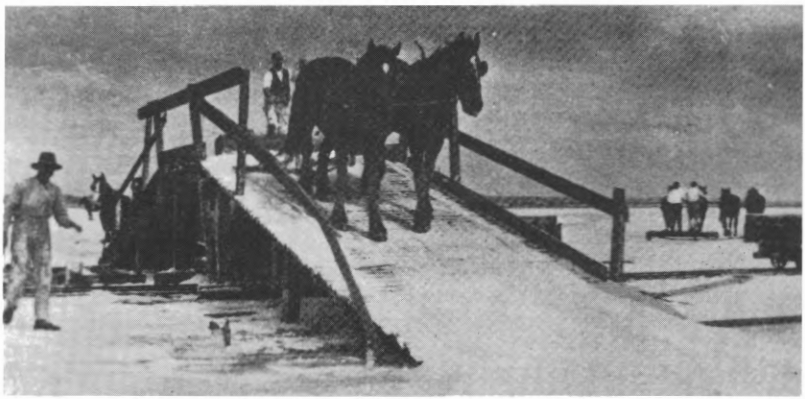
The management review looked at motor truck and tramway haulage (rail tractors pulling 1.5 tonne self tipping trucks) and concluded that motor truck harvesting was the desirable strategy. A fleet of new Ford trucks was subsequently purchased. The factory was rebuilt and some new plant installed, including construction of two new raw salt feed bins and alteration to the stack to mill tramline to feed the new bins from four directions, two north south and two east west. The stacks were formed on the west side of the factory on the high ground above the lake and the feed bins located on the western wall. The broad gauge railway siding was laid on the eastern side.

The proximity of the state railway connection to the salt supplies gave Lochiel an enormous advantage in handling and transport costs and Jack Cunningham sought to maximise this. The processed salt came out of the mill, went down the bagging chute, was fed into the bags, which were sewn up and then placed on a barrow (three at a time) and wheeled a few metres out the door into the waiting railway truck. Skilled operators could fill and sew 60 bags an hour. The workforce in 1930 comprised 85 permanents and 31 casuals on harvesting. At the factory site the company provided a boarding house and sleeping cubicles for some members of staff.

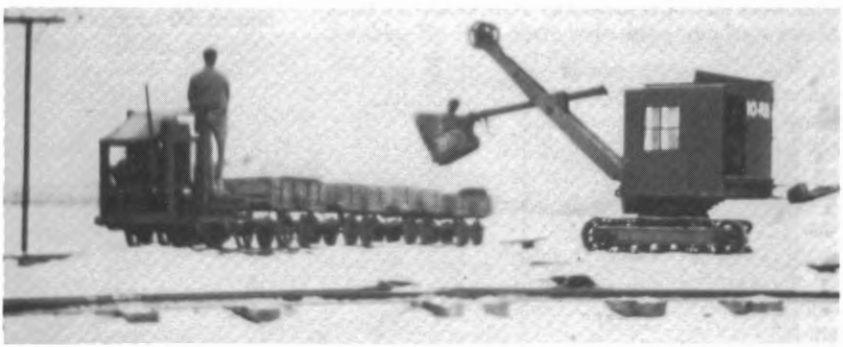
The reorganised tramway plant under the new management possessed 670 metres of tram track comprising 400 metres of 14 lb (7 kg/m) rails to the stack and 270 metres of 30 lb (15 kg/m) double track for the stacker. The usual operating method on the stack to mill tramline was for one truck to be used with a two man team. Each man had a quota of 30 tonnes of salt to be shifted per day. The stack to mill tramline was almost all portable panels that were put down to the stack face as it was cut out.

When a truck was loaded the men took turns to take it to the factory bins. The track was graded with the load so the man on the truck could ride it to the bin but had to push it back.

In 1938 a new batch of stack trucks was made at the Lochiel workshop. Total rolling stock comprised about six salt trucks and one rail carrying trolley. The stacks were enlarged to meet rising demand from time to time and the stack bases were accordingly made higher further from the mill to allow gravity running. Average annual harvests in the 1940's were in the order of 30,000 tonnes rising to 40,000 tonnes in the 1950's. Stockpiles were built up to 100,000 tonnes when conditions allowed. Harvest staff were recruited from a variety of sources. During the second world war the company



LEFT:
Salt loading ramp over tramway on Lake Bumbunga at Australian Salt Co operation, 1921.
Photo: Cheetham Salt Ltd



ABOVE:
Loco and trucks on stack to mill line, Lochiel, 1948.
Photo: Cheetham Salt Ltd

LEFT:
Bucyrus shovel loading trucks on stack to mill line, Lochiel, 1949. *Photo: Ron Darling*

used civilian internees and assigned army recruits and after 1945 university students from Adelaide were the main labour. Many of these casuals first learned to drive at Lochiel and the files contain some amusing explanations of 'accidents' on the lake, especially on night shift harvests when sky larking seemed to be in order.

The refinery then had a capacity of 70 tonnes per shift and, if demand warranted, could work double shifts to process a little under 40,000 tonnes per year. On the 1940's figures the stack to mill tramway was required to deliver 60 to 80 tonnes per shift.

The company also harvested Wallis lake, a private lake 6 kms west, when conditions were suitable. On these occasions the company engaged a contractor and supplied rails, trucks and a wire rope for hauling. The contractor used a horse or a motor truck to haul the trucks into the bank.

The stack to mill line remained manually powered until 1945 when it was found impossible to keep up with the raised output of the plant, even using two or more trucks. When two trucks were employed a 'Y' junction was installed on the tramline near the stack face to keep the trucks separated and allow orderly movements to and from the bins. One or two new factory feed bins were needed by this time as well as an extension to the main salt stack. The site supervisor initially suggested in April 1945 that a conveyor system be installed but Jack Cunningham felt that it would not be responsive enough to customer's frequently changing orders for different grades of salt. A tramway system would prove more flexible as tracks could be laid and shifted to any number of raw salt stacks and raw materials moved in differing quantities by simply varying the number of trucks in the rake. But in order for the tramway to cope it had to have loco haulage.

In May 1945 Jack Cunningham offered to loan Lochiel one loco from Laverton (where there were three) for use as a pattern, with the idea that the Lochiel workshop could make its own loco. The Laverton loco, described in a memo as the most powerful one at that location, was thought to be of greater capacity than required for the grades and load at Lochiel and therefore not suitable in the long term. This notion prompted the local engineer

Rusting piles of light gauge rails from the Castle Co. site, Lake Bumbunga. The conveyor went out into the lake to the left and the remains of four vertical supports can be seen in the top corner. January 1992. *Photo: N. Houghton*

to enquire about the light loco at Port Augusta, then lying idle, with the view to using it. This loco was not complete but could be rebuilt if all its parts could be found.

Enquiries to Price and Port Augusta in June 1945 elicited the response that a set of front wheels was at Price. Most of the loco was at Port Augusta and these parts were sent to Lochiel in August. The Lochiel engineer planned to install a Dodge motor (ex the Works car) in the Port Augusta loco. Lochiel had no experience in loco tractors and intended to use the Laverton loco 'to get an idea of how to fix up the Port Augusta chassis including the fitting of our own engine.' The front wheels were reconditioned at Price and all the pieces of the Purcell loco reassembled throughout September/October 1945.

In the meantime the Laverton loco was readied for despatch to Lochiel. A permit was required from the Department of War Organisation of Industry before the loco could be sent and this was issued on 11 June 1945. Another few weeks were required to organise a rail truck and finally in July the loco left Laverton and arrived at Lochiel in the second week of July.

The salt works was so busy throughout the second half of 1945 that the workshop staff did not have time to fabricate a new loco and the re-assembled Purcell was found to be oversize for the factory loading gauge (it could not pass through the shed over the unloading bins) so in December A.S.C. Adelaide asked Jack Cunningham if Lochiel could buy the ex-Laverton loco. The proposition was put to the Cheetham Co. and agreed to.

The Purcell sat idle at Lochiel until July 1946 when Jack Cunningham minuted A.S.C. Adelaide to send it to Geelong as it was required for remedial works on the coffer dam at Moolap following a bout of high tides and stormy weather. The loco (still not fitted with an engine) was put on rail on 14/8/1946 and arrived in Geelong a few days later.

When the ex-Laverton loco entered service it hauled a rake of four trucks and to speed up the loading, a Ruston 'Bucyrus' power shovel was acquired in 1947. This did away with the need for shovelmen.

The loco worked satisfactorily until January 1949 when its oil pump gave out. The loco motor was a 1923 Chevrolet so a replacement part was impossible to secure. With the loco out of action, the site supervisor asked the labourers to push the trucks on the stack to mill line but the men initially refused. They quickly agreed when the site supervisor offered to secure a horse as the labourers were concerned about getting their 'brains kicked out' and decided they would rather push the trucks after all. The return to labour intensive methods in a time of labour shortages was not economic sense and something had to be done to solve the problem. By this period the Lochiel workforce was 25 production staff and 10 harvest casuals.

The harvest for 1949 was a good one and the field was worked to full capacity. Additional motor trucks were acquired to serve the harvesting machine to its maximum i.e. 14 trucks with 5 spares. It was not long before it was suggested that one of the spare harvest trucks could be used on stack to mill. This was agreed to and the decision made to abandon rail haulage. The factory feed bin area was altered to allow for motor truck tipping and by 1950 at the latest the tramway was abandoned.

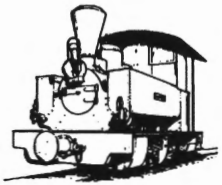
The files make no mention of the disposal of the stack to mill tramway, loco and rolling stock but local advice to the writer is that the items were eventually sold as scrap. The heavier rails under the mobile stackers were retained and from time to time the stacks were extended, requiring more rails for this. By 1955, there were three very large stacks served by two stacker lines.

The already efficient harvest methods were further improved in 1957 when the salt bins on the motor trucks were increased from 1 tonne to 1.5 tonne capacity thereby reducing the truck fleet from 21 to 13 and a new scraper feeder capable of serving all 13 trucks was introduced. Truck tipping times were lowered to as little as 35 seconds per pass. The economics of this type of harvesting could not be ignored at the company's other sites where similar floor conditions could be created, and in 1972 the Lochiel harvesting method was introduced to Price. This effectively ended the tramway system at that location.

The Lochiel site continues to be worked by the Cheetham company but with a very small workforce and with harvesting now carried out on contract. The branch railway has gone and all production is now road trucked to customers. The only rails on site today are in the mobile stacker track closest to the factory.

ACKNOWLEDGEMENTS:

The assistance at Lochiel of Ron Darling, Site Supervisor and Beryl Nicholls is gratefully acknowledged.



LETTERS

TULLOCH DIESEL LOCO

Dear Sir,

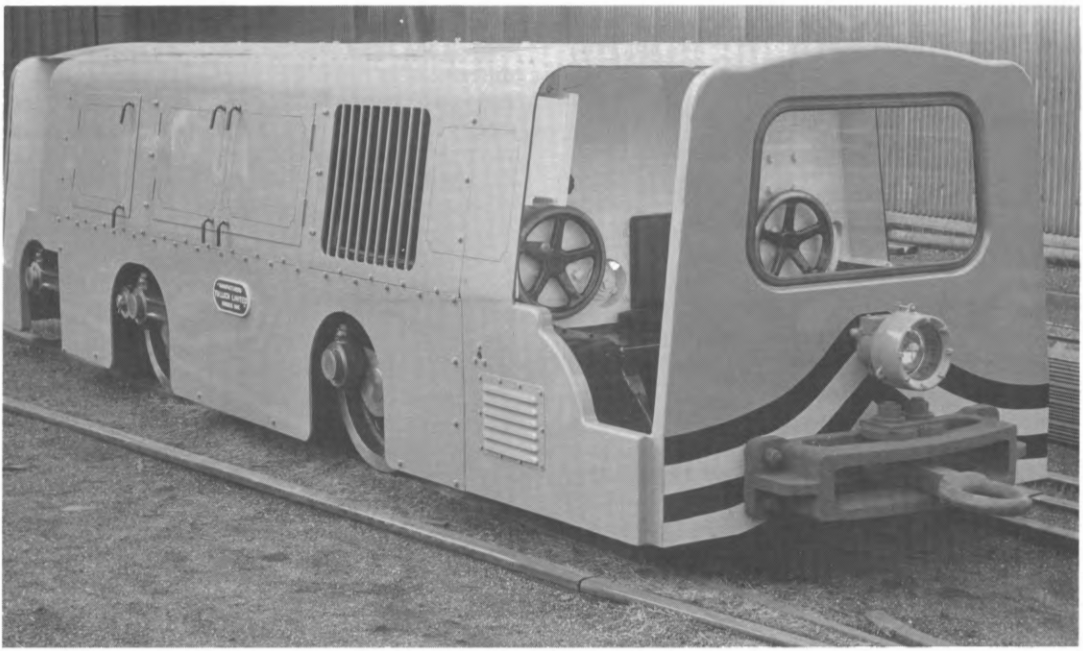
I refer to John Browning's letter in LR 116 regarding the Tulloch diesel loco at Lake Margaret.

This loco together with the one later constructed by E.M. Baldwin were made to drawings supplied by the late Arthur Esgate who, prior to coming to Australia to take up an engineering position with Tullochs, was a director of United Loco etc in Johannesburg. Their locos were largely a copy of a Ruston & Hornsby design.

The Tulloch construction No 002 was given by Esgate because he was not aware of the two 'lame duck' steam locomotives constructed by Tullochs many years earlier. I am uncertain of the reason for it's being regarded as the second of their modern production chronology because the first loco produced was an 0-4-0 diesel shuinter for their own works as a demonstrator and was in service by July 1958. The second loco to appear was an 0-4-0 underground mining type for Coalcliff Colliery and this followed a month later. The Mt Lyell loco did not appear until early in 1959 and, incidentally, was supposed to be one of an order for two. The mining loco was rejected by Coalcliff and languished in Tulloch's works until late 1961 when it was purchased by Esgate who had departed from Tullochs in 1960 and started his own Company, Transport and Industrial Index Pty Ltd who were brokers for all sorts of machinery. I was sales director of that Company in 1961 and 1962.

In 1961 Millaquin Sugar Co was in need of a 3 ft 6 in gauge loco to shunt the mill yard and enquired with Index for supply. Tulloch 001 was considered

The Tulloch 0-4-0 diesel shunter. *Photo: B. McDonald*



The Tulloch 0-4-0 underground mining loco for Coalcliff Colliery. *Photo: B. McDonald*

suitable after re-engining and adaptation of the body for 'open air' work. I had a longtime friendship with Mr Ernest Baldwin through the steam preservation hobby and I was aware that their powers of innovation and resourcefulness would not allow the new experience of rebuilding a locomotive to be a problem. This was done and it went to Millaquin.

However in 1962 we had an enquiry from South Johnstone Mill for a second hand 2 ft gauge loco suitable for the track maintenance gang. An Australia wide search failed to turn up anything and as Estgate was not anxious to repeat an earlier disastrous epic of importing second hand Rustons from South Africa for Gin Gin mill we decided to re-establish the 'Bulldog' line using the firm of E.M. Baldwin as builders. The South Johnstone loco was the only one built through Index. Shortly after I left Index and independently followed a similar business and channelled locomotive work directly to Baldwins, later joining the company itself until the end of 1967. My main thrust was the development and acceptance of the concept of bogie locomotives on 2 ft gauge. Cheers for now.

Bruce Macdonald
Chapman ACT 2611

KITSON TRAM ENGINE LR 116

Dear Sir,

Having studied the recently discovered list of Kitson tram locomotives at the National Tramway Museum. Crich, I was particularly interested in Ron Grant's article and a few additional comments may be of interest, Judging from the practise of other locomotive builders, this list is the Locomotive Register, giving a precis of the details contained in the order and the files relevant to each locomotive.

It is clear that the Glenelg & South Coast and NSWGR Rowan cars were not similar, as has previously been stated. The former (T.5), with its vertical boiler, horizontal cylinders and Danish car body would have differed considerably from T.6 with its horizontal boiler, vertical cylinders and English car body. T.6 had a shorter power bogie; wheel base 4′0″ and wheel diameter 2′4″ (the respective figures for T.5 being 4′6″ and 2′3″). Although both were built in 1879, no clue is given as to their whereabouts of T.6 in the 3 years before it was sent to NSW. In "Tramway Review" 126 (Summer 1986) Ron Grant wondered if it was used in Scotland or South America, countries where Kitson-built Rowan cars were used according to the late Dr. Whitcombe in his pioneer work in this field "History of the Steam Train" (1937).

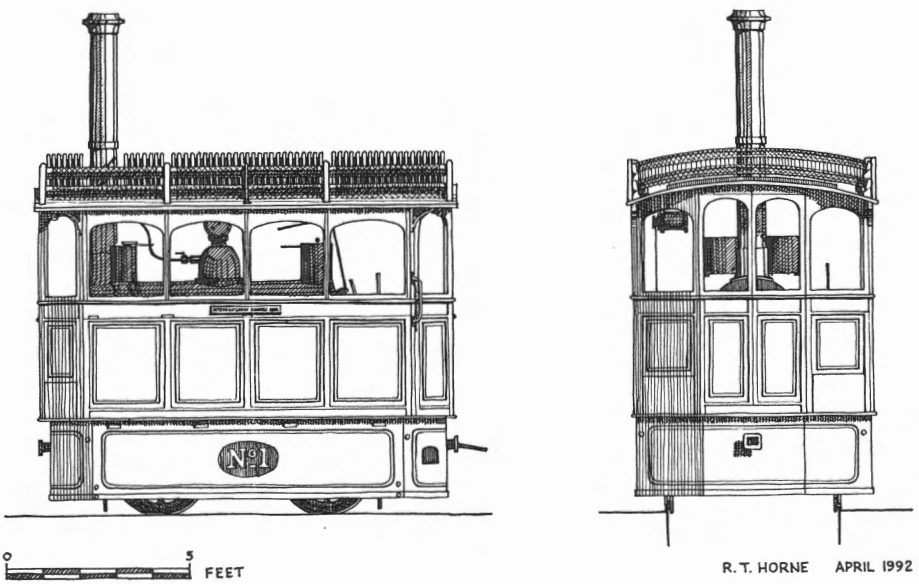
The builder of the car body of the Victorian Rlys. Rowan car (Kitson T.69 of 1883) has not been established, but Scandia works photo No 130 shows a car identical in every detail but one to the VR car. The difference is that in the saloon section a single large window replaces two windows with a dividing panel on the VR one. None-the-less, it must be almost certain that the VR car was built by Scandia and that quite possibly this photograph is of the VR car, it being subsequently altered. Incidentally, the register shows T.53-55 as a blank, but with the cryptic note "mixed up with Calcutta engines 92-5", the note against T.92-95 shows 'parts from 53-55'. Of more interest to LR readers, though, are the notes concerning T.52.

Ron Grant has not shown that the note reading 'Tried Headingley line with 2 cars' concluded with the words 'April 7/82' which confirms his suggestions that the locomotive was built in 1882 and so may well have spent its first 8 months as Kitson's work shunter.

Hartley Vale Shale Railways LR 64, 71, 78,107 & 115

I agree with John Browning's conclusions that the locomotivies illustrated in LR 78 and 102 are, if not the same, certainly from the same builder but not from John Fowler. The probability of there having been two virtually identical locos at Hartley Vale must be less than that of their having been one such loco. If the latter was the case, I believe the minor differences in detail are compatible with modifications made during repairs. The photo in LR 78 was clearly taken earlier: the cab side sheet is not rusted through at the base and the chimney has not yet acquired a backwards lean. There is some light pipework on the right hand side of that saddletank, together with 5 large rivets, not present in the photo in LR 102. Curiously, in the earlier view the loco is running as a 2-2-2 ST (i.e. the coupling rod has been removed). This led John to believe the drive was to the rear axle, but it was not. The rear 'driving' wheel is visible behind the cab-footstep. In the later view the coupling rod has been reinstated, but the saddletank is marginally shallower and has acquired a seam and line of some 30 rivets about 4 ins from its base. From the rust displayed elsewhere, I would suggest that the bottom edges of the saddletank had rusted through and new sections had been rivetted onto each side, to a slightly shallower dimension than the original. On the question of gauge, raised in LR 78, the Dubs & Co (not Dubbs) records are quite equivocal in showing one meter as the gauge of their 1442 of 1881, the 2040OT built for Hartley Vale.

Richard Horne,
Croydon, Surrey, U.K.



PARRAMATTA TRAMWAY (C.E. JEANNERET)
LOCO No1, BUILT 1882 BY KITSON & CO., LEEDS

UNIDENTIFIED PHOTOGRAPH

Dear Sir,

I am hoping you or one of your readers will be able to identify the picture - no clue or provenance.

Jim Smith.
Wentworth Falls, NSW.

TYPOS?

Dear Sir,

The 'proper name gremlin' appears to have gained access to the text files used in the Letters columns on p. 26 and 28 in LR 116.

On p. 26. 'Ted Lister' should read 'Ted Lidster','R.Y. Pikering' should read 'R.Y. Pickering' 'Wilshaw' should read 'Wishaw'. On p. 28. my knowledge of the Trojan Wars tells me that S.S. Melenaus' should very probably read 'S.S. Menelaus'

John Browning
Mackay, Qld

NEW BROOM

Dear Sir,

Congratulations to Bob McKillop for his time at the wicket. LR is a superb publication and 116 was most enjoyable. The Kirchubel story was extremely well done and 'well done' Peter Evans. The bridge drawings are very useful and it would be nice to see them available through LRRSA Sales at 1/48 scale for use on model tramways. I hope this might be possible.

Perhaps the successor may be able to publish a glossary of terms used in the timber tramways as some of them seem unique to me. A dug out and its purpose, a description of a make-up (a bridge?) are examples. Is a slip track a runaway siding?

In the parallel LRN 87, a sketch of a tree trunk grooved for a bull wheel is shown. Might this be a wheel at the end of a cable run? Thank you for your assistance and for putting the effort into this superb research.

Greg Morris
Bullaburra, NSW

IDENTIFICATION REQUIRED

Dear Sir,

Identification required. LR 95,99, 102, 104, 110. The exact number of 2' gauge locomotives usesd in construction of the Captain Cook Graving Dock is at this stage unknown. Twelve have been identified to date (LRRSA., NSW Division RESEARCH BULLETIN, No 8 February 1992). The locomotive 'Flora' (Wilson 1988, LR No 102) was later photographed at The Rock railway yard, as shown in the enclosed photo.

Could this locomotive be one of those removed from Upton's at Corowa (LRN No 61, p 11; and No 63, p 7)?

Jim Longworth
Cheltenham, NSW

J.L. BUCKLAND MANUSCRIPTS

Dear Sir,

I am currently working on the J.L. Buckland manuscripts at the Australian National Library. The manuscripts were boxed for transfer to Canberra without order and comprise in all some 65 boxes; 28 of manuscripts and 37 of photographs.

Two others from the ARHS (ACT Division) and I have spent some 18 months sorting the NSW and Victorian photos only so far.

I have now started to index the manuscripts by State or System - then District or Region:-

- Locomotives - by builder/type or class
- Rolling stock by goods/pass or per.way, misc.
- Civil works e.g. stations/bridges/viaducts
- maps and diagrams/safeworking etc.

Information from the Buckland collection is available but copyright applies and due acknowledgement to the Australian National Library must be recorded on any material referenced.

Frank Mitchell
9 Whitty Street,Talbingo, NSW 2720
Ph 069 495356 or 062 474375

Above: West Ryde Purcell loco at the wooden trestling at the southern end of the shunting line. The group of VIP's is possibly present for the opening of the second pumping station in 1921.
Photo: N. Thorpe Collection

Below: A view inside the second loco shed at the West Ryde pumping station.
Photo: Sydney Water Board