The Newsletter of
Engineering Heritage Australia

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Engineering Heritage Australia

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Engineering Heritage Marker Unveiled at Tidbinbilla

Saturday, 7 August 2010 dawned bright and clear for the crowd gathered at the Canberra Deep Space Communication Complex (CDSCC), Tidbinbilla for the unveiling of a National Engineering Heritage Landmark for Antenna DSS-46. Engineering Heritage Canberra and Canberra Division President Denton Bocking, were pleased to host the National President of EA, Doug Hargreaves and Dr Miriam Baltuck, Director CDSCC, as our guests of honour at the ceremony.

Whilst located at its original site at the now closed NASA Honeysuckle Creek Tracking Station south of Canberra, Antenna DSS-46 etched its place in history by relaying to the world the iconic video and audio of Neil Armstrong walking on the Moon in 1969. It was a case of being in the right place at the right time for Honeysuckle being selected for the historic feed. Parkes could not see low enough to the horizon at the critical moment and the Honeysuckle signal was stronger than that received by the NASA station in the USA. Erected specifically for the Apollo program, this antenna continued to provide communication for the NASA manned space program beyond Apollo before being adopted for use at

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The recognition ceremony in front of Antenna DSS-46

Broken Hill Heritage Recognition Marker Event

On the 11 June 2010 Engineering Heritage Australia awarded the Umberumberka Waterworks, part of the Broken Hill water supply system, an Engineering Heritage Marker. The word Umberumberka is derived from the Aboriginal word for "rat". The marker was received by the owner, Country Water, a division of Country Energy, which operates and maintains the Umberumberka and Stephens Creek Reservoirs near Broken Hill.

An aerial photo of the Umberumberka Dam, near Silverton north-west of Broken Hill

The ceremony to commemorate the significance of the waterworks was kindly hosted by Country Water and many past and present employees attended. The significance of the waterworks system was presented by Nigel Ridgway, SA representative of Engineering Heritage Australia.

The Umberumberka Waterworks is a significant place of engineering heritage in Australia and is recognised with an Engineering Heritage Marker because it is one of the most complete surviving steam driven systems in Australia, it is

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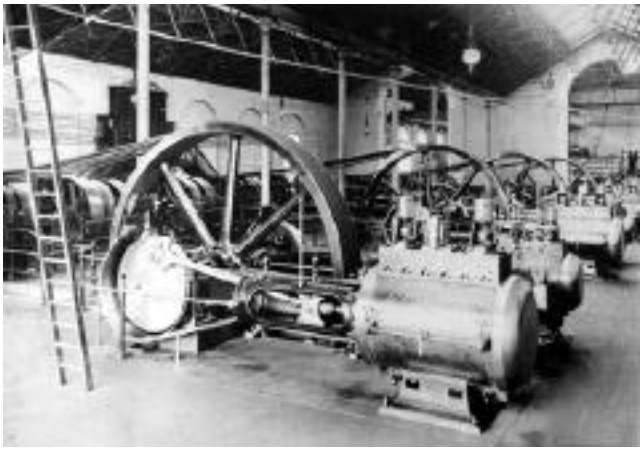
Early Electricity Supply in Melbourne

In the second half of 1882 the Australian Electric Company (AEC) inaugurated an electricity supply facility based on steam engine driven generators in the ground floor of its Russell Place premises in central Melbourne. The plant powered arc lighting in nearby parts of Bourke and Swanston Streets and also supplied several nearby private customers. This nascent public electricity supply venture was contemporary with Edison's first small public electricity supply scheme in London at Holborn Viaduct, commissioned in April 1882, and his famous Pearl Street central public supply power station in New York which started in September 1882. AEC's enterprise was also inaugurated within a year of the public electricity supply for the small town of Godalming in Surrey (UK), which is widely considered to have been the first public electricity supply in the world.

At the end of 1882, the AEC demonstrated the then new incandescent electric lamps in the Atheneum Theatre with supply from their Russell Place generating plant. This was followed by an extensive installation of incandescent and arc lights in the nearby Opera House, later known as the Tivoli Theatre. In 1883, the Victoria Coffee Palace installed electric lighting in public rooms, and became another of AEC's early customers.

In the succeeding years several other private enterprise electricity supply companies set-up in competition to the AEC, with A U Alcock in Corr's Lane and the Union Electric Company in Heffernan Lane being the most notable. Despite its early success, the AEC got into financial difficulties and was wound-up to be replaced by the New Australian Electric Company (NAEC) in 1889. The new company, with substantive capital backing, immediately commenced the construction of a central generating plant in suburban Richmond. The first stage was in service by the following year with the main plant comprising three 2kV Elwell single-phase alternators driven by 200hp (150kW) Robey slow-speed steam engines. AC distribution into parts of Richmond, other adjoining southern suburbs and the CBD, was by overhead lines with 2000/100V step-down transformers for individual customer services.

During the next year – 1891 – A U Alcock, as the Electric Light & Motive Power Company (ELMPC), opened the first stage of a planned large central generating station in Burnley Street, Richmond. It was based on steam engine driven 80kW, 2kV Ganz single-phase alternators, similar in principle to the NAEC plant at Green St. Like the latter, electricity was distributed at 2kV for street lighting and private customers in North Richmond, Abbotsford and Collingwood as well as some parts of the Melbourne CBD. The two companies traded in active competition, particularly for CBD customers.



Spencer Street power station engine room, c. 1895, showing 300 hp Austral Otis horizontal steam engines used to drive arc lighting dynamos via counter shafting

In 1891 the Melbourne City Council (MCC) resolved to establish its own power station and distribution for electric street lighting in the CBD. The MCC's Spencer Street power station was commissioned in March 1894 with the first of four locally built Austral Otis 300hp (225kW) slow-speed steam engines each driving up to five Thomson Houston constant-current 3kV arc lighting dynamos. Each dynamo supplied an individual series-connected circuit of arc lights and incandescent lamps. Four 75kw, 2kV, single-phase alternators were added in 1895 with overhead distribution for street lighting and private premises supply in Council areas outside the CBD. 2000/100V transformers were installed on poles or at customer premises.

By 1899, the MCC decided to become the sole electricity supply undertaker within its municipal boundaries, which it was entitled to do under the 1895 Victoria Electric Light & Power Act. The Council duly acquired the assets of the former private electricity supply companies in the Melbourne CBD. The loss of the more lucrative CBD customers hastened the amalgamation of the NAEC and the ELMPC under the auspices of the UK Brush Co. into the Electric Light and Traction Company, based at the NAEC's Richmond power station. In 1908, this became the Melbourne Electric Supply Company, which was ultimately absorbed into the State Electricity Commission in 1930.

In 1900 the MCC converted the Melbourne CBD supply to a 460/230V three-wire DC system with the aim of meeting demand for motive power applications, particularly electric lifts. From 1913, central DC generation at Spencer Street was superseded by 6.6kV, 3-phase turbo-alternators with the DC then supplied from rotary converter substations. Conversion of the CBD areas to 3-phase AC supply commenced in 1932, however the last DC customer supply was only finally terminated in 2003.

Melbourne was the first city in Australia to host a public electricity supply. The MCC was also an early entrant as a municipal electricity supply undertaking, however it was not the first, with schemes in Tamworth followed closely by Young in NSW both dating from 1888.

(This article is based on a paper of the same title presented at the Third Australasian Engineering Heritage Conference in Dunedin NZ, November 2009. The full paper is published in the Australian Journal of Multi-Disciplinary Engineering, Vol 8 No 1, 2010.)

Miles Pierce

Continued from page 1 - Broken Hill Heritage Recognition Marker Event

an important part of the social and industrial development of Broken Hill, and the major components provide a graphic demonstration of how remote waterworks operated nearly a century ago.

Professor Martin Lambert, Chair of the Engineering Heritage SA committee summarised the heritage recognition process and the inspiration of the system to young engineers today. The pumping station and reservoir were built in a remote and arid environment without today's systems and technology and were in operation for many years.

Merv Lindsay, (then) Deputy National President of Engineers Australia, presented the plaque to Guy Chick, Regional General Manager Far West and Water Operations of Country Energy, and expressed appreciation of the efforts by Country Water in their conservation and sympathetic adaptive use of the assets. It was highlighted how passionate past employees of Country Water and the Broken Hill Water Board have been in conserving this heritage in Australia.

The ceremony was followed by a tour of the pumping station which today shows new diesel driven pump technology compared to early diesel and steam engine technology.

Many of the group then travelled south for a tour of the Psyche Bend pumping station near Mildura featuring the Chaffey Tangye steam pumping plant. This was followed by a Engineering Heritage National Landmark recognition ceremony for the Humphrey Pumps at Cobdogla on the 13 June. (see separate article — Ed.)

Nigel Ridgway

A Peake at Steam

Millewa 'A' Pumping Station

Millewa 'A' boiler in operation in September 2010 after re-tubing

The historic Millewa 'A' pumping station is situated on the Murray River immediately upstream of Lock 9, approximately 50 km west of Mildura. It was constructed in 1927 by the then Victorian State Rivers & Water Supply Commission (SRWSC) as a part of the Millewa area irrigation scheme to provide an annual supply of stock and domestic water into some 462 farm storages. The Millewa 'A' pumping station lifted water from the river into a 14 km earthen channel connecting to Lake Cullulleraine from where three further pumping stations re-lifted the water to successively higher distribution channels. Millewa 'A' is now the only surviving steam pumping station in the scheme after having been de-commissioned by the SRWSC in 1974 and replaced by a nearby electrically powered pumping station.

The 100 years old 300 hp (224 kW) triple-expansion steam engine and its associated fire-tube boiler, manufactured by Thompson's of Castlemaine, returned to life over the weekend 11 & 12 September 2010 following a successful project by Engineers Australia's Sunraysia Group to re-tube the Colonial type wood-fired boiler.

In 1982 the Millewa 'A' station was saved from destruction by the intervention of the then Mildura Shire Council and the Engineers Australia Sunraysia Group. Ownership is now vested in the Mildura Rural City Council with the Sunraysia Group acting as caretakers, restorers and operators. Up until 1994 the boiler was fired at least once per year, raising enough steam to operate the engine on no-load. By then a large number of boiler tube failures precluded further steam operation. In 2007 the Sunraysia Group succeeded in obtaining a grant via Heritage Victoria to purchase replacement tubes and with much dedicated labour these have now been successfully installed to bring the boiler back into service.

Millewa 'A' Pumping Station Thompson engine and Weymouth centrifugal pumps

Both the boiler and engine were second-hand when installed at Millewa 'A' and are believed to have been originally in irrigation pumping service at Cohuna, further up river from Mildura.

The engine drives a pair of 39 inch (990 mm) direct-coupled centrifugal pumps designed by A G Michell and manufactured by G Weymouth of South Melbourne. At present, missing suction pipework and corroded delivery lines preclude demonstration pumping, however, future restoration work may eventually allow this to happen.

Whilst many individual members of the Sunraysia Group and others have assisted with the restoration works since the early 1980s, the dedication and unflagging organisation and hard work put in by Mr Peter Stone - dubbed Sunraysia Group's 'Mr Steam' – has been outstanding and he deserves much credit for the practical restoration of this important piece of our engineering heritage.

The official re-steaming of the Millewa 'A' plant was attended by Mr David Eltringham, Chairman of the Victoria Division of Engineers Australia, Past Chairman Professor Murray Gillin, the current Chairman of Sunraysia Group Mr Danny Grzan and Miles Pierce, Chairman of Engineering Heritage Victoria.

The Millewa 'A' pumping station and its associated works and reserve have been recognised by Heritage Victoria and listed on the Victorian Heritage Register, VHR No. H0549.

Miles Pierce & Owen Peake

Somerset Dam declared Engineering Heritage National Landmark

Geoff Cossins with the marker and interpretation panel and Somerset Dam behind him

The Governor of Queensland, Her Excellency Ms Penelope Wensley AO, unveiled an interpretation panel to celebrate the award of an Engineering Heritage National Landmark to Somerset Dam. The ceremony was conducted beside Lake Somerset on 8 June 2010 in the presence of about 90 invited guests, including Professor Doug Hargreaves, National President of Engineers Australia, Phil Hennessy, Chairman of Seqwater, owner of the dam and Mike Brady, President of the Queensland Division of Engineers Australia. Most of the guests were either directly involved in the dam or related to the principal engineers of the dam.

Geoff Cossins, with a 65-year long professional association with Somerset Dam, presented a well researched overview of the engineering history of the dam. This was followed by an equally well researched speech by Her Excellency the Governor.

A dam on the Stanley River was the brain-child of Brisbane Valley pastoralist and MLA Henry Plantagenet Somerset (1852 - 1936), who, after the floods of the 1890s and drought of 1899-1902, promoted the idea of a dam, at the site where it was eventually built, to provide flood mitigation as well as water storage. The Stanley River is the largest and wettest tributary of the Brisbane River, and was almost always the major contributor to floods in Brisbane and Ipswich.

Somerset Dam, built 45 km north west of Brisbane, with a capacity of 370 GL, was constructed between 1935 and 1959, using cutting–edge technology of the time, by a workforce of about 450 men, initially under an unemployment relief scheme during the Great Depression. Housing accommodation was provided for a population of about 1000 in a township, much of which survives in the town now named Somerset Dam.

The dam was engineered as a multi–role structure with water supply, flood mitigation and hydro-electric functions. Brisbane had endured inadequate and unreliable water supply storage ever since first settlement in the 1820s.

A 4 MW hydro–electric power station, commissioned in 1953 and feeding into the grid, has since played a significant role in supply to the Somerset region.

Construction was nearly complete in 1955 when the dam was first operated in anger and almost totally mitigated what would have been a serious flood. Operation of the dam in the disastrous flood of 1974 substantially mitigated the flood, halving the potential damage.

Somerset Dam, and its younger big brother, Wivenhoe Dam, completed nearby downstream on the Brisbane River in 1984, are the only specifically designed major dual purpose flood mitigation and water supply dams in Australia.

Brian Becconsall & Owen Peake

Michael Clarke awarded 2010 John Monash Medal

2010 John Monash Medal winner, Michael Clarke

At the 2010 Engineers Australia Annual General Meeting, Michael Clarke was presented with the John Monash Medal by EA outgoing National President Doug Hargreaves. The medal is Engineering Heritage Australia's highest honour to an individual who has made an outstanding contribution to the cause of engineering heritage. It commemorates Sir John Monash whose leadership and engineering accomplishment has left a great Australian legacy.

Michael Clarke's achievements have been both national and in his home state of NSW. During his career and since retiring as Chief Engineer of the NSW Department of Public Works in 1992, he has raised awareness of engineering heritage within the profession and the community. He has been a member of the Sydney Engineering Heritage Committee since 1990, was its Chairman in 1995-96 and remains an active committee member.

He joined the National Committee of Engineering Heritage Australia (EHA) in 1995 and was Deputy Chairman in 1999-2000 and Chairman in 2001-2002. He aligned EHA's Strategic Plan with Engineers Australia's Plan to give greater recognition to heritage and strengthen engagement in the organisation. During that period and subsequently he has played a leading role in the development of most of EHA's documentation and procedures.

He has been active in the recording of engineering heritage, especially oral history. As a member of the Management Committee of the Oral History Association of Australia (NSW) from 1995 to the present, he initiated the EHA National Oral History Program and led the Sydney Division program until 2008. Under his management, the Division has conducted interviews of some 200 eminent engineers with around 500 hours of recordings which are available to the public for research.

Michael Clarke was the first engineering representative on the Sydney Opera House Conservation Council in 1996, and in 2005 became the first engineering representative on the NSW Heritage Council's Register Committee. He is also a Life Member of the National Trust of Australia, a member of Royal Australian Historical Society, the Friends of the Historic Houses Trust of NSW and the Australian Society for the History of Engineering and Technology.

He has written a number of publications, the most notable being *Sydney's Engineering Heritage-Walks in the City* which won a National Trust Heritage Award in 1995 and *Sydney's Engineering Heritage and other sites* in 1999. Until recently he organized tours of the Sydney Harbour and conducted heritage walks in the City.

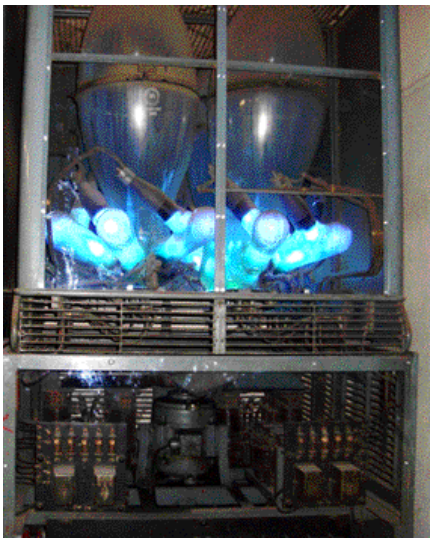
In making the presentation the President stated that Michael Clarke had made an outstanding contribution to engineering heritage over many years which met all the criteria for the award.

Revealing secrets beneath Melbourne

On 19 July 2010 a committee for a Melbourne initiative called Melbourne Open House provided Melbournians with the opportunity to take guided tours of 32 interesting buildings in the city. The program attracted 50,000 visitors. One of the sites in the program was CitiPower's Russell Place Zone Substation, an underground substation with an electricity supply history going back to the very beginnings of public electricity supply in 1882. About 800 people visited the substation and many waited for hours as small groups were given 20 minute tours of the installation.

The substation's underground vaults contain three 22kV to 6.6kV, 10MVA transformers and three banks of 6.6kV metal-clad switchgear for supply to distribution substations in nearby areas, including two housed within the zone substation itself. Perhaps the most interesting part of the substation is the Direct Current (DC) section. This is no longer in commercial service but can be demonstrated for visitors. The DC section previously provided supply to premises, some of which had been DC customers for up to 100 years.

In 1882 the Australian Electric Company (AEC) commenced a public electricity service from a small central generating plant on the site of the present Russell Place Substation and supplied electric lighting to nearby premises as well as arc lights in adjacent parts of Bourke and Swanston Streets. It was the first public electricity supply in the southern hemisphere and was contemporary with Thomas Edison's first public electricity schemes in London and New York.



Operating Mercury Arc Valve at Russell Place Substation

When the Melbourne City Council established its own electricity supply service in 1894, it subsequently acquired the AEC Russell Place site and later integrated it into its 460 / 230 volt DC supply network. The facility was rebuilt as a rotary converter station in 1929. In 1950 it was completely reconstructed as an underground substation, taking supply at 22 kV from the State Electricity Commission's Richmond Terminal Station. From 1962, it also housed glass bulb mercury arc rectifiers to supply the remaining DC load – then mainly lifts – in the CBD. This service was only finally shut down in 2003. The mercury arc rectifiers and open-panel DC switchboard are still in place and were demonstrated on 19 July. Transparent front panels allow visitors to see the eerie blue glow of the mercury arc rectifiers when they are in operation.

Engineering Heritage Victoria, which assisted CitiPower in conducting the Russell Place event, congratulates CitiPower on making the public access to their site possible.

Miles Pierce and Owen Peake
Engineering Heritage Victoria

Shay Locomotives of Christmas Island

Christmas Island, Indian Ocean, is located 1300 km south of Singapore and approximately 2600 km north-west of Perth. It is a small island, the length of the coast being only 80 km. It

became an Australian external territory in 1958. Prior to that, it had been under the administration of the then British colony of Singapore. For most of the twentieth century the major activity was the mining of phosphate deposits for the manufacture of superphosphate.

To service the main mine at South Point, an 18 km standard gauge railway was built from the port at Flying Fish Cove during WWI. The Christmas Island Phosphate Company (CIPCo) purchased three large Shay locomotives from the USA to operate the line: these were ordered between 1914 and 1925. The locomotives were known as 70 ton C class units, having three vertical cylinders beside the boiler which powered a flexible drive shaft that powered bevel gears on the ends of all wheels of the three trucks (or bogies). The boiler was positioned off centre, to compensate for the vertical cylinders on the right hand side. This design of locomotive was developed for the logging industry in the USA, as it allowed large loads to be hauled over rough track and steep grades at low speed.

Given that the coast line of the island is an almost continuous sea cliff, the only way to get machinery onto shore was on small lighters that were loaded offshore. These were then brought up to the island and their cargo hauled up the cliff face by shear legs which had a maximum capacity of 15 ton. Thus each 70 ton machine had to be dismantled and shipped in 15 ton lots. The engineers on the island had the mammoth task of erecting the locomotives and testing them.

The Shays hauled up to 16 phosphate hopper wagons of some 27 ton capacity from the mine at South Point to the terminus at Drumsite. (The train took two hours to make the 18 km journey.) Here the hoppers were uncoupled and lowered in pairs down an incline of 1 in 6; once at the bottom they were shunted into the phosphate works at Flying Fish Cove and unloaded.

In 1935 two of these locomotives had a head on collision which resulted in one locomotive being very badly damaged and ending up at right angles to the track. However, not to be outdone, the CIPCo completely rebuilt it and returned it to service the following year.

All three Shays were in service until the Japanese occupation during WWII. During this time one locomotive was badly damaged in a bombing raid. Post war the remaining two units saw limited service until they were scrapped in 1955.

Australia had four similar three truck standard gauge Shay locomotives in the Wolgan Valley in NSW and their remains were scrapped in the 1950s.

David Jehan

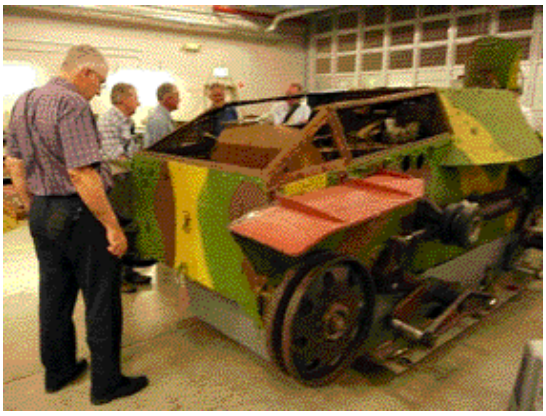
(Readers wishing to know more about these locomotives are referred to David's book, reviewed elsewhere in this issue — Ed.)

Comparing the View

A regular column by EHA past chair, Keith Baker

Restoration and Reconstruction

The EHA Board members took the opportunity of the recent Board meeting in Canberra to visit the Australian War Memorial Annex at Mitchell in the ACT. We were expertly hosted by John Kemister, Senior Conservator of Large Technology at the Australian War Memorial, Canberra who is also a member of Engineering Heritage Canberra. The annex is a large warehouse and workshop where conservation and storage takes place for items to be exhibited at the main Memorial building.



EHA Board members inspect the WWII tank

The previous week I had been to the Da Vinci Machines Exhibition and there were some interesting comparisons to be made. Both had strong elements of engineering heritage and both featured an army tank; in the former case our tour focused on a Japanese WWII tank captured in the Solomon Islands and in the latter a scale model of a tank invented by Leonardo some 500 years earlier. Both places also contained flying machines, self propelled vehicles, lifting machines and a range of worm gears, chain drives, ratchets cams and bearings. Although he was a peaceful man, many of Da Vinci's inventions were developed while he was employed as a military engineer by Cesare Borgia, so in a sense the exhibition was a memorial to 15th century warfare, along with civilian applications and a tribute to his artistic and scientific genius.

Whilst there were similar engineering heritage threads, there were some fundamental differences. The conservation work at the War Memorial involves real articles, albeit in a deteriorated and sometimes degraded condition, returning them to a state as close as practicable to a specific point in time. In the case of the Japanese tank, it was to the condition in August 1942 when it was captured, which was assessed as its most significant historic event. The aim wasn't to be pretty but to be authentic while arresting further deterioration. The tank had been damaged by mine testing after shipping to Australia, inaccurately repainted while in a private collection, and a substantial part of the tracks and some other components were missing. We were shown evidence of meticulous research from photographic records and physical examination to determine wartime damage such as bullet holes and names inscribed by Australian troops which were to be retained, and prior inaccurate restoration to be corrected. This work follows the Burra Charter principles of conservation, combining preservation, restoration and reconstruction to the optimum extent, with emphasis on restoration to the 1942 condition. *Restoration* means returning the existing fabric of a place (or in this case object) to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material. Where new material such as track components had to be introduced for completeness they were accurately manufactured and permanently marked to indicate that they were introduced by the AWM in 2010.

The Da Vinci exhibition displayed models of devices that no longer exist, or in some cases only ever existed as concept sketches. The models had been built with great care using the written evidence that remains, to illustrate that the inventor's ideas were practical and in some cases centuries ahead of their time. In Burra Charter terms this is *reconstruction*, which means returning a place (object) to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric. The exhibition not only allowed the audience to operate most of the reconstructed machines and understand the concept involved, but to gain an insight into Da Vinci's early development of the scientific method in observing mechanisms in nature, understanding the principles and applying them. Whilst restoration is clearly favoured over reconstruction in heritage circles, both have their place, particularly where operating machinery is concerned.

Keith Baker

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Honeysuckle for the unmanned (Robotic) deep space program. Following its move to Tidbinbilla in 1981, it continued in this primary role right until its decommissioning late in 2009.

In his speech, Doug Hargreaves spoke to guests about the Engineering Heritage Recognition Program, and the qualities of significant engineering and social impact that the antenna possessed as part of Australia's involvement in one of the greatest engineering achievements of the 20th century, that of sending man to the Moon and returning him safely to Earth. Dr Baltuck gave details on Antenna DSS-46 and the significant role it has played in the various NASA space programs over the years. Her speech indicated the depth of the attachment that all at CDSCC have to the antenna. Whilst the antenna has now been decommissioned, it is being retained in situ and is planned to form the centrepiece of a new education and heritage facility at CDSCC.

The weekend chosen to present the award was the cusp between Engineering Week and Science Week, thus providing an opportunity to celebrate the bonds between the two professions. The work at Tidbinbilla is a prime example of engineering making the science achievable.

Lyndon Tilbrook

Engineering Heritage Recognition for the Burdekin Bridge

Traffic on the Burdekin River Bridge

Almost 100 guests gathered at Home Hill on the south side of the mighty Burdekin River on Tuesday afternoon, 5 October 2010 as the Governor of Queensland, Her Excellency Ms Penelope Wensley AO, unveiled a marker and replica Interpretation Panel denoting an Engineering Heritage National Landmark award to the Burdekin River Bridge.

The Burdekin Bridge, with its cathedral-evoking steel trusses, was opened in 1957 after a ten-year construction period. It consists of ten 250 foot (76 m) Pratt truss main spans and 22 approach spans with a total length of 1103 m carrying two traffic lanes, one railway track and a walkway.

The bridge has many notable features:

- the river bed at the site is sand to a depth of more than 50m;
- the bridge is founded on waterproof concrete caissons sunk 30 m below the bed level and 15 m below the calculated maximum level of fluidization of the bed in extreme flood conditions;
- it is reputedly the only bridge on a non-solid foundation in Australia (possibly of this size as there are many bridges on driven friction piles, Ed.);
- field joints in the trusses were made with high-tensile bolts, a departure from riveting, which enabled simpler and more rapid assembly and led to the development of later Codes of Practice for such bolts.

The bridge replaced earlier low-level crossings for both rail and road, eliminating the transport disruptions which had occurred on an almost annual basis.

The ceremony was also addressed by Mr Graeme Haussmann, an engineer who worked on the bridge. He related fascinating anecdotes of life on the bridge site during construction whilst a number of other men who worked on the bridge, also at the ceremony, listened intently.

The MC for the event was Ms Janice Ballard, Chair of the Townsville Local Group of Engineers Australia.

After the ceremony guests were invited to inspect the nearby Silver Link Interpretive Centre, developed by the Lower Burdekin Historical Society. The centre contains a superb collection of photographs relating to the construction, opening and life of the bridge.

Brian McGrath

Marker for Restored Humphrey Pumps

The Deputy National President of Engineers Australia, Merv Lindsay, presented an Engineering Heritage National Landmark marker for two pumps at Cobdogla in South Australia's Riverland on 13 June 2010. The plaque was accepted by SA Water's Principal Salt Interception Engineer, Peter Forward, who was involved in restoring the pumps in the 1980s.

The ceremony was attended by the President of Engineers Australia South Australia Division, Doug Gillott, the South Australian Heritage and History Group Chair, Professor Martin Lambert, and representatives of engineering heritage groups from South Australia, New South Wales and Victoria including the Cobdogla Steam Friends Society, the Barmera Branch of the National Trust and the Humphrey Pump Operators Group.

The pumps, on display at the Cobdogla Steam and Irrigation Museum, were designed by the celebrated British mechanical engineer Herbert Humphrey. One of them has been restored to operational condition and is the only functional Humphrey pump in the world. There are three Humphrey pumps still surviving at the Chingford pumping station near London as well as the two at Cobdogla.

The combusion head of the Humphrey pump

Apart from valves on the combustion chamber and the water inlet, the pumps have no moving parts. Instead, a charge of gas is ignited in a combustion chamber nearly 2 m in diameter which forces water down one side of a U-shaped pipe, which lifts the water in the other side into the outlet channel. Acting like a single-cylinder four-stroke engine with a mass of water instead of a piston, each stroke delivered almost six tonnes of water from the Murray River into the irrigation channel. At their peak, the two pumps at Cobdogla could deliver more than 6 ML per hour. The pumps, made by the Scottish firm William Beardmore & Co, arrived at Cobdogla in 1922 and took more than three years to install.

Timber from the area was used to make "producer gas" which powered the pumps.

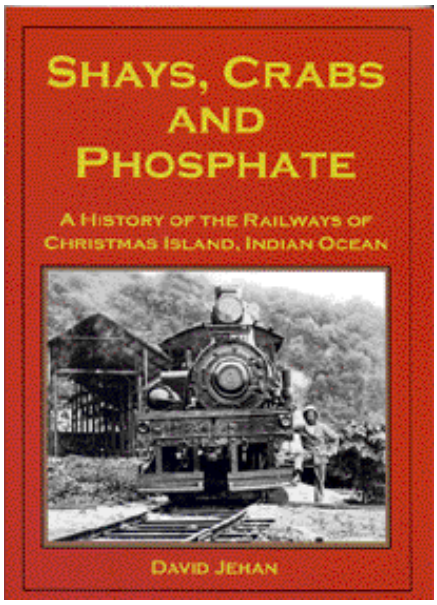
The producer gas plant was designed by Adelaide engineer Wilfred Farrington Saunders and built by May Brothers of Gawler.

The pumps were replaced with electrical units in 1965. Work on restoring the pumps began in 1985 and the Museum opened in 1986.

Richard Venus

Book Review

David Jehan, *Shays, Crabs and Phosphate : A History of the Railways of Christmas Island, Indian Ocean*, Light Railway Research Society of Australia Inc, Melbourne, 2008, 136pp, Paperback.



Christmas Island is well known to Australians today because of illegal immigrants and asylum seekers. However, long before this it was well know as a source of high grade phosphate which is used in the production of superphosphate.

The Christmas Island Phosphate Company was formed in 1897 and started operations on the island in 1899. The island was occupied by the Japanese during WWII and in 1948 the phosphate operations were taken over by the British Phosphate Commissioners. This continued until the Phosphate Mining Company of Christmas Island assumed control in 1981 and operated until 1987.

A system of industrial railways was built, to transport the phosphate to the port on gauges of 2 ft (610 mm) and 4 ft 8 in (1435 mm). Given the small size of the island, the variety of locomotives - both steam and internal-combustion – was surprising. The locomotives were sourced from the USA, Canada, Germany, the United Kingdom and Australia. As this book explains operating and maintaining them in such a remote location provided a constant challenge.

However, this book is not limited to describing the locomotives, and the operation of the railway. It explores the way the industry was managed, the living and working conditions, the use of passenger trains, and the unique problems caused by the huge population of red crabs living on the island.

The book makes good use of maps, stamps and diagrams to describe the operations of the railways and to show their place in the whole materials handling task that existed on the island. There are some 154 high quality photographs, the bulk of which come from the National Archives of Australia.

Available at a special price of $35 per copy (autographed), from David Jehan, 69 Myall St., Oatley, NSW, 2223. Postage included anywhere in Australia.

Ross Mainwaring
Rail & Mining Historian

Engineering Heritage Australia Conference, 13-16 November 2011, Hobart Tasmania

Planning of the various segments which make up a successful heritage conference is well advanced. Two keynote speakers, Professor Geoffrey Blainey and Mr Michael Chrimes (ICE) are coming. The deadline for the submission of abstracts is 28 February 2011. Registrations will be invited in June 2011.

The four-day pre-conference tour will include the Oatlands 1837 flour mill, back in commercial operation, a blacksmith's shop in Launceston, the Tasmania Gold Mine at Beaconsfield, the landmark Cethana Dam, the West Coast Wilderness Railway (the 1897 Abt railway restored), the Pioneers Museum in Zeehan, the restored 1914 Lake Margaret Power Scheme and the amazing Huon Pine Wall.

Plans are also well advanced for a one day training course to be held in conjunction with the conference. The course will be aimed at engineers wishing to obtain NPER registration in Heritage and Conservation Engineering.

More information is available on the conference website www.cdesign.com.au/ehac2011

Awarding Merit

Reporting of Awards of Merit has got somewhat behind. In order to catch up, this column lists the names and dates of Awards of Merit made in recent years which have not been the subject of Newsletter articles.

Jim Paton	November 2007
Bryan Homann	February 2008
Richard Venus	February 2008
Paul Hagenbach (posthumous award)	March 2008
Trevor Horman	July 2008
John McCutchan	November 2008
Geoffrey Cossins	June 2009
Robin Black	August 2009
Richard Hartley	October 2009
Peter Spratt	November 2009
Ross McIntyre	December 2009
Nigel Ridgway	February 2010
Ian Bowie	April 2010
Ron Powell	April 2010
Wally Mills	June 2010
Tony Moulds	July 2010

For further information on the Award of Merit Program contact Katrina Chisholm at Engineers Australia National Office on (02) 6270 6584.

Owen Peake

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