ASHET News

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Newsletter of the Australian Society for History of Engineering and Technology

ASHET weekend tour to Newcastle

Mari Metzke is planning a weekend tour of Newcastle for ASHET members, from Friday 7 November to Sunday 9 November. The party will travel by train to and from Newcastle. This may be a last opportunity to travel by train to the centre of Newcastle as plans are afoot to close the last section of the Newcastle railway line. For details email Mari on ASHETactivities@gmail.com.

ASHET Unilever project now completed

This project, which ASHET undertook with the help of a grant from the Leichhardt Council, is now complete. The graphic display of the history of Unilever at Balmain in nine panels of images and text was launched at Leichhardt Library on Wednesday 6 August and was on show for the whole month of August. Many current and former Unilever employees were at the launch.

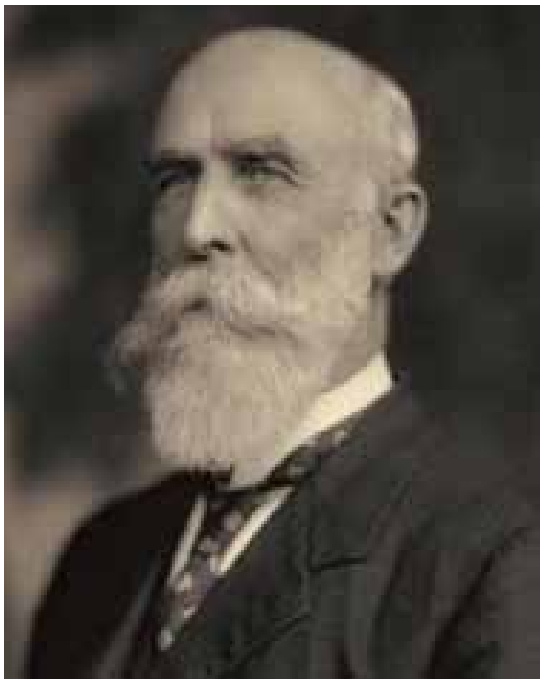
We are planning to present the display in other locations, and also to have an on-line version on the ASHET website.

Unilever occupied a large industrial site on the waterfront at Balmain from 1892 to 1989, and was one of the largest employers in the area. The company's manufacturing activities have been relocated and most of the site has been redeveloped for medium density housing, with two of he historic buildings have been preserved and converted to commercial use.

Library Manager Marilyn Taylor and ASHET President Rob Renew at the launch of the Unilever Display on 7 August at the Leichhardt Library

Henry Deane, railway engineer

This article outlines some of the achievements of Henry Deane, one of Australia's most distinguished engineers. He was successor to John Whitton as Engineer-in-Chief for railway construction in NSW, and the Engineer-in-Chief for the construction of the Trans Australia Railway which at the time was the largest construction project ever undertaken in Australia.



Henry Deane

Henry Deane was born in London in 1847. He was educated in Ireland at Queen's College, Galway, graduating BA in 1865 and MA in 1882, with honours in mathematics and Science. He served a pupilage in engineering under Sir John Fowler. He commenced work in London as an engineer for Waring Brothers and worked in railways and ship-building yards in Hungary. He married a Hungarian, Anna Schramb, in Budapest. From 1877 to 1879 he worked in the Philippines on the construction of a sugar mill.

Railway engineer with the NSW Department of Public Works

Deane arrived in Sydney in 1880 and was appointed as a surveyor under John Whitton, the Engineer-in-Chief. He received promotions to district engineer and Inspecting Engineer, and in 1889 when Whitton took a year's leave of absence because of ill-heath Deane was appointed to act in his position.

The NSW railways had been through a turbulent period in the 1880s. In the period from 1878 to 1886 over 1300 miles (2092 km) of railway were opened, passengers quadrupled and freight doubled. For the whole of this period there were feuds between the Commissioner Goodchap and Whitton in which for the most part Deane was able to avoid being heav-

Next ASHET events

Thursday 9 October 2014
Talk by Vince Taranto and Daniel Percival
Gladesville Bridge 50th Anniversary, 2 October 2014

Sydney's Gladesville Bridge was opened by Princess Marina, Duchess of Kent, on 2 October 1964. It was intended to form part of a visionary freeway system then being planned for greater Sydney and was a bold and ambitious project, built at a time of great growth and expansion in post-war Australia.

At 1,000ft, it was at the time the longest concrete arch span in the world, a record it held until 1980. Its 50th anniversary on 2 October 2014 provides an opportunity to reflect on its national and global significance, and celebrate its engineering heritage status.

Vince Taranto is a town planner and economic analyst in NSW Roads and Maritime Services. He started his career with the Department of Main Roads in 1977, and has worked on the investigation and planning of many major road projects across NSW.

Daniel Percival is currently the Heritage Advisor with the environment Branch of NSW Roads and Maritime Services, where he has worked for 8 years. He has a degree in Archaeology from the University of Sydney and a degree in Communications (Journalism) from Charles Sturt University, Bathurst.

This is a joint meeting of ASHET and the Royal Australian Historical Society.

Venue: History House, 133 Macquarie Street, Sydney
Time: 5.30 for 6 pm. T**Cost;** Includes light refreshments on arrival; RAHS and ASHET members $10, others $12
Bookings: phone RAHS on (02) 9247 8001 or email history@rahs.org.au

Thursday 30 October 2014
Talk by Harry Irwin
Discovering Richard Dawson, Pioneer Ironfounder and Engineer

Writing on early engineering in Australia in the Australian Technical Journal in 1903, the noted engineer Norman Selfe argued that Richard Dawson's Australian Foundry "appears to have been the first important iron foundry in Australia" and that "Dawson, in many branches, was the pioneer machinist of Australia".

Richard Dawson died in 1865 and his widow sold the Australian Foundry to Thomas Sutcliffe Mort in 1872, after which Dawson's name and achievements almost disappeared from attention.

This presentation will promote the discovery/rediscovery of Richard Dawson's ironworks at George Street/Sydney Cove. Attention will be paid to detail of the Australian Foundry's location, size, operation and output (1833-72), with examples of innovative engineering solutions it offered to problems, including to damaged visiting ships. Photographs will illustrate some of the artifacts bearing the Dawson maker's mark that survive and will cover the ongoing search for others.

Dr. Harry Irwin is Emeritus Professor at the University of Western Sydney, and a great-great grand nephew of Richard Dawson. At UWS, Harry served in various positions including Professor of Communication, Dean of the Faculty of Humanities and Social Sciences (10 years), Chair of the Academic Board, and Pro Vice-Chancellor (Parramatta Campus). Harry has enjoyed a life-long interest in aspects of engineering history.

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Thursday 27 November
Talk by Kerry Dougherty
Australian-built Sounding Rockets at Woomera

Even before the launch of the first satellites, sounding rockets, which carry scientific instrument packages on ballistic trajectories rather than achieving orbit, were used to explore the upper reaches of the Earth's atmosphere. Sounding rocket programs for upper atmospheric research commenced at Woomera Rocket Range in 1957, with the British Skylark project and the Anglo-Australian HARP rockoon (balloon-launched rocket) program. Shortly afterwards, the Weapons Research Establishment (WRE), the forerunner of today's Defence Science and Technology Organisation, inaugurated its own sounding rocket program with the first successful Australian-built sounding rocket, Long Tom, developed from surplus British rocket motors. This research would eventually lead to the development of Australia's first satellite, WRESAT, launched in 1967.

This talk will outline the technical and scientific history of the Australian sounding rocket program, examining its origins and the reasons for its demise. It will look at the sequential development of the various Australian rockets and consider the particular research projects with which they were associated, the relationship with the WRESAT project and the move to Australian production after 1967.

Kerrie Dougherty is Curator of Space Technology and Aviation at the Powerhouse Museum and a lecturer with the Space Humanities Department of the International Space University, based in Strasbourg France. Kerrie developed the Powerhouse Museum's Space exhibitions, creating and curating its space technology collection. She is also the author of Space Australia and a number of original research papers on Australian space history. A Member of the International Academy of Astronautics, Kerrie is actively involved with international committees on space history, space education and space and society studies and has consulted for Australian and international space exhibition projects and education and outreach programs.

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ily involved. By 1886 the income from railways was falling far short of paying the interest on the loans that had been raised for their construction. The government decided to take action and introduced a bill to transfer the administration of the railways to a three person Commission. This became controversial because of suspicion that the government proposed to appoint one of its own number as the Chief Commissioner. The parliamentary session ended without any further progress being made and the bill was withdrawn. In January the Jennings-Dibbs Ministry was succeeded by a new government under Sir Henry Parkes.

The election campaign had shown that the state of the Railways Department was a matter of serious concern to the voters. Parkes acted quickly, introducing a Bill to put the railways under an independent Commission, with three members who could not be removed except with the sanction of both Houses of Parliament. It was widely expected that Goodchap would be appointed Chief Commissioner. But in fact Parkes had for a year been making inquiries in London through the Agent General about a suitable person to fill the position of Chief Commissioner. As soon as the Act was passed, he was ready to offer the position to E. M. G. Eddy, who had served for twenty years with the London and North Western Railway and the last 18 months with the Caledonian Railway, and who was highly recommended by the Acting Colonial Secretary. He proved to be an excellent choice, competent, handsome and able to assert his authority without creating animosity. Two other Commissioners were appointed, W. M. Fehon and C. N. J. Oliver.

The Parkes government and the new Commission embarked on a major program of retrenching railway workers. Under the new legislation, the Commissioners were responsible for the operation of he railways, but not for railway construction, which remained with the Department of Public Works. It was against this background that Henry Deane took over from John Whitton. Whitton resigned on health grounds while he was in England on leave in February 1890, and on his recommendation Deane was appointed Engineer-in-Chief for railway construction. Eddy was under attack for reducing the number of workers employed on track maintenance. New railway construction was almost at a standstill, with the only line opened in the year ending June 1890 being the link between Hornsby and St. Leonards. The Commissioners were able to report that over the two years they had been in office there had been a small surplus of railway revenue over expenditure. This was welcome news because the Australian economy was sinking into deep depression.

In 1899 the Minister for Public Works, Bruce Smith, announced to the House that following a decline to almost zero in new railway construction over the previous five years, the government was about to embark on a major program of extensions to country lines, but it was not until 1893 that any of them were opened. In 1891 the Commissioners announced the 'Pioneer System', which had in fact been adopted as soon as Deane had assumed control of railway construction. This policy was for extending lightly trafficked country lines with minimum earthworks, light rail (60 lb per yard), little or no ballast and light, widely spaced sleepers. Speed limits of 15 mph were imposed on these lines and trains ran only in daylight. Whitton had strongly opposed economies of this kind on new railway construction but Deane supported them.

Some work proceeded on improvements to the Sydney suburban railway system which was carrying rapidly increasing numbers of passengers. The main suburban line to Homebush had been quadruplicated, some lines duplicated, and the North Shore line had been completed by an extension from St Leonards to Milsons Point ferry wharf. Attention was then focussed on the problems caused by lack of capacity at the Sydney terminal station at Redfern and by the lack of any rail connection to the centre of the city. There was a Royal Commission in 1991 to canvass possible improvements to the Sydney railway system including a cross-harbour link, and extensions of the railway to the centre of the city with Eddy and Deane making major submissions.

Sydney Central Station

Eddy's proposal to build a main terminal station in Hyde Park met violent opposition from the public. An alternative plan, in which Deane was involved, was to relocate the terminal on the site of the present Central Station and provide a link to the centre of the city in the short term by tram, and in the longer term by either surface or underground rail.

Another Royal Commission in 1897 recommended Eddy's proposal for a terminal station in Hyde Park as also did the Parliamentary Standing Committee on Public Works. But Parliamentary approval was not forthcoming. Eddy died unexpectedly that year, aged 46. 3000 railway workers joined in the funeral procession to Waverley cemetery, the largest private funeral to be held in Sydney. Whitton died the same year.

In 1900 the government accepted a proposal from the Minister for Public Works, E. W. O'Sullivan for a grand new Central Station and railway offices on its present site just north of the then existing station. It involved demolishing several buildings and a cemetery. Work on the design, under the Government Architect, W. L. Vernon and Henry Deane, commenced immediately. The design that Deane described in a paper presented in 1902 before construction started was similar to what was actu-

Edward Miller Gard Eddy

Central Station concourse

Central Railway Station, Sydney, around 1906

ally built, except that Deane's design had a roof in three spans covering the platforms and the concourse on the north side of the platforms, with lines of supporting pillars along two of the platforms. Deane had considered in detail the single span roofs over stations in London and three span roofs that he had seen at Boston and St.Louis while visiting America and Europe for the NSW government in 1894. He favoured the three span solution, with a central span of 198 feet and two side spans of 75 feet each. He commented that his roof would look much more elegant than the one at St.Louis. In the event Deane's three span roof was abandoned in favour of individual roofs covering each of the platforms but not the tracks between them, and a large single span roof over the concourse.

Construction of the new station commenced in 1902 and it was completed, apart from the tower, in 1906. The tower was competed in 1921.

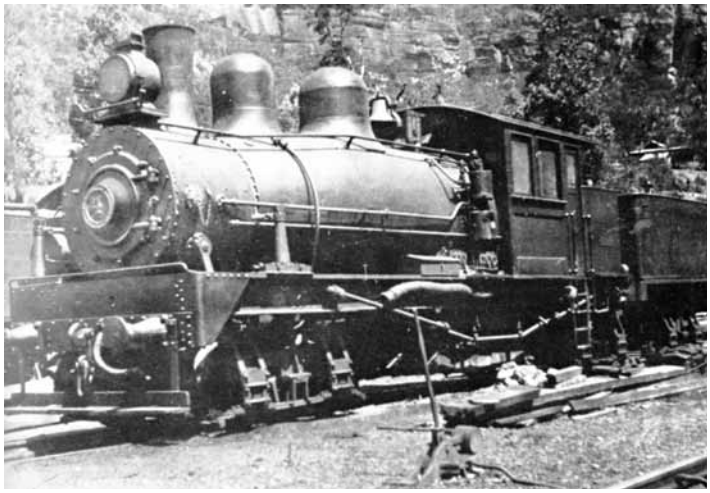
In 1899 Deane became responsible for construction of the Sydney electric tramway system, which was expanding rapidly. Railway construction was at a low ebb, but with Federation in 1901 there was the need to consider the construction of the rail link between South Australia and Western Australia, that had been promised as an inducement to Western Australia in the Commonwealth. Deane was appointed to represent NSW and chair a conference of engineers-in-chief of the state railway systems in 1903 to consider such matters as the route and gauge of the proposed railway. Then before he retired in 1906, the NSW government sent him to Europe and the USA with a brief to investigate and report to it on a number of railway engineering matters.

Central Station tramway collonade

Henry Deane as botanist

During the time he had been employed by the NSW government, Deane, who was an accomplished botanist, had actively pursued his interest in Australian flora, corresponding with other experts in the field and publishing many papers. He made a special study of the eucalypts of NSW, and one was named after him (*Eucalyptus deanei*). He was a fellow of the Royal Horticultural and Meteorological Societies and the Linnean Society in London, and served terms as president of the Linnean Society of New South Wales and the local Royal Society of which he was president in 1897. The Linnean Society of NSW published fourteen of his papers on NSW eucalypts.

Eucalyptus deanei



Shay locomotives on the Wolgan Valley railway

The Wolgan Valley Railway

Shortly after his retirement from the NSW Department of Public Works Deane was engaged as a consultant by the Commonwealth Oil Company to manage the design and construction of a private railway in the NSW Wolgan Valley to provide access to their shale oil works at Newnes.

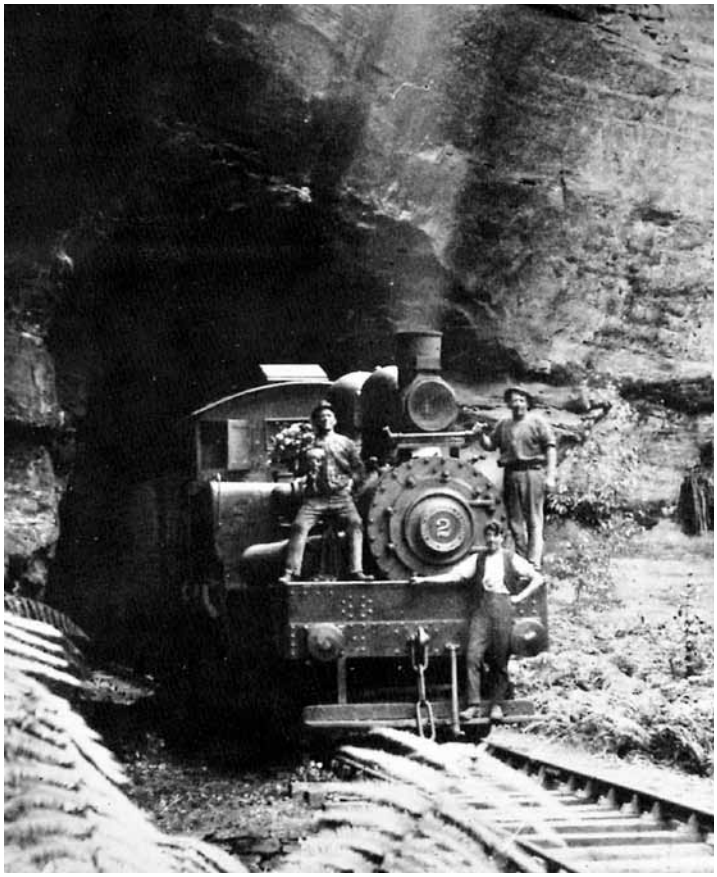
The railway is approximately 50 km long, linking with the western line of the NSW Railways at Clarence Junction in the Blue Mountains. It mainly follows the course of the valley hemmed in by precipitous cliffs. Deane concluded that it was inevitable that the railway would require 5 chain curves and 1 in 25 grades. Two short tunnels would be required. The volume of freight to be handled would be around 1,000 tons per day, which with the heavy grades, ruled out a narrow gauge line as being inadequate for the task.

The choice of locomotives was an important issue. No locomotives in Australia at the time would be suitable for regular use on the line. Deane found that there were several designs of locomotive in service in Europe and North America that could meet the requirements. His preference was for the American Shay locomotive which had several desirable features: it had great hauling power, because the whole of its weight, both engine and tender, were available for adhesion; unlike conventional locomotives it was geared, so a very even turning force was applied of the wheels and it was able to start easily on the ruling grade; it had a very short rigid wheel base which enabled it to traverse very sharp curves; the length of the boiler tubes was very short, a little over 3 m, so the difference of the water in the boiler level in the boiler on steep grade was not serious. Its only disadvantage was that to avoid excessive vibration, speed must be limited to around 25km per hour. The Shay locomotive was a unique design with three cylinders vertically mounted beside the boiler, which was offset from the centre line of the locomotive. An articulated shaft and gears transmitted the power to all the wheels on the locomotive and tender.

Four of these locomotives were imported for operating on the line. For most of its operating life there was one train per day with a load of 400 tons, double headed over the steepest part of the line. It left Newnes at 8.30 am and retuned at 4.30 pm. This one train carried both freight and passengers. For a brief period in 1909 there were two trains per day.

Most of the railway was laid with second hand 75 lb double headed rails purchased from NSW Railways and the remainder of the line was laid with rather lighter second hand flat bottomed rails from Tasmanian Railways.

The railway opened in 1907. There were serious delays in commissioning the works at Newnes, and initially the products carried on the line were not oil produsts refined at Newnes but metallurgical coke and shale for retorting elsewhere. The first refined oil was despatched in 1911. These operations were not profitable and the works closed in 1913, with train service reduced to one train per week. Various efforts were made



over the years to achieve profitable operations at Newnes, but none was successful. The railway was abandoned before World War II. The rails were taken up during the war and sent to Tobruk.

Henry Deane and the Trans Australian Railway

The conference of engineers-in-chief that Deane chaired in 1903 met in Melbourne, and was requested in March of that year by the Commonwealth Minister for Home Affairs to review a large amount of information that had been accumulated about the proposed Trans Australia railway. Deane as chairman was to formally report its findings and recommendations. Dean submitted his final report in July advising the Minister that the line should be standard gauge and follow a route from Kalgoorlie to Port Augusta via Tarcoola. It could be constructed in three to four years at a cost of just over £5 million, and by the tenth year turn an annual profit of £18,000 on a revenue of £400,000.

It was not until 1907 that agreement was reached between the states and the Commonwealth on passing legislation for the railway to proceed, with South Australia holding out for an undertaking to build also a north south railway. The engineers-in-chief were called to Melbourne again, with Henry Deane as the Commonwealth representative and chairman, to arrange for a survey of the route and advise on a variety of other matters. It took the surveyors 13 months, until July 1909, to complete their work. In he meantime Henry Deane was appointed consulting railway engineer to the Commonwealth Department of Home Affairs. During 2009 he led a small a party equipped with horses and camels to meet the surveyors in the field and inspect parts of the route. By 1911 he had a staff of 25 engineers, surveyors and clerks working at the Department of Home Affairs in Melbourne, along with another ten seconded from Home Affairs, to complete a final report with estimates and specifications. Deane submitted his report in September that year. On 12 December the Act was in place, authorising an expenditure of £4 million for construction of the railway. On 1 January 1912 Deane opened the Engineer-in Chief's office in Melbourne, with himself as the only employee.

Deane in the bush; Western Australia

Deane declared his preference for constructing the railway with day labour. This was welcomed by the Labor controlled Commonwealth Government under Andrew Fisher that had been elected in 1910, and in particular by its Minister for Home Affairs, King O'Malley, who rejected overtures from contractors anxious to participate in the work. First sods were turned at elaborate ceremonies in Port Augusta in September 1912 and in Kalgoorlie in January 1913.

Taking advice from a former colleague, E. E. Lucy, Chief Mechanical Engineer of NSW Railways, Deane ordered locomotives identical to the NSW P6 class, as the general purpose locomotives for the new railway, for which they were designated G class. At the same time Deane declared his interest in using internal combustion engines on the new line. It had been estimated that one fifth of the traffic on the line would be coal and water for the locomotives, and he estimated there would be big savings in fuel costs and operating costs if diesel locomotives were adopted.

After a slow start, construction of the track progressed at a rate of one mile per week at both the eastern and western ends, with the help of American Roberts track-laying machines. However things were not going smoothly at the western end, where the Supervising Engineer was an O'Malley appointee, Henry Chinn. It emerged that Chinn had a poor employment record, among other things having been dismissed from positions with the Tasmanian and NSW railways, and an attack on his appointment was soon under way in Parliament. A new Liberal government, under Prime Minister Joseph Cook, took office in June 1913, and within a month Chinn was summarily dismissed. Labor still controlled the Senate and appointed a Select Committee to investigate the dismissal. The Committee accused Deane of persecuting Chinn, and after the Committee predictably found in favour of Chinn and recommending that he be compensated, Labor members of the House of Representatives attacked Deane and attempted to undermine confidence in his administration of the railway. Chinn never received compensation.

When Parliament resmed in April 1914, the Labor Opposition led by Fisher attacked the government over the appointment of contractor Teesdale Smith to undertake urgently needed earthworks at the South Australian end of the railway. The company had just completed a contract for the South Australian Railways and had gangs and plant ready to start. Deane placed a contract for work occupying four months in December 1913, without calling public tenders. Labor Members expressed concern that this signalled the end of day labour. Attacks in Parliament on William Kelly, the Minister for Home Affairs, on this and other issues relating to the railway continued, and the Minister appeared to be reluctant to support Deane.

Deane wrote to Minister Kelly on 5 February 1914 advising that, on health grounds, he wished to retire and would be glad if immediate steps were made for his replacement. He mentioned that the last two years had been of a very strenuous nature. After a hurriedly called Cabinet meeting the next day the Minister announced publicly that he had accepted Dean's resignation. It took effect on 1 April, when he was succeeded by N. G. Bell, then Chief Engineer of Queensland Railways. The first train on the Trans left Port Augusta for Kalgoorlie at 9.32 a.m .on Monday 22 October, 1917 and arrived at Kalgoorlie at 2.50 p.m. on Wednesday 24 October. Because of he war there were no opening ceremonies. Nine changes of locomotive were made on the journey from Port Augusta to Kalgoorlie.

First train on the Trans arriving at Kalgoorlie on 24 October 1917

Just at the time of Deane's resignation Hawthorn Leslie, a respected British locomotive builder, wrote to him with the specification and offer of a diesel locomotive, the Paragon. Apparently this was the locomotive that Deane had hoped would operate on the Trans. It was a diesel electric on two six wheel bogies, with axle mounted motors. Its weight was around 105 tons with either a Sulzer or Workspoor diesel engine. It would meet Deane's specification of a locomotive of not more than 18 tons axle load and a thousand mile capacity to make the crossing between Port Augusta and Kalgoorlie without a change of locomotive, at speeds up to 66 mph (107 km/h) hauling a 300 ton train. No diesel locomotive was operating regularly anywhere in the world at the time and it was not until 1929 that the first diesel locomotives entered regular service on a main line, the Canadian National. After Deane's retirement, little more was heard about diesel power on the Trans for another forty years when diesel eventually replaced steam.

Following his retirement from the Commonwealth public service Deane worked as a consultant in Melbourne. He died suddenly on 12 March 1924 while working in his garden in Melbourne.

Sources and further reading

Deane's own reports on the design of Sydney Central Station and the Wolgan Valley Railway explain in detail the design decisions he made on these projects and are interesting reading. He presented them in lectures to the Sydney University Engineering Society and they are published in its Transactions.

Road through the Wilderness: the story of the Transcontinental Railway by David Burke includes a comprehensive account of its construction and Deane's contributions.

For a serious researcher there is a collection of Deane's correspondence, papers and photgraphs in the National Library of Australia.

Ian Arthur

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