# LIGHT RAILWAYS

# Number 77 June 1982

ISSN 0 727 8101



# Published by The Light Railway Research Society of Australia

Registered by Australian Post - publication No. VBQ1339



Light Railway Research Society of Australia

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

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**Subscriptions:** \$A14.50 per year covering 4 issues *Light Railways*, 6 issues *Light Railway News* and information on Society activities, publications etc. Overseas add \$A2.50 for surface mail and \$A10 for airmail.

Back numbers *Light Railways* and other publications from LRRSA Sales, P.O. Box 32, Mornington, Vic. 3931.

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# No77 Vol. XX JULY 1982

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## Editorial

Sugar has long been the dominant industry in the Fiji Islands and the light railway systems which service the central mills have played a key role in the development of the industry and in maintaining its viability. Early ventures in commercial sugar production in Fiji included many short lived enterprises so it is difficult to pinpoint a precise date which marked the establishment of the country's sugar industry. There is little doubt, however, that the opening of Nausori mill on 18 August 1882 - an event which saw the inaugurations of the first large central mill in Fiji and the commencement of the Australian based Colonial Sugar Refining Company's (CSR) operations in the colony - was one of the most significant events in the history of Fiji's sugar industry. The year 1882 also saw the opening of the Melbourne financed Mago Island Company's tramway system. It is appropriate, therefore, that we should commemorate the Centenary of these events with a special issue of Light Railways devoted to the sugar tramways of Fiii.

This special 32-page issue of *Light Railways* also introduces a new innovation in the Society's publishing programme for the same material will form the basis of a commemorative booklet for sale in Fiji, Australia and New Zealand. With contributions from Peter Dyer in New Zealand and Daryl Tarte in Fiji, together with assistance from CSR in providing access to their archives this production represents a cooperative effort between three countries.

Cover. Clyde 0-6-0DH locomotive No. 1 (B/N 62-270) arrives at Labasa mill in July, 1981 and passes Baldwin 4wDH No. 6 shunting empties. R.F. McKillop

# FOREWORD — FIJI'S SUGAR INDUSTRY

by Daryl V. Tarte, Executive Vice-Chairman, Fiji Sugar Industry

#### Introduction

Sugar cane is thought to be indigenous to the islands of the South Pacific. Fijians traditionally grew cane for chewing and they are known to have used the juice for sweetening food.

The first sugar produced in Fiji was made on the island of Wakaya by Mr David Whippy in 1870. Two years later Brewer and Joske erected a small experimental sugar mill in Suva, followed by a larger mill a year later. This mill was served by about 640 acres of cane which was grown on the site now largely occupied by the City of Suva.

The Colonial Sugar Refining Company (CSR), which was already well established in Australia,

began operations in Fiji in 1880, bringing with it more resources and experience than any previous entrepreneurs. CSR's first Fiji mill commenced operating in 1882 at Nausori and closed in 1959. In the following years two more mills were established by CSR; Rarawai Mill on the bank of the Ba River in 1886 and Labasa Mill on Vanua Levu in 1894. CSR's largest Fiji mill, and one of the biggest in the Southern Hemisphere, commenced crushing at Lautoka in 1903. Penang Mill, founded by the two Chalmers brother in 1881, was acquired by CSR from the Melbourne Trust Company in 1926.

The four remaining mills at Lautoka, Labasa, Rarawai and Penang, out of a total of 34 that



Vintage Fiji: the "free passenger train" heads out across the Ba River bridge on an early morning run to Lautoka in the early 1920s. Archives of Business & Labour, ANU.



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FIJI'S SUGAR TRAMWAYS



A John Fowler 0-6-0TT, probably No. 3 (B/N 7068 of 1893), heads out from Rarawai mill with a train load of bagged sugar for Lautoka in 1935. Archives of Business & Labour, ANU.

operated in Fiji at one time or another, represent the manufacturing side of the Fiji sugar industry. They are on the drier side of the two larger islands where conditions are more suited to sugar production.

Following a period of industrial unrest and an unacceptable arbitration awarded by Lord Denning on the sharing of proceeds with growers, CSR withdrew from Fiji on 31 March, 1973. The Fiji Government bought all CSR's shares in South Pacific Sugar Mills Limited, their Fiji subsidiary, and in April of the same year the Fiji Sugar Corporation Limited (FSC) came into being as a public company. FSC own and operate all four of Fiji's sugar mills and also the railway system. The present equity participation is 82% Government and 18% public.

FSC's four mills can crush over 4.2 million tonnes of cane in an average season length of about 30 weeks. The mill's aggregate crushing rate per hour in 1981 is estimated at about 960 tonnes. **Farming** 

The cane lands of Fiji lie mainly along the seaboard from the south-west to the north-west coast of Viti Levu and in the Labasa and Seaqaqa areas of Vanua Levu.

When the Indian migration to Fiji came to an end in 1916, CSR experimented with various alternatives to the old estate system, but without success. Consequently, the large estates were split into small holdings of about 4.1 to 4.8 hectares and leased out. This system proved successful from the beginning and has remained so since then.

To-day most of the sugar cane comes from small farms worked by individual growers. Over 83,000 hectares are cultivated for sugar cane on the two main islands by about 20,000 growers. Their average holdings are about 4.6 hectares each. This system of small-holder farming has played an important part in the economic and social stability of Fiji.

#### Harvesting and Field Transport of Cane

Harvesting in Fiji extends from May to December when sugar content is at a peak. Mature cane stalks standing 2 to 4 metres high are cut at ground level with a broad-bladed knife and the green leaves and immature tops of the stalk are discarded. Growers are encouraged not to burn, for green cane is more resistant to deterioration and bacterial infection. For harvesting purposes the farmers form themselves into cooperative groups called gangs. For each gang the members elect a committee and a *sidar* who is primarily responsible for the daily running of the gang. The harvesting of the cane is done either by the growers themselves or their representatives (called substitutes).

The cut cane is loaded onto rail trucks or motor lorries for transport to the mill. Cane loaded onto rail trucks is delivered to a collecting point on the permanent line via portable lines and/or tractors and trailers.

#### **Rail Transport**

The railway system is 610mm gauge (2 feet) and consists of four sections with a total operating length of 580km. Each section serves one of the four mills at Lautoka, Rarawai and Penang on Viti Levu and Labasa on Vanua Levu. The Lautoka and Rawawai systems are inter-connected, primarily for the transportation of sugar and molasses from Rarawai to Lautoka for shipment, but occasionally cane is transported from one mill to the other. There are also 51km of 'horse lines' which are permanent field tramways over which cane trucks are hauled by tractors or animal traction. There were originally 72km of these lines, but considerable lengths have fallen into disuse due to lack of maintenance.

There are some 220km (based on straight section only) of portable line in use. Again, the length in use has decreased due to losses and damaged track not being replaced and additional line not being allocated as gang numbers increased.

The system is operated by a fleet of 39 dieselhydraulic main-line locomotives, principally of 0-6-0 (C) wheel arrangement with jackshaft and coupling rod drive. Excluding three locomotives that are 40 years old, the average age of the fleet is 20 years. In addition there are 20 four-wheel shunting locomotives.

The rolling stock mostly consists of four-wheeled cane trucks, the total fleet being 7,888 units of various types and ages. They are designed for side loading and tipping, and are approximately 2m long with hook and ring couplers. The trucks are fitted with either roller or plain bearings, the latter being gradually replaced. At present 72% have roller bearings.

Until recent years the major part of the railway was laid with rail of 17kg/m on pressed steel sleepers, bolted and clipped, on earth ballast, with minor branches, yards, and sidings utilising rail of 12kg/m. Latterly, a ballasting programme has been started using stone, with the steel sleepers replaced by pre-stressed concrete sleepers manufactured locally, and heavier rail of 20kg/m has been used. Following an advantageous purchase of secondhand 30kg/m rail from Australia, the line working out from Lautoka mill has been relaid with this heavier rail. It should be pointed out that 12kg rail is adequate for the current axle loads of up to 6 tonnes, but due to the conditions the steel is subjected to by the climate, combined with the proximity of the sea, the 20kg would seem to be a logical choice. The use of the second-hand 30kg rail can only be justified on a prime cost basis, and it is not known whether further supplies are available.

The operations are supervised at each mill by a Traffic Officer and with the exception of Penang, the train movements are controlled by radio. Although three shifts are operated, the rail transported cane is mainly used to supply the mills during the night and during daytime it is combined with lorries to maintain an even supply. A uniform supply by rail would permit a greater utilisation to be made of the railway.

The allocation of empty trucks is done daily at meetings between the Field Managers and Traffic Officers. The policy is for empty trucks to be dispatched during the night and early morning to reach the sectors in time for the start of cane cutting, however this is not always achieved, and delays occur. The locomotives are then used to pick up full trucks on their return to the mill. There are large differences in the cost/tonne between the mills due to the variation in utilisation of locomotives and trucks.

#### LRRSA Sales <u>STEEL AND RAILS IN NEWCASTLE</u> by Kieth McDonad. The story of the development of the BHP steelworks complex at Newcastle and the associated railway system. 130 pages of photos and text including colour photographs and 139 rolling stock drawings and maps. <u>Price</u>: \$14.50 including postage from LRRSA Sales, P.O. Box 32, Mornington, Vic. 3931.

# THE FIRST SUGAR TRAMWAYS by Bob McKillop

Interest in growing sugar in Fiji was stimulated by the collapse of cotton prices in the 1870's, thus forcing planters to seek alternative crops. Sugar was first produced on the island of Wakaya in 1870' and by 1873 Brewer and Joske were operating a small mill at Suva. Over the next ten years a number of sugar mills were erected throughout Fiji and some of these constructed tramways to transport cane to the mill.

The first record of a sugar tramway in Fiji was that of the Rewa Company at Ului Calia which began crushing in July 1875<sup>2</sup>. In 1877 the *Fiji Times* reported that cane was brought to the mill from plantations on large punts "from whence it was transferred by means of trucks drawn by horses and running over a tramway to the rollers"<sup>3</sup>. The length of the tramway was 120 yards and 12 tons of sugar were produced per week. A similar tramway was in use at Chippendale and Thompson's mill at Savu Savu on Vanua Levu in April 1878<sup>4</sup>.

The first sugar tramway system was that built on Mago Island on the Lau group by the Melbourne based Mago Island Company Ltd. The 1<sup>1</sup>/2 mile section of 20 in gauge tramline from the wharf to the mill site was opened in 1882. Sugar making equipment was ordered from W. & A. McOnie of Glasgow and was shipped to Mago on the company's smart little paddle steamer **Maafu**<sup>s</sup>. The machinery and other supplies were moved to the construction site over the tramway on horse-drawn



Fiji's first substantial cane tramway was opened on Mago Island in 1882. This scene shows Melanesian labourers working on the construction of the 20in. gauge tramway. Fiji Museum



A truckload of cane on the Mago Island tramway, circa 1885.

vehicles. There were apparently difficulties in landing the machinery on Mago Island and in September 1883 the *Fiji Times* reported a serious accident in which one of the triple effect vessels was dashed to pieces on rocks<sup>6</sup>. The mill was not finally opened until May 1884. The mill had three rollers driven by a horizontal engine with 18in x 42in cylinders and could produce one ton of sugar per hour'.

The Mago Island enterprise was a substantial one employing 70 Europeans and 1000 labourers. The tramway system eventually totalled 7 miles in length. In July 1885 the *Fiji Times* reported that the tramway was in "splendid order" and 9 horses were getting 90-120 tons of cane to the rollers each day<sup>\*</sup>. However, this confidence was short-lived and in 1886 it was reported that the company was to be wound up<sup>\*</sup>. The island was taken over by Fraser and Company as mortgagees and eventually most of the equipment was shipped to Raki Raki and used to upgrade the Penang mill.

It appears that the first steam locomotive in Fiji was operated by the Debua Estate near the Navua River. In August 1883 a wharf was under construction for the Estate and a  $1^{1/2}$  mile tramway had

been laid to the mill site which was being operated by a "small locomotive"<sup>10</sup>. This locomotive was an 0-4-0T built by the French firm of Decauville (No. 38 of 1883). This locomotive, together with two similar locos from the Fiji Sugar Company's tramway at Navua which also dates from 1883<sup>11</sup>, eventually joined the roster of the Vancouver-Fiji Sugar Company. In 1923 Decauville locomotive No. 38 went to Queensland and eventually ended up at the Gin Gin mill where it was named **Rocket**. **References** 

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- 2. Fiji Times 17 July, 1875
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### SUGAR ON THE REWA

#### by Peter Dyer, Co-Author of Balloon Stacks and Sugar Cane

1982 is the hundredth anniversary of the opening of the CSR Co's sugar mill at Nausori and the following article gives a brief history of 'Sugar on the Rewa' together with some of the highlights of the tramway story connected with the various sugar mills on this river.

#### Introduction

The Rewa river rises in the highlands of northern Viti Levu, the main island of the Fiji group. It runs generally in a south easterly direction for 160km to enter the sea at the south eastern corner of the island, about 10km east of the capital, Suva. At about 60km from the coast the river becomes navigable for larger vessels and the valley starts to open out with river-flats giving areas suitable for cultivation. The last 15km of the Rewa feature substantial river-flats which are very fertile and, being on the windward side of the island, there is a regular supply of rain to promote luxurious plant growth.

In the 1860's European settlers were attracted to the Rewa river valley, by the excellent growing conditions. At this time cotton was the crop offering the best return and was grown in many parts of Fiji including 'on the Rewa'. The planters who had their

estates mortgaged to provide finance to develop their properties, suffered when the cotton market collapsed in 1870.

The planters, therefore, were forced to seek other crops. Maize, bananas, cattle, boat building and sugar were all tried by various planters, but it was sugar which was thought to offer the best commercial prospects.

By 1873 quite a large number of planters had plots of sugar cane, from 8 to 80 acres, under cultivation and it was at this time that proposals were put forward to build tramways, particularly from the Rewa to Suva. This was felt necessary because of the increase in output from the land of a few hundredweight per acre for cotton to between twenty and forty tons per acre in the case of sugar. and the only sugar mill at that time was in Suva. The First Sugar Mills

The tramway from the Rewa to Suva did not eventuate, but many of the planters did lay down short lines from the cane-growing areas of their estate to the banks of the Rewa where the produce could be loaded into boats for transport along the river. Very little information exists about these lines apart from passing comments in the newspaper and



A view of Nausori mill soon after opening in 1882.

Archives of Business & Labour, ANU.

books of the time. To meet the demand tor sugar milling on the Rewa, the firm of Messrs JC Smith & Company purchased a small sugar mill capable of producing 1<sup>1</sup>/2 tons of sugar per day. This was erected on Mr. Waterston's estate at Koroqaqa (see Map 1). The mill started crushing on 27 July 1874 producing about 4 tons per week and was called *Pioneer Mill.* 

A Melbourne company under the name of Rewa Plantation Co. Ltd. obtained a sugar mill from New South Wales and shipped it to Fiji to be erected on the Rewa at Ului Calia. This mill was urgently required as the little *Pioneer Mill* could not handle all the cane that was offering. The only alternative was to punt the cane to the mill at Suva. The Melbourne company's mill commenced crushing in July 1875 and its output was between 2 and 3 tons of sugar per day. In 1876 the mill made 362 tons of sugar from cane purchased from seventeen planters on the Rewa. Many of these estates had tramlines from the cane fields to the river's bank (see Map 1). Large punts capable of carrying 20-30 tons were provided by the Company to carry cane to the mill where "it is transferred by means of trucks, drawn by horses, and running over a tramway from the water's edge to the rollers, a distance of about 120 yards. The trucks pass over a large 5 ton weighbridge where quantities are accurately ascertained".

In 1876 a dispute arose between JC Smith & Co. and Mr. Waterston which ended in the mill being sold to a Mr. Leicester Smith. Mr. Smith re-erected the mill on the Tole Plantation about <sup>1</sup>/2 mile up stream and on the opposite bank from its previous location, and it was in full production again by mid-November 1876. Mr. Waterston became unhappy with crushing arrangements available on the Rewa and so in 1878 he purchased a sugar mill for himself from New South Wales. This mill was capable of producing 4 tons of sugar per day and started production early in 1879.

In the next few years the great expansion of the sugar industry throughout Fiji occurred, with four large mills being built on the Rewa alone. The small, rather crude sugar mills built up to this time gave way to larger much more efficient installations which in most cases were custom built. For this size of operation it became more important to have an efficient transport system, and the provision of tramways became more important even though river transport was still used as the main feeder.

The first of the bigger mills was erected by Stanlake Lee & Co. at Na Dali, a 500 acre block of land granted to them by the Government on the Lower Rewa. This Company was formed in Bristol in 1880 and a new sugar plant was promptly ordered in Glasgow. The plant arrived in Fiji by the end of that year. The mill was completed and crushing started in October 1881. The capacity of the mill was 10 tons of sugar per day.

#### Nausori Mill

While this mill was being built, a short way up stream at Nausori the Colonial Sugar Refining Company of Sydney were preparing the ground for their big mill on part of a grant of 1000 acres. In 1880 the local authorities and firms, including Messrs JC Smith and CL Sahl who both had large plantations on the upper Rewa, had enticed the CSR Co. to come to Fiji and build a central sugar mill on the Rewa to be operative for the 1882 crushing season. The machinery for the mill arrived in three ships between June and August 1881. Excavations for the foundations involved the removal of 3000 cubic yards of soil. 4000 tons of gravel and sand were obtained from the river for use in concrete. Imported equipment included 1,200 casks of cement, 2,500 tons of machinery and 2000 tons of timber. Built on the premises were eight iron lighters with a capacity of 180 tons each, thirty iron cane punts of 60 tons capacity and one of the five steamers used by the company on the river. By 17 July 1882 the erection had reached a stage where a trial run of the machinery was undertaken, crushing 60 tons of cane in 4 hours. The big horizontal steam engines were named Emma (No. 1), and Mary.

On Friday, 18 August 1882, the mill was formally opened, even though it had been in operation for some time. A large gathering of invited guests were shown over the works, followed by a breakfast laid out in the sugar store, at which the General Manager in Fiji, Mr Murray, presided over the festivities. Mr Kidd, the constructing engineer, was unfortunately absent from the proceedings, but his work spoke loudly for him.

#### Other Mills

The Nausori mill was capable of producing 20 tons of sugar per day and the introduction of a mill of this size on the Rewa soon caused problems with the other established mills. The five sugar mills on the Rewa in early 1882 were reduced to three by the end of the year and one of these (Stanlake Lee) was out of action. The little *Pioneer Mill* was sold a couple of years later and moved out of the district.

In 1884 the Rewa Plantation Co. Ltd. was reconstituted and they built a new, more modern and larger mill, at Koronivia, closing down the old mill, but still growing cane on Ului Calia. The new mill was capable of making 10 tons of sugar per day and the intention was "to introduce locomotives on



land for the purpose of taking cane to the mill by tramway. The total of about 3000 acres of land has been leased from the Government". This mill had many difficulties including competitions with the CSR at Nausori and low world prices for sugar. They put down over 2<sup>1</sup>/4 miles of 24 inch gauge permanent tramway with about<sup>1</sup>/2 mile of portable track through their estate to the mill. Between 30 and 40 cane wagons were used, but, the introduction of locomotives did not eventuate and the mill and estate was finally sold in 1897. The estate continued to grow for crushing at Nausori for many years after that.

The only other sugar mill on the Rewa was at Viria on the upper part of the river which was operated by the CSR Co. for a number of years. This is covered in more detail below.

#### CSR Co. Tramways

In April 1882 the first shipment of the railway equipment arrived for CSR Co. at Nausori and this consisted of 5,932 rails, 14,351 sleepers and 61 wagons. This totalled about 8 miles of track and was partly laid down at Bau Levu to service the plantations of JC Smith & Co. and CL Sahl & Co.,

and partly at Nausori running in a direction towards Verata. The laying down of these two sections of track sparked off again the possibility of constructing a tramway along the left bank of the river connecting the plantations. Later the same year it was recorded that preliminary surveys were being made for a railway to connect Nausori with Viria and, still further on, up to Wainimala. This, however, did not eventuate probably because of cost and the fact that the punt service to Bau Levu had already been established.

These tramways were laid to the CSR Co.'s standard gauge of 2 feet and 241bs per yard rails and were horse worked. At Bau Levu the track terminated in a large iron shoot on the river bank where the cane was loaded into the punts for towing to the mill. To unload the punts at the mill sets of floating cane carriers, which extended about 70 feet into the river, were used to carry the cane to the machinery.

In 1884 the capacity of Nausori mill was doubled to 20 tons per day, and to feed sufficient cane to the mill a steam locomotive was introduced at Bau Levu. This area was providing the mill with the bulk of its cane requirements and yields of up to 60 tons



The versitality of the common cane wagon is well illustrated in this scene with a load of wooden sleepers being returned to Nausori mill. Bullocks were, and still are, the common form of motive power on portable tracks in the cane fields. P.V. Hodge



An aerial view of Nausori Mill in 1947. In the foreground between the road and river is the inward yard. Between this yard and the mill proper is the engine shed and workshop. To the left of the road is the empties yard and general storage area. In the background is Nausori township and bridge. Archives of Business & Labour, ANU.

per acre were being achieved. The locomotive named *KIDD* was started up on 23 June 1884 and was able to run the 3<sup>1</sup>/4 miles of line hauling some forty to fifty trucks, each carrying about 1 ton. *KIDD* was an 0-4-0T supplied by Decauville (No. 25), but was actually built by the Belgian firm of Couillet, whose works number was 737.

The weather was dry in 1884 and the river level dropped so that it became very difficult to get cane down from the plantations high up the stream above Bau Levu. It was decided to take down the Stanlake Lee's mill at Na Dali and re-erect it at Viria so that crops grown in the area could be crushed there. Only the finished sugar, one-tenth the volume of the cane, then needed to be transported down the river.

The Viria Mill commenced crushing in 1886 and a tramway about 2<sup>1</sup>/4 miles long was laid down using local hardwood sleepers, 8 x 3 inches and 4 feet long. A small locomotive was brought in early in November 1887 to operate on this remote section. This locomotive was John Fowler No. 5429 of July 1887 and was an 0-4-0ST. Unlike the Decauville locomotive she did not carry a name or even a mill number for many years. In 1889 leased land on the Waidina River was planted out in sugar cane and

arrangements were put in hand to connect it to the Viria Mill tramway. This involved an additional 2 miles of tramway, a tunnel and two large bridges. The tunnel was bored through a low range of hills separating the new area from the mill. The work was undertaken by Mr Harry Smith, who had had experience in tunnelling in the Ballarat gold-fields in Victoria. During the tunnelling one or two accidents took place, Mr Smith was severely hurt when a charge of dynamite exploded 'too quickly'. The contract for the two bridges which spanned creeks intersecting the canefields towards the Waidina was undertaken by Mr G Beddoes. One bridge was 45 feet high by 150 feet long, the other 35 feet by 110 feet. The work was finished towards the end of 1891 and increased the acreage of cane grown for Viria Mill from 750 to 1750. Communication between Viria and Nausori was maintained by special steamer built for the shallows on the upper river. The hull was an iron pontoon fitted with a powerful boiler, machinery and a stern wheel. She could carry 40 tons in the rainy season and in the dry season could always carry a small load if there was any water in the river.

In December 1892 there was a tremendous

storm on the Rewa. At Viria the river rose 40 feet (5 feet higher than any previous recorded). The water was 9 feet deep through the mill and the Indian labourers had to take to the roofs of their quarters. The waters at the tunnel at the back of the Estate rose to a depth of 60 feet. The Fowler locomotive was swamped and was sent away to Sydney for overhaul in the 1893 off season.

The year 1895 a further bad storm in the Fiji group brought down the following buildings at Viria - hospital, stables, coolie line (labourers quarters), another dwelling and a portion of the mill. These setbacks contributed to the decision to close down the mill. All equipment was removed from Viria during 1896; mill machinery was shipped out, presumably for scrap; railway track and rolling stock went to Nausori and many of the buildings to Labasa.

Construction of the railway feeding directly into Nausori Mill was put into hand about this time. Now having a locomotive they were able to haul cane by rail over a greater distance than had been possible, or in fact necessary. In 1898 the long line down the river, parallel to and about<sup>3</sup>/4 mile from the bank, was started firstly to Vuci-Maca and onto Nakelo in 1908. A further line about <sup>1</sup>/4 miles from the river was also laid down in 1908/9 and this was to extend over to the Waidamu River. The newer mainlines used heavier rails of 35 lbs per yard and over the years older mainlines, including the one at Bau Levu, were re-laid using the heavier rails.

For the 1897 crushing season tenders were called for the transport of sugar cane from the various plantations to Bau Levu, weighing the cane at the terminus and transferring the cane from the trucks to the punts. The Company would supply a locomotive. This action relieved the Company of some of the worries of operating this remote section and was continued for many years.

A second Fowler locomotive, identical to No. 5429, was transferred to Nausori from Rarawai Mill in about 1905. This carried works No. 6448 and was built in 1891. She was followed in 1910 by another Fowler from Rarawai, this was an 0-4-0T with works No. 5406 built in 1886.

By 1910 the total permanent track mileage was 26 miles 68 chains, with just over half 241bs per yard and the remainder 35 lbs per yard. There were also 23 miles 52 chains of portable track for laying out into the cane fields. The capacity of Nausori mill had been increased several times and reached a maximum of 105 tons of sugar per day in 1914.

The year 1912 saw the Company again obtaining



Barlcay No. 1456 heads for Bau Levu with a cane train in 1956. After passing the points, the train will back into the siding and pick up the loaded wagons. P.V. Hodge



sugar cane from the land at Viria, and to enable the crops to be got out it was proposed to extend the Bau Levu line, cross the Waidina River, and thence into the Viria plantation. Work on this extension was put in hand and the major feature was the large bridge over the Waidina. The bridge totalled a length of 258ft made up of nine spans, one of which was moveable to allow river traffic through.

The total permanent mileage when the Viria extension was completed amounted to 33 miles with 21<sup>1</sup>/2 miles of portable track. In 1926 the Waidina bridge was washed away; it was not rebuilt and the extension line upstream from the bridge was removed with the exception of about 1<sup>3</sup>/4 miles left on the Viria plantation. This isolated section was connected to a transhipment chute on the bank of the Rewa. Economically the Viria extension must have been a border line case as only 20-25 tons a day were carried over it from Viria in later years. It was decided to dredge the shallows in the river, where necessary, to allow the passage of loaded punts and their towing tugs.

Two other isolated sections of the Nausori Mill tramway were at Tausa, about <sup>1</sup>/2 mile long and Naitasiri, about <sup>2</sup>/4 miles. Both these sections have always been worked by horse-power. The latter was taken over from Mr Wm Reece who had been growing cane since 1879. After the removal of the Viria extension the total permanent mileage reduced to between 28 and 33 miles, varying from season to season.

The tramway system remained almost unaltered from this time until the mill closed down in 1959. (See Map 2). The odd siding was lengthened or shortened to suit traffic requirements. Some of the more heavily used lines were partly relaid with 401bs per yard rails starting in 1946.

#### Rolling Stock

The equipment supplied up to and about the mid 1880s was obtained from Decauville. The cane trucks were one of their standard designs, which was known as the type 'Porto-Rico'. This type had 300mm diameter wheels and the cane was loaded crossways in an iron basket having inside dimensions of 1600mm long by 1200mm wide and 950mm high. Original experience showed these trucks were too lightly constructed and Mr Kidd required later ones to be more solidly built including a much more robust buffer and drawgear. Later Decauville cane trucks were built incorporating these requirements and were known as type 'Kidd'. Wheels were 320mm diameter and the internal dimensions were 1950mm long by 1200mm wide and 1300mm high. Carrying capacity was increased from 900kg to 1500kg. This then became the standard CSR Co. cane truck and batches were built by various firms and also by the mills themselves in later years.

In 1911 there were eight different types of cane trucks in service, the best were reported to be the long and short Fowlers and Decauville. The long and short signified the original and later designs mentioned above. Many of the long Fowlers were transferred in from Lautoka in later years.

Mention was made in the mill reports for 1915-17 of 10 cane trucks for 18in gauge, but no further information was given and it is assumed they came from one of the plantations on the river.

After the closure of the Tasmanua Mill on the Navua River 36 of their cane trucks were acquired by Nausori in 1924. It is not known who manufactured these trucks, but they were very similar to the CSR Co. standard truck. The short Fowler and Decauville trucks had disappeared by this time, but 74 of the long version lasted out to the closing of the mill. The maximum number of cane trucks used by all the Nausori mill tramways was 825 in 1917 and this slowly reduced over the years to 563 when the mill closed down.

Cane trucks were very versatile and they were adapted to many other duties. The iron basket was boxed in with a door on each side for carrying coal, mill mud or ballast. The basket could be removed to enable portable track to be carried and a deck added for general cargo.

A total of six steam locomotives have worked on Nausori mill tramways as follows:

- *KIDD* 0-4-0T from Decauville worked all its life from 1884 to 1934 at Bau Levu. Later numbered 4. Scrapped.
- (2) 0-4-0ST from John Fowler. Started life at Viria Mill. Later numbered 2. Transferred to Condong, New South Wales, in 1953.
- (3) 0-4-0ST from John Fowler. Transferred from Rarawai Mill in about 1905. Later numbered 3. Transferred to Penang Mill in 1928.
- (4) 0-4-0T from John Fowler. Transferred from Rarawai Mill in 1910. Later numbered 1. Scrapped when mill closed in 1959.
- (5) 0-6-0T from John Fowler. Transferred from Labasa Mill in 1913. Later numbered 5. Scrapped when mill closed in 1959.
- (6) 0-4-OT from Andrew Barclay. Transferred from Penang Mill in 1934. Originally named *ELLINGTON*. Not numbered at Nausori, spent 1934 to 1959 at Bau Levu. Scrapped when mill closed.



Table 1 shows the stock of locomotives and other vehicles at various years throughout the life of the mill.

In 1914 four tenders, or more correctly water tanks, were supplied for use with the locomotives working in and out of Nausori on the fairly long round trip to Makelo. Watering points were not provided in this area even though there are many streams and creeks available.

Various vehicles for track gangs, some hand and some motor propelled, were also provided about the same time. These were of standard types which

Year	1910	1914	1915	1922	1928	1941	1956
Steam Locomotives	4	5	5	5	4	4	3
Tenders	_	4	4	4	4	4	3
Buda Cars (Hand Pumping Trolley)		2	4	4	4	4	4
Grass Scorcher	_	1	1	1	1	—	—
Pedal Quad.	—	—	—	3	2	1	_
Motor Quad.				1	1	1	
Poling Trucks				1	1	—	_

Table 1Nausori Mill - Locomotive and Misc. Stock List





Locomotive No. 5 chugs quietly along the Rewa Delta with a load of cane bound for Nausori Mill in 1957. P.V. Hodge

operated on tramways throughout the world.

At one stage it was proposed to have a Simplex rail tractor to handle the cane wagons in and around the Mill, but this did not eventuate and a farm tractor, with headstocks and couplings fitted, was used for many years.

The comparative dimensions of the steam locomotives used are shown in Table 2.

#### **Operation and Closure**

At the height of the life of Nausori Mill the tramway was operated by three locomotives in steam plus one at Bau Levu. The locomotives would take out rakes of empty cane trucks on different lines dropping off the numbers required at various cane-cutting locations as directed by the mill. On the return full trucks would be picked up and delivered back to the mill. On the return full trucks would be picked up and delivered back to the mill. Even with the fairly large tramway system connected directly with the mill, large quantities of cane still came in by the punt service from the up river estates of the Company and many private planters.

After the opening of the other CSR Co. sugar mills in Fiji, all on the dry sides of the islands where there were distinct advantages for sugar cane growing, the Nausori mill became rather a back water. As far as equipment was concerned Nausori received the cast-offs from the other mills. Though the General Manager for Fiji always had his office in Nausori until the mill closed, Nausori Mill only worked at half capacity for the ten years from 1949 and the cost of sugar production at Nausori was much higher than the other Fiji mills. It was obvious that economically this state of affairs could not continue and the mill finally closed down in 1959. Most farmers changed to other activities such as rice growing and dairying. The tramways and all the machinery were removed, mostly for scrap.

**FIJI'S SUGAR TRAMWAYS** 

Name or No.	1	2	3	4 <i>KIDD</i>	6	_
Builder	Fowler	Fowler	Fowler	Decauville	Fowler	Andrew
						Barclay
No. and Date	5406/86	5429/87	6448/91	25/83	7023/93	1456/16
To Nausori	1910	1887	1905	1883	1913	1934
Туре	0-4-0T	0-4-OSt	0-4-0ST	0-4-0T	0-6-0T	0-4-0T
Cylinders	8 <sup>1</sup> /4in x 12in	8 <sup>1</sup> /4in x 12in	8'/4 x 12in	210mm x	8 <sup>1</sup> /4in x 12in	8in x 12in
				300mm		
Wheels	24in	24in	24in	600mm	24in	26in
Wheelbase	5ft 0in	4ft 0in	4ft 0in	1250mm	5ft 6in	4ft 3in
Heating Surface Tubes	146sq.ft.	145sq.ft.	145sq.ft.	$12m^2$	229.2sq.ft. )	155 saft
Heating Firebox	27sq.ft.	20sq.ft.	20sq.ft.	3m <sup>2</sup>	23.8sq.ft. )	
Grate Area	5sq.ft.	4.4sq.ft.	0.5m <sup>2</sup>	4.4sq.ft.	4.6sq.ft.	
Pressure	140	140	140	9kg/	140	160
	lbs/sq.in.	lbs/sq.in.	lbs/sq.in.	cm <sup>2</sup>	lbs/sq.in.	lbs/sq.in.
Weight in Service	10T	8T	8T	7.5T	12T	11.6T
Overall Length	14ft 3in	15ft 9in	15ft 9in	4200mm	17ft 5 <sup>1</sup> /4in	16ft 8in
Overall Height	9ft 11/2in	9ft 0in	9ft 0in	2740mm	9ft 11in	8ft 1 <sup>1</sup> /2in
Overall Width	6ft 0in	6ft 6in	6ft 6in	2000mm	6ft 10in	6ft 11in
Disposal	Scrapped	To Condong	To Penang	Scrapped	Scrapped	Scrapped
	1959	1953	1928	1934	1959	1959

Table 2Nausori Mill - Dimensions of Locomotives (as built)

\* Frame later lengthened to 15ft 6in.



Nausori locomotive shed in 1956. Locomotive No. 1 stands in the foreground getting up steam while No. 5 rests in the shed. P.V. Hodge

During its lifetime the Nausori mill crushed approximately 7.6 million tons of cane. During its last years the mill was purchasing cane from about 1800 farmers from all parts of the Rewa.

Today the remnants of the mill and its tramway are few and far between. Many major developments have occurred including the extension to the Nausori Airport, which have changed the face of the countryside. The main mill building still stands, having been used for many years as a rice mill and store.

This then is briefly the story of Sugar on the Rewa but it is hoped to republish the New Zealand Railway and Locomotive Society book **Balloon** Stacks and Sugar Cane shortly in a completely revised edition which will more fully cover this story.

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Observations and records of my *Balloon Stacks* partner, Peter Hodge.

## LABASA MILL, 1894-1982 by Bob McKillop

The cane areas of Vanua Levu centred on Labasa mill have, until recent years, been the 'northern outpost' of Fiji's dynamic sugar industry - a small and unheralded enterprise isolated from the main centres of activity on Viti Levu and from the wider world. The development of Labasa mill and its associated tramway system has accordingly received scant attention from historians. This review seeks to correct this neglect with a brief introduction to the Labasa mill story based on readily available documents, but a more detailed history of the Labasa mill and its tramways awaits the attention of future historians.

#### The Early Years

For nearly eighty years the history of Labasa was dominated by the Colonial Sugar Refining (CSR) Company Ltd. The contribution by CSR to Fiji's economic development is a controversial subject in Fiji and will not be entered into here. However, the Labasa story provides an understanding of the reasons why CSR was so successful in Fiji.

The decision to establish a mill at Labasa was made in 1891, a period in Australia of general economic depression and low sugar prices. The raw sugar price had plummeted from £40 per ton in 1880 to £16 in 1886 and, although it recovered to £20 in 1889, it dropped to £16 again in 1890'. As a result of conservative financial management during the 1880's CSR had accumulated the equivalent of two years of dividends as surplus profit by 1891, so that the Company was not only in a better position than many competitors to survive the depression, but also it was able to further increase its investments in Fiji<sup>2</sup>. By vertical integration of its operations from plantation to mill to refinery and investment in research to improve milling efficiency, CSR was able to establish large and competitive mills which made it more difficult for less efficient mills to compete.

The suitability of the northern Vanua Levu coast for sugar cane production had been demonstrated by J.B. Simmons who established a plantation and sugar mill at Matsaswaluvu on the Dreketi River in 1882<sup>3</sup>. Moynagh suggests that the availability of substantial areas of freehold land, which for the most part was lying idle, was an important factor influencing CSR to establish the mill at Labasa<sup>4</sup>. Labour problems on CSR estates were also important. CSR's own history notes that serious problems at the Victoria mill in Queensland influenced the Company to decide to close the mill and rebuild it at Labasa'. Subsequently it was decided to break-up the Queensland plantations into small farms and retain the Victoria mill, so new machinery was ordered from Glasgow for the Labasa mill.

CSR purchased land on the Labasa, Qawa and Buciasau Rivers for estates and commenced construction of the mill on a site adjacent to the Qawa River. The initial work at Labasa was mainly carried out by Melanesian labourers, mostly from

the Solomon Islands, who had been recruited under the 'indenture' system. They were given the arduous task of constructing about 25 miles of sea walls served by floodgates to reclaim hundreds of acres of mangrove swamps, the tramway system and the mill itself. In 1894 an experimental group of 205 Japanese indentured labourers arrived at Labasa, but they suffered from disease and the survivors were soon repatriated. These activities in the distant north were of only minor interest to the citizens of Suva and Levuka and there are few reports of Labasa in the pages of the Fiji Times. When the arrival of CSRs chief engineer, Mr. Gibson, to oversee the erection of the mill was reported in June 1893, it was in respect to the hectic round of dinner parties and dances held in Labasa at that time that the events were recorded for posteritv<sup>6</sup>.

The Labasa mill was opened for the 1894 season and it crushed 30590 tons of cane in its first season at a rate of 17 tons per hour. However, the mill was to prove less profitable than CSR had hoped. Drainage was a major problem in the areas around Labasa and added higher costs to land preparation, while for many years the Company was unable to obtain sufficient cane to work the mill to full capacity'. In an effort to overcome there problems new cane areas were opened on the Wanikoro and Qaloyago Rivers in 1907, but these areas were a considerable distance from the mill and required heavy investment in the transport infrastructure. **Development of the Mill** 

Throughout the period of CSR ownership Labasa mill remained modest in size as the Company concentrated its investments at Lautoka and Rawarai. Additional cane areas were opened in the Labasa valley in 1927 and at Wailevu after World War II, but in 1959 the mill only had a crushing capacity of 60-65 tons per hour and handled an average of 170000 tons of cane per season.



A view of Labasa mill shortly after its opening in 1894.

Archives of Business & Labour, ANU.



General view of Labasa mill in September, 1981. The empty yard is in the foreground with one of the Drewry 0-4-0 loco's and the Simplex in view. R.F. McKillop

Following unrest by growers over cane prices which culmunated in a strike by growers in 1960, South Pacific Sugar Mills (SPSM) was formed as a wholly owned subsidiary of CSR in 1962 with responsibility for all CSR assets in Fiji<sup>\*</sup>. The formation of SPSM coincided with an improvement in the sugar market, but by 1965 sugar production in Fiji was declining. In that year SPSM selected Labasa mill for expansion and new contracts were issued in the area. Gradually the crushing rate of the mill was increased to 110 tons per hour<sup>\*</sup>. However, at the end of the CSR era in Fiji Labasa remained a relatively small mill and life in the 'northern outpost' continued at a relaxed pace.

#### The Fiji Sugar Corporation

In 1973 CSR sold its sugar interests to the newlyindependent government which established the Fiji Sugar Corporation (FSC) to take-over and operate the assets. FSC's first Chief Executive was Mr. Gwyn Bowen-Jones, former Managing Director of Bookers-McConnell Ltd in Guyana. Shortly after taking up his appointment Bowen-Jones was instrumental in a bold decision to expand Fiji's sugar production by establishing a large new cane scheme at Seaqaqa which would reduce the unit costs at Labasa mill and reverse the overall decline in Fiji's output of sugar<sup>10</sup>. With assistance from World Bank financing some 800 families were to be settled on newly developed land and it was planned that they should produce 200 000 tons of cane annually. By 1981 annual production reached 285 000 tons. At the same time a drainage and seawall rehabilitation programme was initiated in the old Labasa cane areas.

To cope with the increased cane production a major expansion of Labasa mill was undertaken in 1979-80 to lift crushing capacity to 275 tons per hour or 1.25 million tons per annum. New equipment included a 20 000 gallon vacuum pan, a large crusher, a shredder driven by a 2000hp Brotherhood turbine, new elevators, a 2.5mW Allen turbo alternator, new No. 4 boiler, centrifuges, drivers, conveyors and elevators". At the same time a bulk sugar terminal was constructed at Malau with a 30 000 ton storage shed. The total cost of these improvements and the extension of the tramway was in excess of \$F25 million.



The famous "Kanaka cutting" was little different in 1981 to when it was first cut by hand in the 1890s. R.F. McKillop

#### The Tramway System

From the outset CSR has used tramways at Labasa to transport cane to the mill at minimal cost. The two foot gauge tramways followed similar standards to those established by the Company in Queensland.

The initial lines served estates between the Labasa and Oawa Rivers to the south and in the Bucaisau River valley to the east. Shortly after leaving the mill the Bucaisau line crosses the Qawa River by a six span 200ft bridge. A major feature of the line is a cutting excavated mainly by Solomon Island labourers and known as "Kanaka Cutting". Mr. S.B. Sumeru, who has worked at Labasa mill for 48 years, is the son of an Indian labourer who worked on the cutting. His father used to recall that the work took a very long time to complete as only hand tools and small hand carts were employed for the excavation. The 50ft deep, 300 yard long cutting is located approximately 6 miles north east of the mill. In 1981 the original cutting was still in use, but frequent land slips mean that it has become

a bottleneck for traffic and it is planned to widen the cutting in the near future.

In 1907 the tramway was extended east to Wainikoro estate (26 miles) and west to the Qaloyago River (5.5 miles). This latter line crossed the Labasa River by a seven span 250ft bridge and ran through the small settlement that eventually became the prosperous township of Labasa. Today the tramway runs parallel to Labasa's main street, Nasekula Road, and for 300 yards it forms the southern frontage of Rosawa Street.

The Wainikoro extension was a major engineering task. The line crosses the Bucaisau River by a 9 span, 300ft bridge then winds along the coastline through mangrove swamps for some 13 miles. A 250ft bridge is required to cross the Wainikoro River before the old CSR Wainokoro estate is reached. Eventually further extensions brought the tramway up the Wainikoro River to Duku (30 miles from the mill) and to Nubu River (35<sup>1</sup>/2 miles).

In 1927 new areas were opened up on the Labasa River for Indian tenant farmers and new tramway lines were constructed to serve the area. The Vunimoli branch leaves the western line at Nasea Points in Labasa township and runs south, parallel with the river, to Vunimoli (9 miles) with a short branch to Vunicuicui. After World War II an extension was constructed to serve the Wailevu River valley (9 miles) to the west of Labasa. This branch presents most visitors to Vanua Levu with their first encounter with the tramway system for it runs by the Waigele Airport.

The Seaqaqa cane scheme brought a further expansion of the tramway system in 1974 when an extension was constructed from the Qaloyago River to a railhead at Tabia (11.3 miles). This 5'/2 mile line has been built to modern high capacity standards with extensive earthworks at a cost of \$F1.7 million.



Tracklaying on the Tabia extension, 1974. Fiji Times Picture



The Labasa mill tramway system now has 45 miles (74 km) of mainline from Tabia to Nubu and 34 miles (54 km) of branchline, a total of 79 miles (126 km). There are 12 loops and 45 sidings. An additional 6 miles of lines are worked by tractors or bullocks and are still referred to as "horse lines". **The Mill and the Community** 

Today Labasa is a thriving township serving as both the major administrative centre for Fiji's Northern Region and the commercial centre for cane farmers from surrounding districts and the many people who are dependent on the mill for their livelihood. Throughout the crushing season an endless stream of cane lorries and trailers passes through the main street joining the many taxis and buses to provide the town officials with the headaches of traffic congestion. The sounds of cane trains, with the anxious hooting of the diesel locomotives as they approach level crossings, echo through the town day and night. On the footpaths one senses a buzz of urgency and excitement as people snatch brief conversations with friends and go about their shopping along Labasa's busy main street. A large number of buildings under construction along Nasekula Road attest to a newfound prosperity and confidence in the future.

As one approaches the mill in the crushing season a long queue of cane lorries, often up to a mile in length, confronts the visitor. The drivers gossip while waiting to unload, and tea and cold drink sellers ply their trade along the line. In the tramway yards cane trains arrive at regular intervals and the locomotives proceed to the weigh-bridge where the crew report to the operations room. Here traffic controllers are kept busy directing the movement of trains over the 126km tramway system. Drivers, mechanics, shunters and controllers work around the clock keeping the trains moving in the struggle to ensure a constant supply of cane to the mill.

Today's bustle and prosperity in Labasa is a recent phenomenon. When Dyer and Hodge visited the mill in 1957 they found a quiet relaxed little community<sup>12</sup>. The sugar mill and its associated activities dominated the employment opportunities, but even in the crushing season most activities could be conducted at a leisurely pace. Four locomotives were adequate to handle the bulk of cane transport, with a fifth stationed at Wainikoro to service the branchlines there. Horses were still used for light shunting duties in the mill yard.

Early written accounts generally provide a European perspective of the community. They indicate that Labasa was essentially a company town - an Australian outpost within a British colony. In 1907 the *Cyclopaedia of Fiji* recorded that:

Over 25 miles of railway lines run through CSR Coy and Labasa estate and three locomotives are in constant use. Forty to fifty Europeans are employed in the mill, in addition to about twenty overseers, besides a large staff of clerks and chemists. Houses are provided for the married employees and quarters for the single. The telephone is laid to all outlying plantations, eight in number. A commodious wharf is erected which accommodates the steamers plying to the mill bringing stores and taking sugar away.<sup>13</sup>

By the twenties the extensions to the tramway systems linked a number of outstations to the central mill and, to the European community at least, the tramway provided the main means of personal transport. Passenger cars, locally referred to as "palace cars" were attached to trains running to and from Wainikoro for use by Company personnel. At other times the use of 'pole' cars or pump trolleys enabled people to use the CSR tramways as their personal highways. Oldtimers recall with nostalgia the excitement of rides on the 'pole' trolleys.

Mrs. Vera Gibson, the proprietor of Labasa's Grand Eastern Hotel, first came to the town as a schoolgirl in 1924. She recalls travelling from Nausori to Labasa on the CSR boat Rani which brought passengers to the mouth of the Labasa River. Here they transferred to a steam tug for the journey to Labasa and, via a canal dug between the Labasa and Oawa Rivers, to the CSR mill. Mrs. Gibson remembers Labasa of the twenties as a very "Australian town". The houses of senior Company staff and the school were located on "CSR Hill". The school catered for 50 to 60 European and mixed race children. School picnics were a memorable experience. They were held at Nasealevu Point every Sunday during the school holidays. The children joined the 'palace' cars for the tramway journey to the picnic grounds where there was a good beach.

To the Fijian villagers the establishment of the mill and its tramways was a peripheral matter. In the 1880's it had been hoped that a large proportion of cane would be provided by Fijians, but the villagers soon found that cane offered an inadequate return, compared with the return to labour possible from root crops. By 1914 Fijian-grown cane was making a negligible contribution to sugar production in the colony<sup>14</sup>. Increasingly the participation of Fijians in the sugar industry was as landlords



A cane train, headed by locomotive No. 3 (Fowler 10992), entering Labasa Mill yard in 1957 when steam was still widely used. The small Fowler diesel locomotive is parked on the scrap road to the right of the picture. P.F. Dyer

renting their land to others to grow cane. It was not until recent years that Fijians in significant numbers began to grow cane. Labasa has been the focus of this development and in the Seaqaqa cane scheme over 50 per cent of the growers are Fijians.

In contrast to the Fijians the Indo-Fijian community has always been closely involved in the sugar industry. Initially the Indians were brought to Fiji as indentured labourers. The life of the indentured labourer was undoubtedly a hard one. Reports suggest that a typical working day began at 4 or 5 am and was occupied by such tasks as weeding, digging or clearing drains, planting, harvesting and loading cane onto tramway trucks<sup>15</sup>. However, the Indians soon became cane growers themselves on small farms, with supervision and the organisation of planting material and harvesting being provided by the company. This small farm system proved to be more efficient than the large estates and in 1925 the CSR Labasa manager was instructed to lease out the remaining company land to farmers as quickly as possible<sup>16</sup>. The Indo-Fijians also took over skilled jobs in the Company and eventually the professional positions as well. Operation of the tramway system soon became a special preserve of the Indo-Fijian community and many families have worked on the tramways through a number of generations.

#### Locomotives

Sugar tramways are traditionally associated with diminutive steam locomotives fitted with balloon smoke stacks. For over 70 years such locomotives trundled cane to the Labasa mill. Unlike other Fiji mills, Labasa remained a stronghold of John Fowler locomotives during the steam era.

Detailed descriptions of the locomotives used at Labasa have been provided by Dyer and Hodge<sup>17</sup> so only a brief summary is presented here. The first locomotive to be used at Labasa was a small Fowler 0-4-2ST (B/N 4788 of 1880) which was transferred from Victoria Mill in 1893 for construction work. It was named *John-O-Gaunt*. Two larger Fowler 0-6-0TT locomotives, Nos 1 and 2, were delivered in 1893 and 1896. These 11<sup>1</sup>/2 ton locomotives had 8<sup>1</sup>/2<sup>1''</sup> x 12<sup>''</sup> cylinders and were rated to haul 150 tons. These three locomotives were in use when the *Cyclopaedia of Fiji* report was prepared in 1906.

With extensions to the tramway system three Fowler 0-6-2TT locomotives. Nos 3-5. were delivered in 1907. These 13 ton locomotives had 9'/2" x 12" cylinders and were rated to haul 230 tons. No. 4 was destroyed in a boiler explosion in 1912, but Nos 3 and 5 remained in service until 1964. John-O-Gaunt was withdrawn about 1926 and written off in 1930 while No. 1 was transferred to Nausori in 1913. About 1961 an additional Fowler 0-6-0TT locomotive was transferred from Lautoka and became Labasa No. 6. Most of the Fowler locomotives used in Fiji had their original four wheel water tanks replaced with six ton bogie tenders built by the Clyde Engineering Co. of Sydney. An exception was Labasa No. 5 which had a four wheel tender constructed on the frame of John-O-Gaunt".

FIJI'S SUGAR TRAMWAYS

In 1913 CSR introduced a larger 0-6-0 tender locomotive to Fiji built by Hudsell Clarke of Leeds and this type subsequently became the standard locomotive because of its greater power, speed and operating range. Only one of the Hudswell Clarke's (1051 of 1914) came to Labasa where it became the second No. 1. This locomotive was ideally suited to the long trip to Wainikoro and it operated this run until replaced by a diesel in 1955.

Steam locomotives were withdrawn from service in 1964, but No. 6, at least, was kept on standby for a number of years. Its final appearance in steam was a memorable occasion. To mark Prince Charles' visit to Labasa for the Independence celebrations in October 1970, No. 6 was steamed and HRH drove the locomotive from the mill to a point near Labasa College, a distance of approximately one mile.

Steam locomotive No. 3 had been preserved at the mill with the four wheel tender built on *John-O-Gaunt's* frame, while No. 2, minus tender, was placed in a children's playground in Mudliar Place, Labasa. By 1981 it had rusted away to the point of being a danger to children. Locomotives Nos 5 and 6 together with two bogie tenders lie derelict in the mill yard, but one tender remains in service as a



Labasa's No. 3 was the first Fowler 0-6-2TT locomotive to arrive in Fiji. She has been preserved in the mill yard with a four-wheel tender built on the frame of Labasa's first locomotive, *John-O-Gaunt.* 





Labasa mill's empty yard with the two ex-underground locomotives Nos. 5 and 6 engaged in shunting duties, October 1981. R.F. McKillop

water carrier. In 1981 it was noted at Tabia.

The first diesel locomotive at Labasa was a 30hp 0-4-0 diesel mechanical built by John Fowler in 1926. It was written off in 1956. In 1938 a 74 hp Gardner powered 0-6-0 diesel locomotive was obtained from Hudswell Clarke. For many years this unit was stationed at Wainikoro to work the branch lines there, but in 1979 she was transferred to Rarawai. In 1950 a small 68hp 0-4-0 diesel mechanical locomotive arrived from the UK and received the number 8. It was built by E.E. Baugley Ltd for the Drewry Car Coy. A similar engine (No. 11) entered service in 1960 and these two locomotives undertake shunting duties at the mill and work nearby branches. A small Motor Rail 'Simplex' tractor shunts the empties from the carriers to the yard.

In 1955 CSR adopted a 170hp 0-6-0 diesel hydraulic locomotive, built by the Clyde Engineering Company of Sydney (as their Model DHI.71) as their standard canefield locomotive. The first of these locomotives to arrive in Fiji was allocated to Labasa and numbered 9 in June 1955. Since this date Australian-built locomotives have been the main source of motive power at Labasa. No. 9 replaced No. 1 on the long Wainikoro run. By 1964 she had been joined by three sister locomotives which were numbered 1, 2 and 4.

In the 1970's locomotives built by EM Baldwin of Sydney gained wide-spread acceptance for canefield use. In 1976 a Baldwin 0-6-0 Model DH.18 diesel hydraulic locomotive fitted with a GM 305hp engine was delivered and became No. 10. An identical locomotive, No. 7, was delivered in 1981. To handle Seaqaqa cane from the Tabia railhead a Baldwin Model DH23B 365hp bogie locomotive was obtained in 1978 and numbered 3. The expected traffic from Tabia did not eventuate and this unit is now primarily used on the main line to Wainikoro.

By 1980 Labasa was experiencing a serious motive power shortage and to ease the situation two underground locomotives from Codfela's Suva tunnel project were purchased. These four-wheeled units were built by EM Baldwin in 1970 with 160hp Caterpillar engines to 762mm gauge from tunnelling work in Australia. They were converted for tramway use at the Labasa workshops and numbered 5 and 6. With their low profile hoods and high cabs they present a toy-like appearance as they go about their duties on the Vunimole and Waiqele branch lines. Nos 5 and 6 bring a character to the tramway system and one detects a pride and attachment among their crew as they boast to visitors of their engines' power and haulage ability.



A Drewry line car on the Wainikoro River bridge during the General Manager, Dr. Harman's, visit to Labasa, September, 1953. Archives of Business & Labour, ANU.

No.	Builder	Builders Number	Year	Туре	Remarks	
Ste	am					
—	John Fowler	4788	1880	0-4-2ST	ex. Victoria Mill, Qld. 1893. Named <i>John-O-Gaunt</i> . Written off 1930. Chassis used as tender.	
1	John Fowler	7023	1893	0-6-0TT	Transferred to Nausori as their No.5 1913.	
1	Hudswell Clarke	1051	1914	0-6-0	Transferred Lautoka 1956.	
2	John Fowler	7879	1896	0-6-0TT	"Preserved" in children's playground Labasa.	
3	John Fowler	10992	1907	0-6-2TT	Preserved at Labasa mill.	
4	John Fowler	11323	1907	0-6-2TT	Destroyed boiler explosion, 1912.	
5	John Fowler	11350	1907	0-6-2TT	Derelict at mill.	
6	John Fowler	9462	1903	0-6-0TT	ex. Lautoka No. 3. Driven by HRH Prince Charles 1970. Derelict at mill	
Die	sel					
6	John Fowler	16541	1926	0-4-0DM	Written off 1956.	
7	Hudswell Clarke	D609	1938	0-6-0DM	Transferred to Rarawai, 1979	
1	Clyde Eng.	62-270	1962	0-6-0DH	Model DHI.71	
2	Clyde Eng.	64-319	1964	0-6-0DH	Model DHI.71	
3	EM Baldwin	7248.10.78	1978	B-B	Model DH23B	
4	Clyde Eng.	64-320	1964	0-6-0DH	Model DHI.71	
5	EM Baldwin/	3229.4.70	1970/	4wDH	Built for Atkinson-Holland to 762mm gauge for	
	Labasa Mill				use Thomson Dam, Vic. To Codfela Suva tunnel project. Rebuilt Labasa mill.	
6	EM Baldwin/	3229-?-4-70	1970	/4wDH	As for No. 5.	
	Labasa Mill		1980			
7	EM Baldwin	9442.1.4	1981	0-6-0DH	Model DH.18	
8	Drewry*	2365	1950	0-4-0DM	68hp shunting locomotive.	
9	Clyde Eng.	DHI-8	1955	0-6-0DH	Model DHI.71	
10	EM Baldwin	5995.1	1976	0-6-0DH	Model DH.18	
11	Drewry*	2676	1960	0-4-0DM	71 hp shunting locomotive.	
—	Motor Rail Co	11036	1956	4wDM	50hp 'Simplex'. Transferred Penang 1979.	
—	Motor Rail Co	11288	1965	4wDM	50hp 'Simplex'.	

Table 1Locomotive List - Labasa Mill

\* Built be E.E. Baguley Ltd. for Drewry Car Co.

#### **Rolling Stock**

The standard four-wheel cane truck is the predominant vehicle on the Labasa tramway. In 1981 there were 2019 in service, an 122 per cent increase on the 1961 figure. These trucks are now of three ton capacity and are progressively being fitted with roller bearing axle boxes. By 1980, 58 per cent of the fleet were fitted with roller bearings.

The tramway system also uses a wide assortment of rolling stock for special duties. There are 90 'tellah' single trucks which are essentially a flat cane truck used to transport tools and equipment to the field. Sixty four-wheel hopper waggons with a capacity of  $2^{1}/2$  tons carry ash from the mill to the dumping area. There are also eight large bogie ballast hoppers in service. Bogie flat cars or paired four-wheel flat cars are used for the transport of portable line. In 1981 there were seven bogie and six pairs of flat cars in service.

Three passenger cars were built for the Wainikoro line in 1939 which means they would have replaced the earlier 'palace' cars. The 1939 cars were 26ft 6in overall length. Two were designed to sit 40 second class passengers and the other 20 second and 6 first class passengers. They were still in use when Dyer and Hodge visited Labasa in 1957<sup>19</sup>, but passenger services were withdrawn when the Wainikoro road was opened in 1969. One passenger car has been retained in service and in 1981 it was parked at the Tabia railhead where it was used by workers as a meal room.



New and old: Labasa's oldest locomotive, No. 8 (Baguley-Drewry 2365 of 1950) beside recently delivered E.M. Baldwin No. 7 (9442-1-4-81) in the arrival yard, July 1981. R.F. McKillop

Permanent way stock includes a Plasser ballast tamper (No. 63 of 1974) 5 rail motor trolleys probably built by Wickham in the UK, 3 pumping trolleys, 2 poling trucks, 1 low-joint lifter, 1 camping van, 1 tool van and a grass mower.

#### **Tramway Operation**

The traditional method of cane transport is based on the use of portable lines laid from the permanent tramway to the field. Trucks are moved into the field on the portable line by bullocks or tractors and loaded by the cutting gangs. They are then moved back to the permanent line to await a locomotive. The portable line method is estimated to be 40-50 per cent cheaper than other methods of transport, the trucks are easy to load and it can be used in wet weather with little damage to the fields. Accordingly the portable line system is used wherever there is a flat terrain and direct access to the tramway system.

With the rapid expansion of cane into new areas other cane transport systems have emerged. One is the use of tractors with winch trailers to transport rail trucks to and from the tramway siding. On reaching the field the truck is lowered onto a short length of portable track and loaded with cane. A modification of this system was initially tried at Seaqaqa whereby tractors and winch trailers delivered loaded trucks to short tramway shunts from where they were collected by specially designed semi-trailers, which transported them by road to the railhead at Tabia. This was unsuccessful and has been replaced by the bundling system. This required the cane to be built on the ground into a three tonne stack and two lock chains are secured around it to form a bundle. Single bundles are taken to the transfer station by tractors and winch trailers from where they are collected by FSC lorries and transported to the railhead.

A combination of transport delays, the cost of transfers and the status accorded to motor lorries has resulted in a preference for road transport of Seaqaqa cane direct to the mill. By 1980 45 per cent of cane to Labasa mill was being transported by road. This has resulted in serious congestion in the main street of Labasa township and at the mill where queue waiting times of 6-8 hours are a

regular occurrence.

Tramway operations are controlled by 2-way radio from a base in the weighbridge building. On arrival at the mill the locomotives leave their train in the full yard and report to the operation room. Daily movements of each locomotive are recorded on running sheets. There is also a traffic board which enables the location of each locomotive to be recorded by numbered pegs, but, in practice, the board is rarely used.

Tramway operations are run in three 8-hour shifts during the sugar season, and with increasing production these have become busier. In 1957 the mill only crushed 200 000 tons of cane compared with 965 273 tons in 1979. In 1979 the tramway system handled 521 938 tons of cane, chiefly from the Wainikoro, Buciasau and Tabia (Seaqaqa) sectors. The breakup of this traffic is indicated in Table 2.

#### The Future

In a motor vehicle age, sugar tramways have tended to be viewed as an old fashioned means of transport. However, rising fuel costs and the congestion caused by motor lorries at the mill and in Labasa township has brought a new appreciation of the efficiency of the rail transport system. A study of the Fiji sugar cane transport system undertaken by Booker Agriculture International in 1980<sup>20</sup> concluded that the rail system should, with certain improvements, provide the long-term optimum



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Sector	Tonnes Cane	Distance/km	Tonnes/km
Waigele	46 324	12	555 888
Wailevu	53 878	8	431 024
Vunimoli	50 224	12	602 688
Labasa	23 201	5	116 005
Buciasau	113 036	19	147 684
Wainikoro	141 162	44	211 128
Tabia (Seaqaqa)	94 113	16	505 808
Total	521 938		11 570 225

#### Table 2 Labasa Mill Rail Haulage, 1979

Source: Fiji Cane Transport Study, 1981

cane transport system and recommended that the number of lorries supplying the mills be reduced in favour of rail transport.

The political implications of the Booker proposals have yet to be resolved, but it is apparent that FSC strongly favours the upgrading of the rail system at Labasa. There is a strong body of opinion within FSC that the difficulties of transporting Seaqaqa cane to the mill will only be overcome by extending the tramway to the Seaqaqa plateau. This would be a difficult engineering task and current estimates of the cost are in order of \$F13.5 million.

In July 1981 the Chief Executive of FSC, Mr. Rasheed Ali, made a major policy statement that Labasa would be the focus for the future expansion of Fiji's sugar industry and announced preliminary plans to take the crushing capacity of Labasa mill to 400 tons per hour or an annual throughput of 1.4-1.5 million tone of cane<sup>21</sup>. This would involve a second train to the mill and major improvements to the tramway system and mill yards.

#### Acknowledgements

My thanks to the following of the Fiji Sugar Corporation for their assistance in providing information: Mr. Jone Galuinadi, General Manager, Labsa mill; Mr. Naidu, Field Manager, Labasa; Mr. Gnash Nand Civil Engineer, Labasa. Also to Mrs. Vera Gibson and Mr. S.B. Sumeru for their reminiscences and Peter Dyer and John Browning for technical details.

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- 3. *Fiji Times* reports of 8 April, 1882, 3 May, 1882,10 October, 1883,2 January, 1884,2 August, 1884 and 2 December, 1884. The initial mill at Dreketi was replaced by the Pioneer mill from the Rewa which was reerected at Matsaswaluvu in 1885 and operated until 1896. Today the remains of both mills, including rollers, vacuum pans and a boiler are still in existence on the estate which has been owned by the Bull family since the early 1900s.
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- 17. Dyer and Hodge, op cit.
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- 19. Ibid. p.50.
- 20. Booker Agriculture International, *Fiji Cane Transport Study*, January 1981.
- 21. Fiji Sun 17 July, 1981.



# LETTERS

# ANDERSON'S TRAMWAY, BARKSTEAD, LR 72

In connection with my research into traction engine type locomotives, I am still trying to obtain further information on both the Anderson Bros' locomotives. I was most interested to see that Mr. Albert A. Gunsser is still writing, as it was his article in *LR*, Autumn 1969 which first got me interested in the site. I had been hoping that he would have some comments to offer regarding *Timber and Gold.* 

According to Mr. Gunsser's article (p.21) the main locomotive had *GARRETT* written on the maker's nameplate, whereas Norm Houghton (p.21) says, "its boiler bore a maker's plate describing it as of *GARRATT* manufacture." Mr. Gunsser in his letter (*LR* 72, p. 18) changes his spelling to *GARRATT*. Some comment is needed I feel.

If GARRETT is correct, then the only candidates for manufacture of the locomotives are Richard Garrett & Sons, Leiston, Suffolk. Garrett's never built a railway locomotive. They did quote the Emu Bay Railway, Tasmania, for a steam railcar in 1925, but nothing came of it. A Sentinel-type vertical-boilered shunting locomotive was proposed for the LNER, again around 1925, but the proposal was rejected on the grounds that the boiler was too small. Garrett's also put out a brochure offering a Sentinal-type vertical-boilered shunting locomotive at work. A few minutes with a magnifying glass reveals that the Garrett "locomotive" has been painted in. Additional evidence of Garrett's lack of locomotive building expertise came in 1929, when a accident at their Leiston siding led them to seek a locomotive. They purchased a second-hand Aveling & Porter loco (No. 6158 of 1906) from Gypsum Mines Ltd. in Suffolk. Why do so if they themselves were locomotive builders?

Turning to the possibility that Anderson's locomotive was converted from a Garrett product, 1873 is very early for a Garrett traction engine. Only about 30 such machines were built by Garrett pre-1873. A portable engine would be more likely, retaining the boiler with cylinders, rods, wheels etc., perhaps made locally.

If the correct spelling is *GARRETT*, then there is still much mystery. The only Garratt I know of in a railway context, was Herbert William Garratt, patentee of the system of locomotive articulation as utilised by Beyer Peacock and others. His first patent, taken out in 1885, was too late to be connected with Anderson's 1873 locomotive, and he was never involved in building locos under his own name in any case. There was a company named Carrett Marshall & Co. based at the Sun Foundry, Pensbury Road, Leeds, who are reported to have built a locomotive in 1860 for the Natal Railway and almost certainly they built others.

There was also a firm of engineers at Ipswich, Queensland, c.1918, named Barbatt. They converted the Beaudesert locomotive originally and also converted several ex-QGR locos into mine winders. Is it possible that **BARBATT/GARRATT** arose from an indistinct casting on the workplate, or the use of an unorthodox typeface?

Certainly, on the evidence available, there is little to link Anderson's locomotive with Garrett's of Leiston or H.W. Garratt. Its identity is, in consequence, a greater mystery than Messrs Gunsser and Houghton suggest.

B. Henderson

London, UK

Rear Cover: an aerial view of Lautoka mill taken in 1980. The bulk sugar storage shed is in the left foreground while cane arriving by both rail and motor lorry will be noted at the middle left of the photograph. Fiji Times Picture.



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