Past Heritages, Future Prospects

10th Congress of the International Mining History Association

and

20th Annual Conference of the Australasian Mining History Association

6-11 July, 2014

Charters Towers, North Queensland, Australia

Painting of Charters Towers from the Day Dawn Ridge by William Allom, 1895

CHARTERS TOWERS REGIONAL COUNCIL

Exceptional Service for an Exceptional Community

Message of Welcome

As Mayor of the Charters Towers Regional Council, it is my immense pleasure to welcome delegates to your Australasian Mining History Association annual conference and International Mining History Congress to our fine town of Charters Towers.

My Council and the entire community are delighted you have chosen our historic mining town as the location for your 2014 annual conference. I note there is also an international flavour to your conference with delegates from the UK, USA, Japan, India and China. As an international destination in the mining boom of 130 years ago, it is fitting that once again we will be a hub for international mining interest.

I assure you as a community of very friendly people, we will do everything in our power to make you most welcome and to ensure that your visit is both memorable and enjoyable.

COUNCILLOR FRANK BEVERIDGE

Mayor

Charters Towers Regional Council

PO Box 189
CHARTERS TOWERS QLD 4820
Administration: 12 Mosman Street
ABN 67 731 313 583

Telephone: (07) 4761 5300
Facsimile: (07) 4761 5344
Email: mail@charterstowers.qld.gov.au
www.charterstowers.qld.gov.au

AUSTRALASIAN MINING HISTORY ASSOCIATION

President's Foreword

The AMHA Executive welcomes you to Charters Towers and thanks you for your attendance at the 20th annual conference. We also welcome international mining historians for the 10th International Conference which is combined with the Australasian one.

Charters Towers has a colourful mining history since its discovery in 1872. Ravenswood as a sister mining town has been a major contributor to Queensland mining output through silver and gold. Carpentaria Gold Pty Ltd is the major operator in the Ravenswood area today and will be hosting a tour of the mine and town on 7 July. The late Kett Kennedy's book, *Spruikers' Corner* provides an excellent overview of the history of both mining towns from their discovery to date through biographies of all the politicians elected for the local electorates. The late Diane Menghetti's book, *I remember: Memories of Charters Towers,* in 1989 vividly outlined the social history of Charters Towers.

Our conferences seek to concentrate on minerals for which the particular area is famous – gold in this case – though we accept papers on a wide range of topics. Papers cover north Queensland places - Charters Towers, Ravenswood, Wolfram Camp, Mary Kathleen, Mount Coolan – together with national and international mining history. Topics and places covered include India, China, Egypt, Spain and Portugal, Japan, Korea, Alaska, Malaya, Laos and New Caledonia. There are also papers on Australian significant mining figures and other regional locations of Australia.

Conferences such as this happen through the enthusiasm and conscientious work of the organisers. Dr Kett Kennedy of Charters Towers and retired History Professor at James Cook University in Townsville took on the task of organizing the Charters Towers conference in 2012. Kett tragically died on 22 February 2014 and since then Ross Both, Mel Davies, Peter Bell, Jan Wegner and I have taken up the organization role. The Charters Towers Regional Council has been of enormous assistance and the association thanks them for that.

Dr Ruth S. Kerr OAM

President AMHA

The Charters Towers Goldfield

There were small mineral discoveries all over North Queensland from 1862 onward, but they were mostly short-lived alluvial deposits. That changed on Christmas Eve 1871 when an Aboriginal boy called Jupiter Mosman picked up a gold specimen at a place that the Mining Warden would call Charters Towers, after his colleague William Charters and the granite "tors" which dotted the hills. Hopeful diggers arriving in the following months found there was not much alluvial gold available, but a lot of reefs that required capital to work. A difficult period of development followed, but in the early 1880s the success of the Day Dawn Mine, followed by the railway from Townsville in 1882, an influx of London capital, and the discovery of the Brilliant reef in 1889 confirmed Charters Towers as a major goldfield.

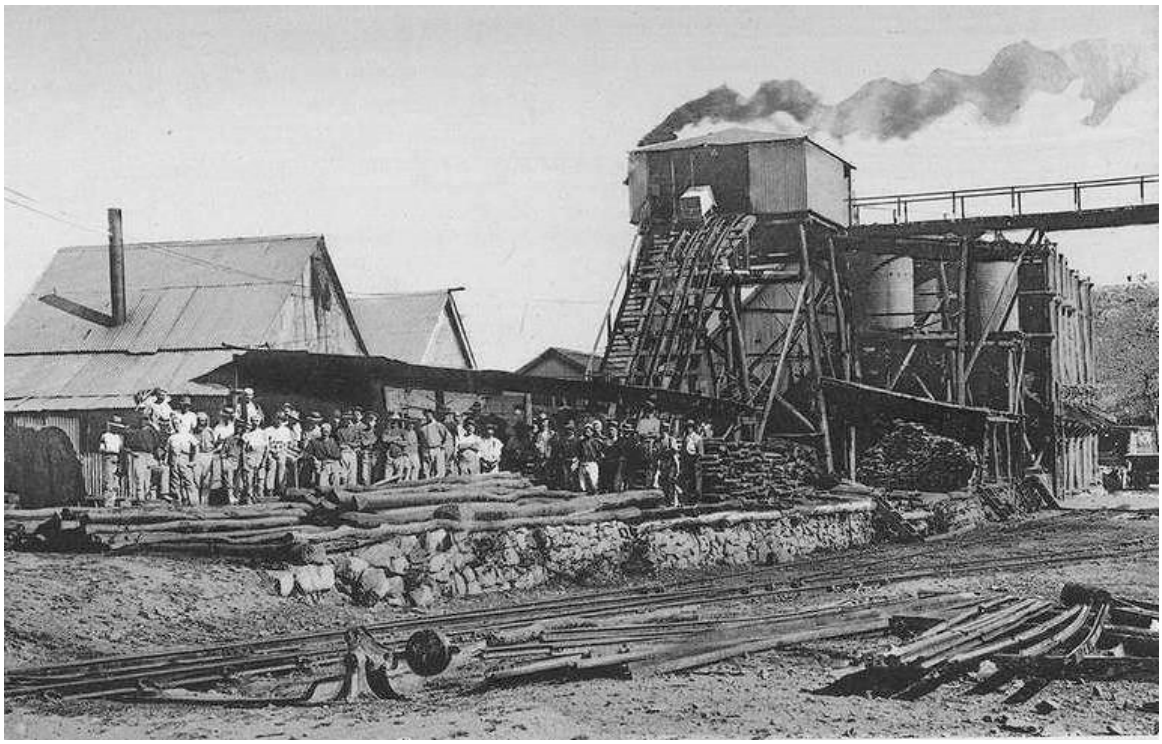
From the early years of milling sulphide ores, the miners knew that a certain amount of gold was lost in the tailings, but these were simply discarded into the creeks. With the arrival of the cyanide process in 1892, it was discovered that it worked well on the sulphide tailings. There was a new rush to peg leases over the creek beds downstream from the mills, small cyanide works proliferated on the field, and Charters Towers experienced its peak production in 1899, boosted by the massive cyanide re-treatment output.

Charters Towers had a population of over 25,000 by 1900, housed in about 6,000 mostly timber houses, the second-largest city in Queensland and the largest in the northern half of Australia. The busy Charters Towers-Townsville railway axis dominated the northern economy. It was a booming, cosmopolitan city, with every amenity known to European civilisation, from opera and French fashions to electric street lights and ice-cream. Its citizens complacently called it "The World", implying that it was unnecessary to travel anywhere else. It was famous for the brass bands that played in the streets on Saturday nights, although Thadeus O'Kane, the acerbic editor of the *Northern Miner*, pointed out that this was because the "government duffers" who surveyed the town had neglected to provide any parks or public open spaces.

In all, Charters Towers produced over 200 tonnes of gold - worth about £25 million at the time - but the arrival of the twentieth century was like the turning of a page in history, and output began to decline in every year after 1900. It was the problem common to all ageing underground mines of rising costs and falling returns: the biggest mines were down to 3,000 feet (900m) and being worked at ever greater expense while the ore grades were declining. One by one the deep mines closed and turned their pumps off, increasing the pumping costs of all their neighbours. As the population shrank, timber houses, churches and hotels were dismantled and railed to the growing sugar towns of the coast, or the wool and cattle grazing towns of the west. By 1910 the decline was rapid, and the First World War silenced the brass bands. When the diggers started arriving home in 1918 every significant mine and mill in Charters Towers had closed.

Charters Towers re-invented itself, finding a new staple industry through a clever, calculated program. At 300m altitude, the district has what was called a "healthy upland climate", and the churches were invited to establish boarding schools. The empty mansions of the mining magnates were converted to private secondary schools, starting in 1919. Although the city has shrunk to less than half the population of the mining boom, it has maintained a healthy economy based on secondary education, the sheep and cattle industries and the Mount Isa railway.

Charters Towers



Day Dawn Block & Wyndham Mine, largest producer on the Charters Towers field

The Royal Arcade housed one of the two Charters Towers stock exchanges

Conference Programme

Sunday 6 July

Shuttle transfers from Townsville to Charters Towers (times to be advised)

4.00-6.00pm	**Registration** –World Theatre Complex
5.00-6.00pm	**Social gathering** – Foyer, World Theatre Complex
7.00pm	**Advisory Committee Meeting** – Woodburn Stevens Seminar Room in the World Theatre Complex

Monday 7 July

PRE-CONFERENCE TOUR

7.45-8.00am	**Registration** – World Theatre Complex
8.15am-5.00pm	**Ravenswood tour**, depart from World Theatre Complex.
	Tour leader: Peter Bell.
6.00pm	**Civic Reception** hosted by Charters Towers Regional Council in the Stock Exchange

Tuesday 8 July

8.00-8.20am	Registration – The World Theatre Complex
8.30-8.45am	Official Opening
8.45-9.35am	**Keynote Speaker**
	Chair: Ruth Kerr
	Peter Bell *A brief history of mining in North Queensland*
9.40-10.40am	**Charters Towers Session**
	Chair: Ruth Kerr
	Jim Berry *The Queensland artist William Jamieson Allom (1832–1902)*
	Jim Morrison & Ian Hodkinson *Don Johnson's Charters Towers Mining History: the importance of historical data*
10.40-11.05am	Morning Tea
11.10am-12.40pm	**Non-European involvement in Australian mining**
	Chair: Jan Wegner
	Paul Macgregor *Race relations on the goldfields: the Chinese reconsidered*
	Sandi Robb *"One is tempted to ask … whether one is in an English colony, or in a Chinese Town, the pigtails are so plentiful": a brief look at the Chinese communities of Ravenswood, Millchester and Charters Towers*
	Kal Ellwood *Aboriginal prospectors and miners in North Queensland*

12.40-1.25pm	Lunch
1.30-3.00pm	**Mining investment and development**
	Chair: Brian Hill
	Erik Eklund *Atomic Town: Mary Kathleen and post-war Australia, 1954-1981*
	Anthony Styan *"Meat Hunger" to the Metals Exchange: Wolfram Camp, 1894-1920*
	Robin Gendron *Going global?: the struggle over foreign investment in New Caledonia's nickel industry from the 1960s to the 1980s*
3.00-3.25pm	Afternoon Tea
3.30-5.30pm	**Mining technology-methodology-analysis**
	Chair: John Isdale
	Matthew Churchward *'A million pounds and not a penny return': the unfortunate saga of the Moolort and Charlotte Plains Deep Leads*
	Lloyd Carpenter *A new paradigm for digging up mining history in the 21st century: the "Goldfields Explorer" heritage interpretation App for smartphone and tablet - proposals, problems and potential*
	Nicola Williams *Colour in minerals: how were they found - observation, planning, serendipity?*
	Tom Barker *Thames Goldfield production statistics and why the numbers don't always add up*
5.30-6.15pm	Bar snacks – The World Theatre Foyer
6.30pm	Movie Evening –The World Cinema - **'Beneath Hill 60'** – with commentary and background by Executive Producer Ross Thomas

Wednesday 9 July

8.30-10.30am	**Mining in Asia**
	Chair: *Paul Macgregor*
	Hiroshi Ichihara *Korean miners in Japanese coalmines during World War 11*
	Dhiraj Kumar Nite *Women mineworkers and family-oriented labour: Indian collieries (Jharia), 1895-1948*
	John Edgar & Nigel Chang *Twenty-five centuries of copper mining and the 21st century: an example of heritage collaboration from the Lao Peoples Democratic republic*
	Xiaolu Wu *A brief history of the Tianfu Coal Mining Company and its cultural impact on local everyday life*
10.30-10.55am	Morning Tea

11.00am-12.30pm	**Mining personalities and entrepreneurs** *Chair:* Erik Eklund
	John Ferguson *Philip Jon Stephenson OAM: Earth scientist, explorer, educator*
	Helen McMonagle *Sir Bruce Watson: memories of the Queensland mining industry, 1950-1965*
	Adrian Hutton *William Tipple Smith: Australia's unsung mining industry hero*
12.30-1.25pm	Lunch
1.30-3.30pm	**Gold mining – corporate development**
	Chair: Robert Vernon
	Robin McLachlan *Branding the Klondike: influence of the Klondike Goldrush on Australian and New Zealand culture*
	Victor Bibby *Golden Raub hydro power, Pahang, Malaya*
	John Woodland *Haim Guedalla: "the gold mine shareholders' invaluable friend"*
	Simon Richards, Peter Tamaduk & Janrich Buys *Opportunities for mineralisation in Charters Towers: looking to the past to uncover future resources*
4.30pm	Optional visit to Tower Hill or conducted historical walking tour of the town, followed by optional barbecue at Charters Towers Civic Club

Thursday 10 July

8.30-10.30am	**Company mining – gold and silver: a country comparison**
	Chair: Ross Both
	Brice Mutton *Mount Coolon (Koala) gold mine: "Queensland's great unknown mine"*
	Susumo Imano *From gold mine to urban mine*
	John Isdale *"HAURAKI!" Golden Past! Glorious future?: Hauraki Goldfields 1852-1952, before and beyond*
	Robert Vernon *John Taylor and Sons, mine promoters and managers: seventy years of mining in Spain and Portugal*
10.30-10.55am	Morning Tea
11.00am-1.00pm	**AMHA Annual General Meeting** followed by **IMHA Meeting**.
1.00-1.55pm	Lunch
2.00-2.50pm	**Keynote Speaker**
	Chair: Mel Davies
	Collin Myers *The challenge of standing on the shoulders of giants*
3.00pm	Optional Tours: Venus Battery, or conducted walking tour of the town
6.30 for 7.00pm	**Conference Dinner** – Halse Hall, All Souls St Gabriels School

Friday 11 July

8.30-10.30am	**Mining heritage and archaeology**
	Chair: Adrian Hutton
	Peter Bell *The Ravenswood Goldfield*
	Chris Green *Ravenswood (North Queensland) and Banska Stiavnica (Central Europe): 2 sites compared*
	Christopher Davey *Discovering mining technology: excavation techniques in Late Period Egypt*
	Peter Claughton *Australian silver: new questions, old answers?*
10.30-10.55am	Morning Tea
11.00am-12.30pm	**Coal, oil and gas**
	Chair: Wendy Carter
	Leonie Knapman *Berrima Colliery: coal from 1860s to 2013*
	Nic *Haygarth* *"This mountain may run your motor car": early 20th century shale oil shenanigans in the Tasmanian high country*
	Jim Enever, Mike Wood, Rob Jeffrey & Lincoln Paterson *The birth of the coal seam gas industry in Australia: the role of research*
12.30-1.00pm	**Official closure**
	Shuttle transfers to Townsville (times to be advised)

The following Poster Presentation will be on view during the conference:

Eric Heidecker *Organic regeneration for climate management since the 1880s: Towers Hill Scientific Reserve, Charters Towers Goldfield*

Saturday 12 July

Shuttle transfer to Townsville (time to be advised)

See details on post-conference self-drive mining heritage tour on AMHA webpage at:

<http://www.mininghistory.asn.au/wp-content/uploads/2014/06/self-drive-mining-heritage-tour-from-cairns.pdf>

Abstracts

Thames Goldfield production statistics and why the numbers don't always add up

Tom Barker

Thames School of Mines Research Unit, Thames, New Zealand

Stories and rumours are integral to the histories of goldfields but what do the statistics say? A review of the output of New Zealand's Thames Goldfield as a whole offers some surprising insights into the history of this goldfield. The historical production data from a selection of mines has been chosen to compare and contrast against written and oral historical perspectives of the Thames Goldfield. In keeping with the conference theme, the historical data will be compared with production data from the modern Newmont Gold operation in Waihi, New Zealand.

A brief history of mining in North Queensland

Peter Bell

Consulting historian, Adelaide, SA

North Queensland was the earliest part of Australia sighted by Dutch explorers in 1606, but one of the last settled, not occupied by Europeans until the 1860s, after separation from New South Wales. Pastoral settlement was quickly followed by small discoveries of gold and copper ore. Then in the late 1860s and early 1870s came a succession of major gold discoveries: Ravenswood and the Etheridge in 1869, Charters Towers in 1871, the Palmer in 1873. They were followed by Croydon and Mount Morgan in the 1880s.

These events brought an enormous upsurge in population, accompanied by an increase in wealth that financed the construction of roads, railways, ports and other infrastructure to serve the rapid growth. New ports like Cairns, Port Douglas and Cooktown were established in the 1870s to serve the mining industry. In the north, the mining industry expanded faster than grazing, and in many areas the miners reversed the pattern of southern Australia by being the first Europeans to arrive. Charters Towers became Queensland's greatest goldfield, producing ten tonnes of gold each year. From a few bark huts on a sheep run in 1872, in 30 years it expanded into the largest city in Queensland after Brisbane, and the largest in the northern half of Australia. Its wealth would later be outstripped by Mount Morgan's, but there the profits went straight to London and local development remained modest.

The great gold rushes were only the beginning of a diverse mining economy. In the next few decades other commodities such as tin, copper, silver and tungsten continued to create towns such as Herberton, Irvinebank, Cloncurry, Chillagoe, Mungana, Wolfram, Mount Molloy and Mount Garnet all over the north. Coal fields opened at Mount Mulligan and Collinsville. The largest mineral deposits in Queensland were only discovered at Mount Isa in the remote north-west as late as 1923. In more recent decades newly-valuable metals such as uranium, bauxite and nickel created more mining towns like Mary Kathleen, Weipa and Greenvale. The Bowen Basin coal mines provide one of Australia's greatest export industries. The Carpentaria Mineral Province surrounding Mount Isa is newly resurgent, with Phosphate Hill, the Century zinc mine, the Ernest Henry mine and Cannington. The latter opened in 1997 and is already the world's largest silver producer. As Geoffrey Blainey reminds us, the rush has never ended.

The Ravenswood Goldfield

Peter Bell

Consulting historian, Adelaide, SA

Ravenswood is no ordinary town. It is the oldest surviving inland town in North Queensland. It is a town planning nightmare, because the government surveyor didn't arrive until long after the local people had made their own arrangements; the largest mine in town was across the street from the school. It was the first significant goldfield discovered in the northern half of Australia. The house where one of the Ravenswood schoolteachers lives today is the oldest standing house in any town in North Queensland. Ravenswood had the first railway in Australia built to serve a silver mining field - yes, silver, not gold. Although Ravenswood was a rich mining field, it had some of the most obstinate, frustrating polymetallic sulphide ores in Australia, and this put it in the forefront of technological innovation; it was the first place where the chlorination process and Wilfley tables were used in Queensland, and the first place where the cyanide process for extracting gold was used in Australia. A hundred years ago its abandoned mineral treatment plants formed one of the world's finest museums of gold processing machinery. The New Ravenswood Company consolidated the leases under one ownership, transformed gold treatment with successful technology in 1899, and Ravenswood experienced its most prosperous years when many Australian goldfields were already closing down. The town's rich legacy of Edwardian buildings dates from those boom years. But even technological innovators can fall prey to bad management practices and fanciful geological theories; the mines closed in 1917 and Ravenswood became the first town in Queensland to have its railway closed. It shrank to a population of about sixty people and perhaps a thousand goats, but the solid brick buildings of the boom years anchored its core, and the township survived for 70 years until mining re-commenced by open cut methods in 1987.

The Queensland artist William Jamieson Allom (1832 – 1902)

Jim Berry

Scheding Berry Fine Art, Northwood, NSW

The paper examines a previously unknown painting by the artist, William Jamieson Allom, that was originally believed to be set in Victoria in the 1860s. It shows an alluvial minehead and probable syndicate of owners. However, research, aided by Robert Ashley, now strongly suggests that the painting (to be illustrated), which was originally in a very dilapidated state, was likely to have been painted in the 1880s in Charters Towers or its surrounds. Research has so far not established the mine, but there appear many clues in the painting.

This process of research and restoration of the painting will be described and background information on the painter will be provided. The painting will be available to view and comment upon.

Golden Raub hydro power, Pahang, Malaya

Victor Bibby

By 1900 the Raub Australian Gold Mine in Pahang, Malaya, was operating with 80 head of stamps entirely on hydro electrical power. The power station on the Sungei Sempam, 7 miles from Raub, provided 300 BHP by two-phase 5000 volt bare copper cables strung on 12 inch 18 foot wooden posts seven miles through virgin jungle. The dam and penstock were of concrete and the flume of timber. Much blasting was required to build the dam and the power station. The electrical

machinery in 5 ton loads was transported from a railhead 35 miles across a mountain range by bullock cart. Gold production continued throughout construction.

It was the brain child of William Bibby, the first manager who established the mine in 1889. William started talking about mine electrification as early as 1891, after submitting a proposal to the board in 1895 which was initially rejected, not only for cost concerns but also because of doubts about the technology, a view that prevailed about the use of electricity in mining circles at that time in some parts of Australia. He saw great savings in the cost of operations in the use of electricity and harboured no such doubts. It was a remarkable achievement by a small group of miners and local workmen who seemed to have the ability to tackle anything and overcome prevalent sickness and disease and other difficulties that nature presented. It stands as a monument to their endeavour and William's foresight, still providing power to the Malaysian national grid over 110 years later. This is a short treatise on how it was built and includes images and extracts from actual progress reports.

A new paradigm for digging up mining history in the 21st Century: the *'Goldfields Explorer'* heritage interpretation App for smartphone and tablet - proposals, problems and potential

Lloyd Carpenter

Lincoln University, Lincoln, New Zealand

After working with the New Zealand Department of Conservation to re-work the interpretation panels at Otago's Bendigo Historic Park, the author became increasingly frustrated with the limitations of interpretation panel rules, under-funded budgets and inaccurate or incomplete heritage displays. This prompted a proposal to work with the team at the University of Canterbury's Human Interface Technology Laboratory to develop the *Goldfields Explorer* App for smartphone and tablet computers. Having secured funding for four Central Otago goldfields sites, the group successfully rolled out the first of the Apps: *Goldfields Explorer Bendigo*.*

The paper will discuss the various platforms available for Augmented Reality interpretation of heritage sites, what was intended with the development of the *Goldfields Explorer* App, the limitations the group worked under, the problems encountered, the opportunities the App provides for additional mining (and other) heritage interpretation, and ideas for doing more to bring New Zealand's colonial history alive.

*The App is available at: https://play.google.com/store/apps/details?id=com.hitlabnz.og

"A million pounds and not a penny return": the unfortunate saga of the Moolort and Charlotte Plains Deep Leads

Matthew Churchward

Engineering and Transport, Museum Victoria

In 1897-8, British investors and the associated West Australian Goldfields Limited acquired extensive alluvial mining leases in the Loddon Valley of northern Victoria, commanding the lower portions of the famous Berry and Majorca Deep Leads. Over the following decade some £1,000,000 would be invested in six of the best equipped deep lead mines ever seen in Victoria. Despite the best technical advice and management available, the largest and most efficient concentration of pumping plant ever installed in the state and a host of technical innovations, including Australia's first centralised electric power station and transmission system for mining

and Victoria's largest steam-powered pumping installation, none of the mines ever achieved sustained production and the entire investment was lost.

This paper will examine the remarkable technical innovations of these British-owned mining enterprises and explore some of the reasons why they ultimately all failed, hastening the demise of Victoria's deep lead mining era.

Australian Silver: new questions, old answers?

Peter Claughton

University of Exeter, U.K.

In Australia, during the so called 'silver boom' of the mid-1880s, the processing of rich silver-bearing ores was a key issue. For some fields, such as that in the Barrier Ranges of western New South Wales (NSW), where rich silver chloride, or horn silver, was found at shallow depths, the precious metal content of the ore justified its shipment for processing elsewhere. In most cases some form of processing was required on or near the site of extraction to reduce the bulk of the product and enhance its value. For most mines in eastern Australia there were, however, problems associated with the nature of the ores, the frontier environment in which they operated and particular environmental issues, such as the general lack of reliable water supplies, which influenced their choices.

This paper explores those choices, making comparisons with similar scenarios in Europe from earlier periods, and looking at how experience elsewhere influenced decisions on the ground in eastern Australia. In many cases the decision was made to smelt on site and export the product as either a silver-rich matte or as silver-lead bullion for refining elsewhere, although in at least one case the bullion was also refined on site. The decision to smelt introduced further choices: the type of furnace to be used, fuel supply and access to suitable fluxes. Added to which, these choices were being made against a background of uncertainty as to the market and steadily declining prices.

Using experience gained in researching silver mining in England and Wales, and the links with central Europe, the author examines the decisions made at mines in the Barrier Ranges, northern and eastern NSW, including Sunny Corner, and in Queensland. The latter provides some useful examples, including operations in the Herberton district of north Queensland and the developments at Montalbion, to illustrate the choice of processing techniques.

Discovering mining technology: excavation techniques in Late Period Egypt

Christopher J. Davey

Australian Institute of Archaeology, La Trobe University, Bundoora, Vic

While the technology of craftsmen may be studied from their creations, miners' products are removed leaving underground openings. This paper explores the ways that marks on the walls of these openings may be used to identify the tools employed by the miners and the ways they were used. Two tunnelling methods have been be reconstructed from 'false-ends' found in the Cow Galleries of the Sacred Animal Necropolis, Saqqara, Egypt. One method exploited the properties of the limestone beds using a flat-backed top-heading and benching system to create the main passage and to produce building material. The other method produced chambers with arched roofs. Chiselling techniques reminiscent of draw-cuts, burn-cuts and smooth-wall blasting are evident. All miners were right handed and worked in teams.

Twenty-five centuries of copper mining and the 21st Century: an example of heritage collaboration from the Lao Peoples Democratic Republic

*John Edgar and Nigel Chang**

Department of Anthropology, Archaeology and Sociology, James Cook University, Townsville, Qld

We outline the collaborative efforts of the Department of National Heritage of the Lao PDR, MMG-LXML operations at Sepon, Laos, and the Department of Anthropology, Archaeology and Sociology, James Cook University, Townsville to balance heritage, mining and research challenges at a large open cut mine in southern Laos. Since 2008 a series of excavations at Peun Baolo, within the MMG-LXML mining tenement, has revealed extensive evidence of iron age copper mining and smelting activity, intermingled with associated burials of the miners themselves; some of which suggest even earlier bronze age exploitation of the resource. Elsewhere on the tenement, archaeological salvage excavations within active open cut pits have revealed remarkably preserved evidence of ancient timber mine shafts dating to more than 2000bp, and extraordinary examples of basketry and mining implements.

In this paper we discuss not only the evidence of very early mining technology and society in Southeast Asia, but also how the stakeholders are working to maximise the heritage potential of the archaeology within a modern working commercial mining operation.

*Co-authors: Thongsa Sayavongkhamdy, Viengkeo Souksavatdy, Samlane Luangaphay, Thonglith Luangkhot (Department of National Heritage, Lao PDR); Antonino Tucci, Warren Mayes (Cultural Heritage Unit, MMG-LXML, Sepon, Laos); Marion Ravenscroft (Lao National Heritage Museum).

Atomic town: Mary Kathleen and post-war Australia, 1954-1981

Erik Eklund

Gippsland Campus, Federation University, Vic

Mary Kathleen was a purpose-built company town located in northwest Queensland. It was created to work a rich uranium oxide, or yellow cake, deposit discovered in 1954. The town's curved streets, modern materials and progressive urban planning scheme were a world away from the fly-in-fly-out arrangements that dominate mining in remote and regional areas today. The extensive company records remain untouched at the University of Melbourne Archives. This paper uses the example of Mary Kathleen to explore key themes in post-war Australian history while also considering the influences of prior uranium mining communities in Australia and overseas.

The design of Mary Kathleen represented a strong statement about transplanting a functional, suburban community into the bush (Iwicki & Jones, 2012). In many ways it was emblematic of post-war Australia with the rapid growth of suburbs, all achieved through a mix of public and private investment (Darian–Smith, K and Willis, J 2007). Mary Kathleen, however, was a pioneer in terms of planning principles with Robert Freestone suggesting that it represented '[t]he most decisive break with past traditions'. (Freestone, 2010: 130) Its large access roads ringing the settlement, its curved interior streets hugging the contours of the hills, and the provision of open parkland would not look out of place in contemporary growth corridor suburbs in Australian cities.

A history of Mary Kathleen is also significant because it can shed light on our complex and changing international relationships in the 1950s and 60s. The US alliance was increasingly important from 1942, further reinforced by the ANZUS Treaty of 1951, yet Australian-British co-operation in specific areas was still vitally important. British power was on the wane in the Far

East, but there were still plans to utilize Dominion or Commonwealth resources for the development and maintenance of British military power (Reynolds, 1998). Mary Kathleen played a little-known though pivotal role in these wider geopolitical changes. Mary Kathleen would be the source of the raw materials to fuel that British program, and possibly further evidence that Australia was interested in acquiring nuclear weapons capability (see especially Reynolds, 2000).

Aboriginal prospectors and miners in North Queensland

Kal Ellwood

School of Arts and Social Sciences, James Cook University, Cairns, Qld

The history of Aboriginal mining in post-contact Australia has been both neglected by historians and forgotten by the community. In North Queensland alone there are 22 named individuals, 17 named families and an unknown number of the nameless who were Aboriginal miners and prospectors mentioned in the historical records. The two best known are Pluto and his wife Kitty Pluto, who made major gold finds on the Batavia goldfield around the turn of the 20th century. Two other important miners and prospectors in the same area were Romeo and Friday Wilson. Their lives encapsulate some of the themes associated with Aboriginal miners: their independence from the controls of the Act, and their use of European names to take up leases and European social structures, and their ability to move between industries.

The birth of the coal seam gas industry in Australia: the role of research

Jim Enever, Mike Wold, Rob Jeffrey and Lincoln Paterson

CSIRO, Melbourne, Vic

Today CSG is a booming new industry in Australia, albeit with more than its share of controversy around environmental issues. Twenty five years ago, however, it was far from clear that a viable industry would ever come to pass. At that time, the prime concerns to the pioneering groups attempting to get the industry off the ground were understanding the factors controlling the potential to produce gas in economic quantities and at economic rates, and the production technologies best suited to Australian conditions.

CSG in Australia had its genesis in the coming together of the efforts made by the underground coal mining industry to manage its long standing problems associated with the mining of gaseous coal seams, and the early success of CSG as a stand alone industry in the USA. Various local groups formed working relationships with consultants from the USA during the 1980s and early 1990s to undertake pilot projects in both the Bowen and Sydney Basins. In parallel with this, there was a presence by some of the major US CSG producers in their own right. The knowledge and expertise underpinning these endeavors was largely proprietary. It was in this environment that CSIRO initiated a comprehensive locally-based research program, building partly on its previous involvement with the Australian coal mining industry and partly on a newly-formed nucleus of petroleum engineering expertise, to provide a sound basis upon which the industry could grow.

CSIRO's research program was structured to integrate with other research activities going on in Australia and overseas at the time, and to build on the data flowing from the activities of the pioneering operating groups. Valuable understandings/technological advances were achieved in several areas, some of which have found a place in the tool kit of the emerging industry in Australia.

Philip Jon Stephenson, OAM: earth scientist, explorer, educator

John Ferguson

Philip Jon Stephenson, 1930-2011, was better known as "Doc Jon" or "PJ". Born in Brisbane, he graduated in Geology from the University of Queensland. In 1957 he completed his PhD at the Imperial College London with a study of the Mt Barney Volcanic Complex. From 1961-1995 he was Associate Professor at James Cook University, (JCU), Townsville.

Formative factors in his life and career included: outdoorsman and adventurer with a passion for mountains, rocks and expeditions; the only Australian, as Geologist, on the successful Trans Antarctic Expedition of 1957-8, which included over-wintering in a three-man party; foundation staff member of JCU; inspiring educator and accomplished researcher, especially of igneous complexes of Queensland, Antarctica, Heard Island and Himalayas; an unassuming, powerful, versatile personality; and a family man.

His legacy includes: numerous scientific publications, compendiums and his book "Crevasse Roulette" (2009); the high status of JCU in Earth Sciences; numerous students who went on to be mining geologists: the first Australian to reach the South Pole driving a dog team as pathfinder; remote, natural landforms bearing his name - Stephenson Bastion in Antarctica and Stephenson Glacier and Lagoon on Heard Island.

In harmony with his nature and life, his ashes rest high on lofty Mt Barney.

Going global?: the struggle over foreign investment in New Caledonia's nickel industry from the 1960s to the 1980s

Robin S. Gendron

Department of History, Nipissing University, Ontario, Canada

The nickel industry has been the mainstay of New Caledonia's economy since the late 19th century. In its early years, the development of this industry depended heavily on 'foreign', i.e. non-French, entrepreneurs and capital, mostly British and Australian. But by the first decades of the 20th century the industry was largely dominated by the French firm *Société Le Nickel* [SLN]. By the 1960s, however, internationalisation of the global nickel industry had convinced many Caledonians that their interests lay in ending SLN's virtual monopoly of their industry by opening it to foreign investment, a position that clashed with the French government's firm conviction that the industry, and the rich nickel reserves upon which it depended, were a vital strategic and industrial asset that needed to be marshalled primarily for the benefit of France itself, leading to persistent efforts to prevent foreign companies from investing in New Caledonia and a bitter dispute between French and Caledonian authorities over governance in the territory and its political future in the 1960s and 1970s, a debate that contributed directly to the emergence of the movement pushing for New Caledonia's autonomy and ultimately its independence by the 1980s.

This paper will examine the debate in New Caledonia surrounding foreign investment and the role to be played in New Caledonia's nickel industry by multinational corporations from the 1960s to the 1980s, focussing on the varying responses of key actors in the internationalisation of the nickel industry in the late 20th century and the ways in which these responses contributed to the evolving debate about the territory's political relationship to France throughout this period.

Ravenswood (North Queensland) and Banska Stiavnica (Central Europe): two sites compared

Chris Green

In my travels as a geoscientist, two particular historic mining sites feature strongly: Ravenswood (North Queensland) and Banska Stiavnica (Central Europe). Although the mineralisation style is very similar, the age of mineralisation and timing of utilisation by man are very different. *Young geology with ancient mining vs old geology with modern mining*: this simplistic relationship between sites could be the core of a special interest tourism project. It seems to me that the existence of amazing places like Banska Stiavnica is relatively unknown in Australia.

Banska Stiavnica, (185 km east of Vienna) has a very long history of mining, including bronze-age workings and having been a very important gold mining centre during medieval times. It aligns closely with an early illustrated book, one of the first on mining and metallurgy, viz. "de re Metallica", published in 1556 with 230 wood-cut illustrations. This ancient mining town is world heritage listed by UNESCO, and the international organisation GeoPark has sponsored a series of very informative multilingual posters along walking trails across the townscape. Small scale underground mining for rich gold-bearing veins continues today in the adjacent village of Hodrusa Hamre.

Ravenswood (65 km east of Charters Towers), an early Queensland goldfield (1868), and very productive from 1890-1910, is particularly significant for the experimental metallurgy carried out, including pioneering work with cyanide extraction. Modern bulk low-grade mining for gold ore started here in 1988 and continues today.

Both of these sites can claim to be very significant in the history of mining and metallurgy. A group, of which I am a member, is currently building a 1:500 scale model of historic Ravenswood, largely based on old photographs and records. I hope this presentation inspires those of you who have never heard of Banska Stiavnica to have a look at it online, or even to visit and enjoy it. The beer there is very good, locally brewed and very cheap!

'This mountain may run your motor car': early 20th-century shale oil shenanigans in the Tasmanian high country

Nic Haygarth

School of Humanities, University of Tasmania, Tas

The need for Australia to develop its industrial economy was accentuated by isolation from Europe during World War I (1914–18). One response was the attempt to create 'the great Australian oil company'. In the 1920s and 1930s much of today's Cradle Mountain-Lake St Clair National Park in Tasmania was leased by the Adelaide Oil Exploration Co, whose efforts and claims suffered from a fundamental misunderstanding of chemistry. Echoes of this company's battle to gain public confidence and government approval sounded in recent years when Great South Land Minerals Ltd sought oil in the Tasmanian highlands.

Organic regeneration for climate management since the 1880s: Towers Hill Scientific Reserve, Charters Towers Goldfield

Eric Heidecker

This Conference poster draws on trials in the goldfields and Burdekin Rangelands during King Droughts, their heat waves, fires, storms, leaching and pluvial events. A consequent system in organic regeneration is illustrated in its full maturity by the civic parks and tree gardens of Charters Towers. The author has coined the term "Geocare" for this system, illustrated along with others in the Towers Hill Scientific Reserve established by the University of Queensland during the 1960s. The poster illustrates the processes and multiple benefits of organic regeneration entailing Geocare in the Towers Hill Reserve alongside other systems that require preventive fire management, and thus carbon emissions.

William Tipple Smith: Australia's unsung mining industry hero

Adrian Hutton

School of Earth and Environmental Sciences, University of Wollongong, NSW

William Tipple Smith was born in England and migrated to Australia with his brother. A builder in 1835, William opened a lapidary and jewelry shop in George Street North, Sydney, and offered his services in identifying mineralogical specimens of metallic ores and stones. An article in the *Sydney Morning Herald* (28 September 1847) aroused Smith's interest in gold in Australia. He went to the Bathurst area and discovered gold at Yorkey's Corner (Ophir) in 1848. Smith brought his discovery to the attention of the Secretary of State for the Colonies but received little satisfaction, even after having corresponded with Sir Roderick Murchison to whom he sent samples.

In 1848 William and John Tipple Smith formed a partnership with John Neale and Thomas Holmes to purchase a parcel of land with iron ore. Within three months they were producing Australia's first iron from a Cataline furnace. Smith was appointed Manager of the iron works. In 1849 Smith was involved in an accident at the iron works that left him partly paralysed. He may also have suffered a stroke. His condition worsened within a short time and on 3 December 1852 he suffered a second stroke and died. William Tipple Smith played a leading role in the early development of two of Australia's present day mining strengths – gold and iron, but is relatively unknown to most Australians.

Korean miners in Japanese coal mines during World War II

Hiroshi Ichihara

Dokkyo University, Saitama, Japan

Japan annexed Korea in 1910, ruling it until 1945 as a colony. During this period numerous Koreans visited Japan, and many settled there permanently. In 1945, approximately 10% of all Koreans lived in Japan and Korean workers were an important source of labour for Japan's coal mines, one of their main sources of employment.

Unfortunately, memories of the suffering of Koreans under Japan's colonial rule are a major cause of worsening relations between Japan and South Korea, even today. Among Japan's colonial policies that caused suffering to the Korean people, the World War II policies of mobilizing Koreans and forcing them to work in Japan's munitions industries to supplement the labour shortage in Japan remain today subjects of anger among Korean people. These policies were

known by the names “forced transportation” and “forced drafting of labour.” The number of Koreans mobilized in munitions industries under these policies can be estimated at approximately 650,000 people, of whom more than 300,000 were mobilized in coal mines. However, while ethnic Korean residents in Japan and some sympathetic Japanese researchers have studied these policies from perspectives critical of colonial policies, almost none have elucidated empirically the actual conditions of their coal mine work. For this reason, unfortunately, not a few comments and reports on the subject reflect misunderstandings or mistakes of fact. This paper analyzes internal documents of Japanese coal-mining companies that employed Korean workers to make clear the actual conditions of Koreans’ work in Japanese coal mines during the war.

From gold mine to urban mine

Susumu Imano

Chugai Mining Co. Ltd., Tokyo, Japan

Chugai Mining Co. Ltd. has been developing gold and silver mines in Japan since 1932. The last gold mine operated by Chugai was the Seigoshi Mine in the Izu Peninsula, which was closed in 1987. The Seigoshi Mine is an epithermal gold-silver deposit, with an average grade of 10 g/t gold and 400 g/t silver. However, development had to be discontinued due to the following reasons: the drainage could not be made to function well because of proximity of the mine to the seashore, and the heat and humidity in the mine because of its proximity to hot springs. Exploration for gold will continue since the Izu Peninsula is thought to have potential for undiscovered veins of gold.

On the other hand, the Mochikoshi Smelter started the recovery of gold and silver from recycled materials in 1973, with recovery of gold from circuit boards and integrated circuit parts, and silver from film and photographic paper. The maximum monthly production was 100 kilograms of gold and 15 tons of silver. Gold and silver ingots were produced with 99.99% purity. However, the demand for silver recovery declined as photography transitioned from film to digital. Accordingly, the Company shifted its core business to gold recovery from jewelry goods and relocated the factory to Tokyo. A solvent extraction process was developed at the Tokyo Factory, which is now capable of producing 1 ton of gold per month.

The paper will discuss the historical developments and problems that have been faced by the Company over time.

“HAURAKI” Golden past! Glorious future?: Hauraki Goldfields 1852-1952 - before and beyond

John Isdale

Thames School of Mines Mineralogical Museum, Thames, New Zealand

This presentation reviews the mining history of Hauraki, New Zealand’s largest epithermal goldfield, centred on the Coromandel Peninsula in the North Island. Historic characters in Hauraki range from early Polynesian explorers Toi and Kupe, to promoters Ring and Fraserhurst, financiers Whittaker and Swig, politicians Grey and Fitzsimons, and of course the miners/prospectors from Calloway to Rabone.

The Hauraki story begins with the first exports of ultra high-grade cutting stone long before European discovery of New Zealand. For European mining, gold at Coromandel in 1852 is the beginning of gold mining, but not mining! Within the classic goldrush era 1852- 1952 the pivotal roles of “The Thames” and Waihi will be discussed.

The 1952 closure of the Martha Mine saw the end of that era but not of mining. Work continued on smaller-scale silver and base metals, prospecting, and scavenging at the beginning of this

"modern era" which took off when the US went off the gold standard in the 1970s. The largest historical mine, the Martha, reopened in 1988. Subsequent regional development however has been glacial; reasons for this including political and social will be addressed.

Berrima Colliery – coal from the 1860s to 2013

Leonie Knapman

Berrima Colliery is located in the Southern Highlands of New South Wales, 20 km from Mittagong. The first mine was opened in 1867 by A.J. Huntly and J.L. Le Gay Brereton to sell coal to the Mittagong Iron Ore Smelting Works. Other mines opened in the latter part of the 19th Century. Markets were local but with the advent of the railway to the Southern Highlands in the 1880s a wider range of markets opened up and larger production was possible

The early 20th Century saw a period of significant mining when German prisoners, held at Berrima during the 1st World War, discovered that all ingredients for making cement were available in the area; this included coal. The construction of the Southern Portland Cement works at Berrima in 1924 resulted in a period of stable production for Berrima Colliery as it was the nearest mine and sole supplier of coal to the cements works. The colliery also built a railway to Moss Vale. Although a licence was re-issued, and permission to continue mining granted, the mine ceased operations in 2013 after facing opposition from various local people and organisations. It is currently under care and maintenance.

This presentation details the three periods of mining, looking at various factors, such as landscape, mining methods, transport, markets and social issues that have influenced mining operations since the 1860s.

Race relations on the goldfields: the Chinese reconsidered

Paul Macgregor

Melbourne Chinese Studies Group, Melbourne, Vic.

When Chinese goldseekers in 19th century Australia are thought of, it is the race riots and tensions that usually come to people's minds. Lambing Flat, NSW (1860-61), and Buckland, Victoria (1857) are the two riots by European diggers against the Chinese that are the most famous. They weren't the only ones, but they were the most violent. And yet, over the 60 years 1850s-1910s that Chinese miners worked in large numbers on Australian goldfields, from Victoria to the Northern Territory, violence and riots were not commonplace, and there are many examples of Chinese being accepted on other goldfields, and in the longer-established established mining communities. Even at Lambing Flat and the Buckland, there were Europeans who supported the Chinese during the periods of the riots. This paper will explore the factors that led to harmony – or discord – between Chinese and others, bringing race relations into wider historical context. The paper will also examine how histories of the Australian goldrushes, even up to the present day, often prefer to feature the drama of past conflict when Chinese are referred to, rather than consider Chinese as significant contributors to mining achievement on this continent.

Branding the Klondike: influence of the Klondike Goldrush on Australian and New Zealand culture

Robin McLachlan

Charles Sturt University, Bathurst, NSW

Jack: "That Miss Beverley, to whom I bowed just now, is a regular Klondike".

Tom: "That so? Rich?"

Jack: "Yes, also cold and distant".

(Oft printed joke in Australian and New Zealand newspapers, c.1898)

The discovery of gold on Bonanza Creek in 1896 precipitated the Klondike Goldrush of 1898, the last of the great rushes of the 19th century. Located in the remote northwest of Canada, reputed to be both fabulously rich and permanently frozen, the Klondike quickly achieved an iconic status in the public imagination in Australia and New Zealand. The very word 'Klondike' was soon attached to all manner of commercial products, from household appliances to fashion wear, while Klondike-themed entertainments found audiences in church fetes and music halls. Klondike jokes – invariably corny – dotted the comic columns of newspapers, while the mining, social and sporting columns reported other incidents of the magic word as the chosen name for both new ventures and old favourites. An example offered by Charters Towers can be found in the naming of the Klondyke Cyanide Works in 1898.

In this presentation, I will explore some of the ways in which the Klondike, both experienced and imagined, influenced Australian and New Zealand culture around the turn of the last century, and consider why this may have happened. While much of that influence has long since passed, there may be one significant remnant, now very Australian, that just might be beholden to the Klondike Gold Rush.

The research for this talk draws mainly on "tailings" recovered in my electronic 'sluicing' of NLA Trove newspapers for references to the Australians and New Zealanders who made it to the Klondike.

Sir Bruce Watson: memories of the Queensland mining industry, 1950-1965

Helen McMonagle

School of History, Philosophy, Religion and Classic, University of Queensland, St Lucia, Qld

Sir Bruce Watson AC, Chairman and CEO of MIM Holdings Ltd through the tumultuous 1980s, started his engineering career in the early 1950s, working with mining powerhouses and witnessing significant change throughout his 40 years in the mining industry. With rare foresight for the need to record his extraordinary experiences, Sir Bruce documented his memories in ten books of handwritten memoirs. These memoirs will form the basis of my paper, which seeks to provide an analytical assessment of key industrial relations disputes in the 1950s, and the 1964-5 Mount Isa Mines Dispute. This analysis will be tempered by Sir Bruce's reminiscences of industry figures such as John Saint Smith, Pat Mackie and the foremen he worked with.

Don Johnson's Charters Towers Mining History: the importance of historical data

R.J. Morrison and I.P. Hodkinson

Charters Towers, discovered in 1871 by an aboriginal boy, is one of Australia's largest goldfields and was a source of fabulous wealth. It has a colourful history full of larger-than-life characters including Don Johnson himself, an eloquent and erudite, yet occasionally implacable historian/artist of legal background and self-indulgent lifestyle. Don became obsessed with researching and chronicling the early history of Charters Towers. He embarked upon writing a complete history but died prematurely in 1993 with only the first 13 chapters completed.

Johnson vividly documented the amazing discoveries of bonanza gold, the riots, roll-ups and rogues, and the fortunes made and lost. The history is filled with characters like Warden Charters, who named the goldfield after himself, and Thadeus O'Kane, the radical newspaper owner who escaped to the colonies following a sensational scandal involving his wife and the British PM.

Posthumous publication of Johnson's book was unsuccessful and it was effectively lost for two decades. His diligent research was not in vain however, as his files are available at the Dalrymple Archives and are regularly used by local government, company and private researchers. They helped Citigold locate previously unknown oreshoots within the old workings and to explore for extensions. He accumulated information not readily accessible which prevented a calamity in 2006 by alerting Citigold to unknown water-filled mines along the planned Warrior Decline.

The fate of Johnson's work demonstrates the need for historians to make known what they would like done with their work in the event of their untimely death.

Mount Coolon (Koala) gold mine: "Queensland's great unknown mine"

Brice K. Mutton

Gold was first discovered at Mount Coolon in Central Queensland in 1913 (one hundred years ago). The mine is located 3km southeast of the township which was originally known as Koala, until it was re-named Mt Coolon in 1922.

It is not well known that Mt Coolon (Koala) Mine was the first mine of Gold Mines of Australia Ltd (GMA) which was incorporated in April 1930 and was a key for-runner company to the formation of the great Western Mining Corporation Ltd (WMC). It was the rich profits (during the Depression years) from mining Mount Coolon from 1931 through to 1939 that assisted its principals to develop the Kalgoolie gold prospects and the formation of Western Mining Corporation Ltd in 1933. The first superintendent at Mt Coolon was James Coldham and other mining industry notables to work at Mt Coolon included, Ian W Morley (later Queensland State Mining Engineer), Lou Westcott (later General Manager at Mt Morgan Mine) and William M Morgan (later Managing Director of WMC).

Following the discovery, a goldrush occurred and by 1914 some 10 claims were active. Hand-held mining of shallow pits and shafts by small syndicates continued from 1914 until GMA progressively purchased and amalgamated key claims in 1931. GMA's underground mine and treatment plant employed modern techniques, with the main access by a vertical service and haulage shaft. Workings extended over 140m vertically from surface on four levels and over 525m of strike length and a mining width of 1.5m to 8m. The average grade of the ore was 22.5 g/t gold with local "bonanza grades".

Operations ceased on 28th February 1939 when grades became uneconomic (and possibly the onset of World War II). Total production from 1914-1939 was 5582kg (or 196,900 oz) of gold bullion from 303,408t of ore, including 765kg (or 26,985 oz) of silver. By 1940, the bustling

Mount Coolon township of some 2000 people was almost deserted. Today, the population numbers about 10.

The history of the Mt Coolon goldfield is also infamous for the murders of 4 people in 1918 by a man named Thomas Coolon, and, for a major industrial strike in 1935.

The challenge of standing on the shoulders of giants

Collin Myers

The past leaders of Australia's mining industry embraced downstream processing of mine production in Australia as a natural extension of their businesses. For them, there was unassailable logic in adding maximum value through smelting, refining and manufacturing in Australia, for commercial reasons and for what they perceived to be the national interest.

As value adding activity increased in Australia in the mid-late 20th century, ironically there was vociferous criticism that Australia had become no more than a quarry. Today, at a time when the downstream processing of Australian mine products in Australia is being reduced and Australian processing technologies are being applied in other countries, public discussion is muted.

Women mineworkers and family-oriented labour: Indian collieries (Jharia), 1895–1948

Dhiraj Kumar Nite

School of Liberal Studies, Ambedkar University, Delhi, India

This paper elucidates the attitudes of migrant mineworkers toward employment of women and the prohibition of women from working below ground during 1929-1946. It suggests that the prohibition disregarded the opinion of the majority of wo/men mineworkers, who were family migrants. The latter insisted that family-oriented labour and supervision should continue, while accepting the prohibition on employment of children. Protesting against the new regulation, they struck back with the demand for alternative jobs for women and other social-insurance benefits (contra Lahiri-Dutt and Macintyre 2006; Lahiri-Dutt 2011, 2013; Sen 1999, 2003). The single-male-migrant colliers supported the new regulation but asked for male breadwinner wages. But the state and employers opposed both sets of proposals. The response helped bring the family-migrant and single-male-migrant colliers together on a hybrid agenda of alternative jobs for women and improved wages for all. While failing to support the egalitarian treatment of males and females, they attempted to maintain family incomes in the face of new concerns related to improving status and quality of life. They attempted to defend patriarchal control over wages and work on the mines, and in the family (after John 1984). The camaraderie between the protesting women and men had its roots in mutuality, as found in the institution of family [mining] gangs.

Opportunities for mineralisation in Charters Towers: looking to the past to uncover future resources

Simon Richards, Peter Tamaduk and Janrich Buys

Citigold Corporation Ltd, Qld

Charters Towers is one of the richest goldfields in Australia, having produced over 6.8 million ounces of gold since the field's inception in 1872. One of the most significant factors contributing to the success of Charters Towers was the high grades of gold mineralization, averaging 38 g/t Au. The mineralisation is hosted within narrow (sometimes up to 5m thick) fracture sets that contain abundant quartz and gold together with other base metal sulfides. Examining historical data reveals that the deepest worked reef was the "Brilliant" which extended to 1000m vertically below

the surface. There are over 30 well-defined fissures in the Central area of Charters Towers; however, none of these reached the same depth as the Brilliant. The sheer volume of historical underground workings may lead a modern day mining company to consider Charters Towers as well-explored, however, there are some key points that illustrate how under-explored this region is: 1) A near complete lack of drilling in the northern part of the Charters Towers Goldfield; 2) A focus on shallow mineralisation by previous exploration companies; 3) A lack of understanding of the style of mineralisation by previous exploration companies; 4) A lack of modern-day exploration techniques applied to the field; and 5) Historical records stating that technical issues such as water, ventilation and other hazards forced the abandonment of mining rather than a lack of gold. Through close inspection of historical documents and of the field in general, we show that Charters Towers exhibits an opportunity for very high-grade mineralisation and a long-term mining future.

"One is tempted to ask … whether one is in an English colony, or in a Chinese Town, the pigtails are so plentiful"*: a brief look at the Chinese communities of Ravenswood, Millchester and Charters Towers

Sandi Robb

James Cook University, Townsville, Qld

From 1872, the discovery of gold inland from Townsville attracted the attention of miners from around the world as people flocked to the emerging region in the hope of striking it rich. Large and thriving settlements sprang up and developed into towns, including Ravenswood, Charters Towers and Millchester. Rich in their lodes and prosperous in their development, these towns supported large and relatively stable communities, including self-contained Chinese precincts referred to as "Chinatowns". These precincts supported individuals and families; they were economically diverse and catered to the recreational, spiritual and cultural needs of the Chinese community. Yet very little is known about them or the families who lived in them. It seems extraordinary that despite the volume of research undertaken about mining communities that an integrated approach to understanding the social formation of a mining environment continues to ignore the contribution of early Chinese and other marginalised members of the community. At best, the incorporation of this history is a little more than a cursory nod, at worst it continues to present a "whitewash". This paper aims to present an alternative community environment associated with North Queensland's mining landscape by looking at the Chinese communities of Ravenswood, Charters Towers and Millchester. * *The Ravenswood Miner, 20 January 1872.*

‘Meat Hunger’ to the Metals Exchange: Wolfram Camp, 1894-1920

Anthony Styan

James Cook University, Townsville, Qld

This paper will examine the development of Wolfram Camp, a mining town in the Cairns hinterland, during the late nineteenth and early twentieth centuries. As the site of a war-driven rare metals boom, a target for risky foreign investment, and a proving ground for Queensland’s trade union movement, Wolfram Camp became a focal point for some of the most important economic, technological and political changes of the time. By examining the stimulating impact of the First World War on metals prices, the struggle between the Irvinebank Mining Company and the Amalgamated Workers’ Association, and the sudden appearance and mysterious failure of the Societe Francaise des Metaux Rares, this paper will provide some insights into the development of mining in North Queensland, as well as the wider role played by the Cairns hinterland region in the creation of Queensland’s economic and political identity.

John Taylor and Sons, mine promoters and managers: seventy years of mining in Spain and Portugal

Robert W. Vernon

Welsh Mines Society, UK, and Colectivo Proyecto Arrayanes, Linares, Spain

The mid-19th century mining activities of John Taylor and Sons (London), were initially centred on England and Wales, but quickly spread to the Iberian Peninsula. In Spain, the Taylors registered *La Bella Raquel Company* in 1846 to work the Hiendelaencina silver-lead mines, near Madrid. It soon became apparent that other Spanish mining opportunities existed. In 1849, the Taylors were attracted to Linares, Jaén Province in northern Andalucía, and formed the *Linares Lead Mining Company*. This was the first of several profitable Taylor's ventures there (e.g. Fortuna, Alamillos). In 1898, the *Linares Lead Mining Company* declared its 100th dividend; a unique achievement. Other Spanish mines were also 'tried', for example *Monte del Oro*, Galicia, but they were not successful.

By the early 1900s, the Taylors were reducing their operations at Linares and sought new initiatives that included the *Cerro Muriano Mines Company* (1903), formed to work copper mines near Cordoba, Andalucía. It was restructured in 1908 as the *Cordoba Copper Company*, and operated profitably until 1919. In 1924, the company was again reconstructed to become the *Indian Copper Corporation* to work copper deposits in India, previously explored by the *Cape Copper Company*, another Taylor's company. In Portugal, the Taylors successfully managed the *Lusitanian Mining Company* to work copper mines in the Aljustrel area. The company was registered in 1854 and ceased operations in 1880.

The paper provides a brief account of John Taylor and Sons’ many mining operations on the Iberian Peninsula, including their failures, and their legacy.

Colour in minerals: how were they found - observation, planning, serendipity?

Nicola Williams

School of Chemistry, Monash University, Clayton, Vic

The surface expression of minerals has been responsible for many discoveries – gold, opal and malachite are some of the most obvious. But why are our beautiful minerals the colours they are?

From the precious gemstones of ruby, emerald, sapphire and diamond, via the quartz suite of semi-precious stones, to the native metals copper, silver and gold, this paper will explore the causes of the colour, in a discussion ranging from gems to industrial feedstock.

Haim Guedalla: "the gold mine shareholders' invaluable friend"

John Woodland

Nearly 120 proposals to exploit the goldfields of California and Australia were thrust upon a booming share market during 1849 and the early 1850s, collectively aiming to raise over £15 million. In the end, less than £2 million was raised between one-third of the so-called 'gold bubble' companies, the rest sinking into oblivion.

All but one company that raised funds subsequently squandered them on ill-conceived and poorly managed ventures. By late 1853 the floundering companies were refusing to convene shareholders' meetings or provide information on their progress or remaining capital. The latter was crucial, as many shareholders feared unlimited liability in the event of their failure.

Haim Guedalla, an investor in eight of these companies, came to prominence with a campaign of letters and critiques of the companies and their directors in the London *Mining Journal*. He organised meetings of disaffected shareholders in a number of the companies, at which a committee would be formed to press its directors for the information needed. The committee approach had far more clout than individuals, and the meetings often exposed other corporate irregularities and contributed to the de-listing of seven of the companies.

Guedalla's continued efforts to bring about corporate reform arguably contributed to a number of Acts passed between 1855 and 1858 to better regulate the activities of joint stock companies in Britain.

A brief history of the Tianfu Coal Mining Company and its cultural impact on local everyday life

Xiaolu Wu

School of History, Philosophy, Religion and Classics, University of Queensland, St Lucia, Qld

The Tianfu Coal Mining Company was established in Chongqing, the fourth biggest city in western China, in 1933. Before the founding of the Company, the local people had mined for a long period of time. The Company was a modern organization that brought something new to the local people. A small town developed where the mine was located and became a well-known model town. One of its founders, Lu Zuofu, was a famous industrialist whose dream was to modernise the local people through his enterprises, such as shipping and mining. To some extent his dream was realised by the Tianfu Coal Mining Company. As most of its employees were from the neighbouring area, the local people experienced a different life to others. The object of the paper will be to examine the impact and to show how the small modern town that developed was dependent on the mining company.

Mining in North Queensland

Europeans did not begin to occupy the North Queensland region in significant numbers until 1861, with the establishment of the government administrative centre of Bowen and the commencement of sheep and cattle grazing. Alluvial gold was discovered within months, the first on the Fanning River, about 50km north-east of Charters Towers in 1862. Larger discoveries followed, at the Star River in 1865, the Cape River in 1867, and Ravenswood, where a system of rich reefs was found in 1869, the first significant and stable goldfield in North Queensland. It survives today as North Queensland's oldest continuously occupied inland town. Further west, the Etheridge and Gilbert goldfields opened almost simultaneously. All of these early fields were overshadowed on Christmas Eve 1871 when gold was discovered at Charters Towers. It would become a major underground field after the influx of London capital in the 1880s, producing over 200 tonnes of gold and growing to a population of 25,000 by 1900, the second-largest city in Queensland and the largest in the northern half of Australia. The private graziers' landing place of Townsville became its port, and the booming Charters Towers-Townsville axis dominated the northern economy until the First World War.

Mills Day Dawn United Mine, Charters Towers, about 1900

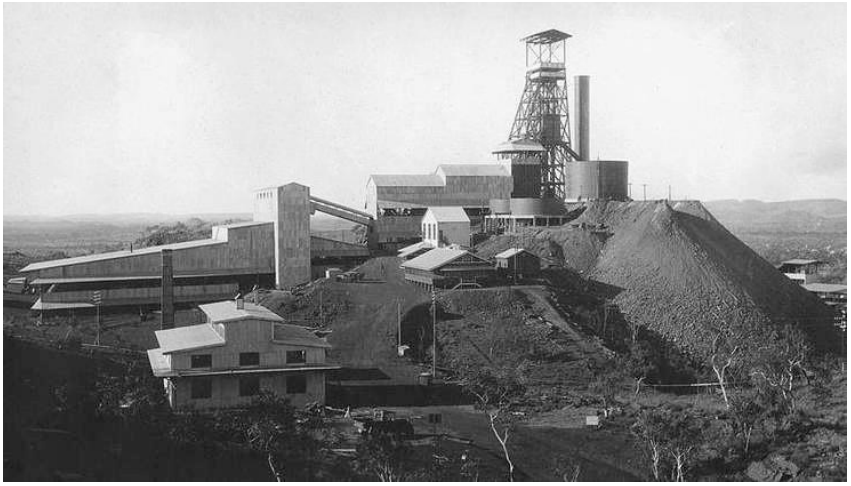
The goldfields spread north to the Palmer and the Hodgkinson, and west to Croydon in the 1880s. The new or enlarged ports of Cairns, Cooktown and Normanton followed, each with a railway to its hinterland. The Palmer set a new northern pattern in being discovered far beyond the frontier of pastoral settlement. The field was spectacularly rich in alluvial gold, but there was no infrastructure in existence, and miners lived a squalid life beset by horrendous costs, a monsoonal climate, Indigenous resistance and tropical diseases. It also brought the greatest influx of Chinese diggers that Australia had ever seen. The Chinese on the Palmer in 1876 outnumbered all the Europeans in tropical Australia.

Since the 1860s, mining has been a major industry in the north, at times dominating the economy. The great gold rushes were only the beginning of a diverse mining industry. Copper was being found alongside the first gold, and base metal mines spread across the north. The complex geology of the northern ranges brought to life copper mines and smelters at Cloncurry, Einasleigh, Chillagoe, Mount Garnet, Mount Molloy and OK. There were silver mines at Totley, a suburb of Ravenswood, and at Argentine and Montalbion until the price collapse in the 1890s. Tin was plentiful in the tablelands west of Cairns, and the towns of Herberton, Irvinebank, Stannary Hills and Mount Garnet sprang up as the tin price boomed in

the 1880s. Tin was dominated by the shrewd entrepreneur John Moffat, who built a smelter at Irvinebank. In 1897 he spun off his western base metal interests, floating the Chillagoe Railways and Mines Company which built a 400km private railway network linking the Chillagoe smelters with its mines at Mungana, Einasleigh, Forsayth and Mount Mulligan, producing copper, silver-lead and coal. At its peak, this grand London-financed enterprise employed thousands across the north, but commercially was a spectacular failure, losing its shareholders some three million pounds. Its assets were taken over by the Queensland Labor government as a state enterprise in 1918. The coal mine at Mount Mulligan was the last vestige of the Chillagoe empire, but a coal dust explosion killed 76 miners in 1921 in one of Australia's worst industrial accidents. The State Mines and smelter sank into inefficiency, corruption and scandal, and a Royal Commission in 1930 ended the careers of two former Labor premiers.

Another coalfield opened at Collinsville in 1915, at the northern tip of the vast Bowen Basin. But the early twentieth century saw mining in decline. The goldfields were all moribund by the end of the First World War, and base metal prices, artificially raised by wartime demand, plunged in the 1920s.

At Cloncurry in the far north-west, the last copper smelter closed in 1922. The following year the largest mineral deposits in Queensland were discovered at Mount Isa nearby. Developing vast low grade silver-lead and copper deposits in a remote and arid environment required more money than Australian investors could provide, and bankrupted the British Russo-Asiatic Corporation before Asarco brought in US capital in 1930. It was 1947 before Mount Isa paid its first dividend, but it has gone on to be one of the world's great base metal mines, producing 7 million tonnes of copper while no drill has yet reached the bottom of its orebody.



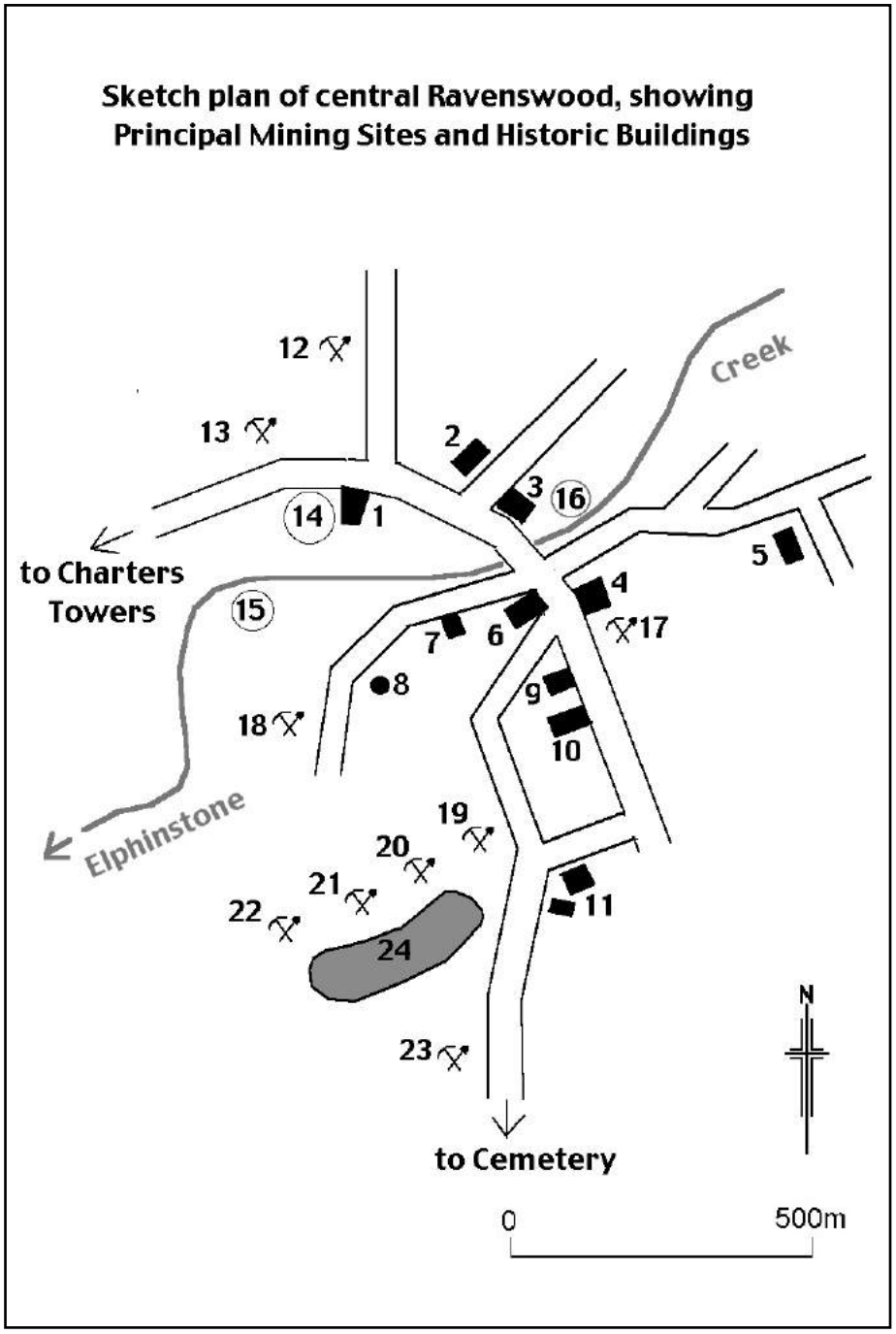
Urquhart Shaft and silver-lead mill, Mount Isa Mines, 1932

In more recent decades newly-valuable metals such as uranium, bauxite and nickel created more mining towns like Mary Kathleen, Weipa and Greenvale. The Bowen Basin coal mines now provide one of Australia's greatest export industries. Since the 1980s, the rising gold price has brought new life to almost every nineteenth century goldfield including Charters Towers and Ravenswood, far more profitably now with cheap opencut extraction and efficient cyanide treatment. The Carpentaria Mineral Province surrounding Mount Isa is newly resurgent, with Phosphate Hill, the Century zinc mine, the Ernest Henry mine and Cannington, opened in 1997 and already the world's largest silver producer. As Geoffrey Blainey reminded us, the rush has never ended.

Tour of Ravenswood, Monday 7 July 2014

8.30 am	Leave Charters Towers by bus
9.30 am	Arrive Ravenswood School of Arts Hall
	Morning tea, introduction to Carpentaria Gold's Ravenswood operations
10.30 am	Commence tours of Carpentaria Gold Nolan's treatment plant
12.30 am	Return to School of Arts Hall for lunch
1.30 pm	Walking tour of Ravenswood township
3.00 pm	Bus tour of cemetery and outlying sites
4.00 pm	Leave Ravenswood by bus
5.00 pm	Arrive Charters Towers
6.00 pm	Civic Reception in Charters Towers Stock Exchange

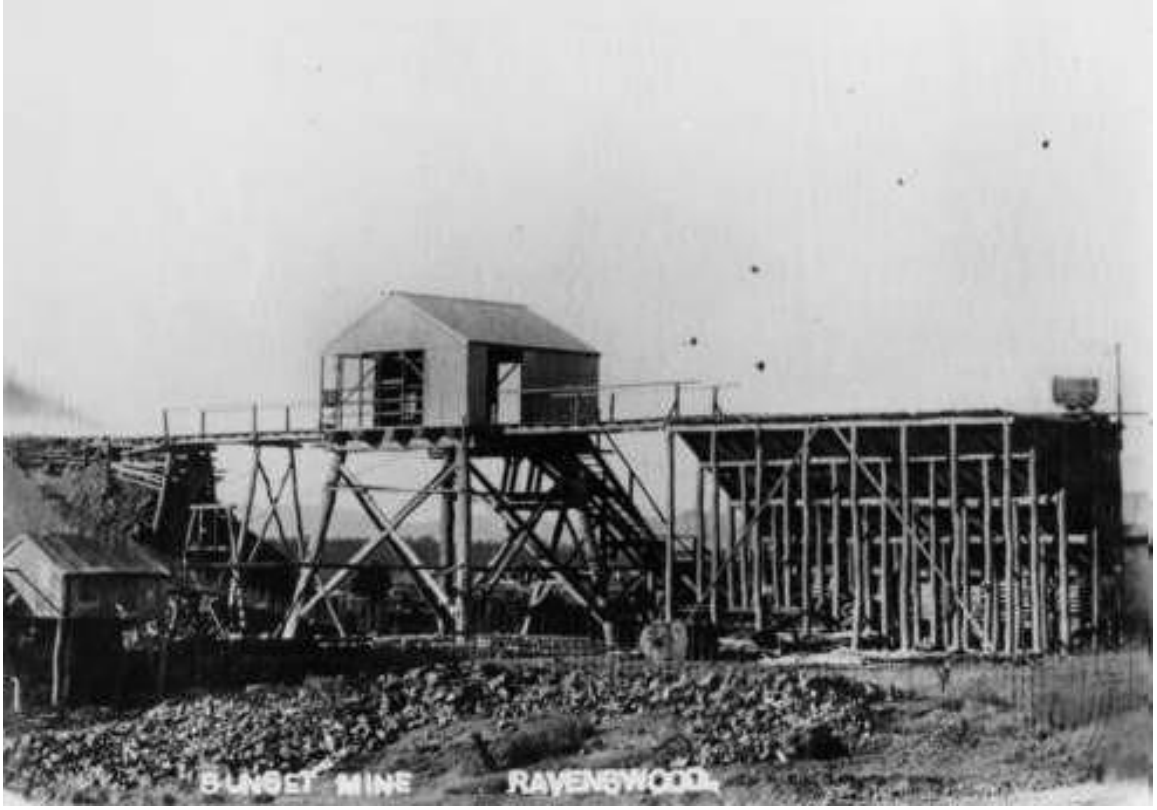
Gold was reported on the Ravenswood field in 1868 and several alluvial camps formed. The largest was the Upper Camp, where a system of rich reefs was found in 1869. It would become the first significant gold discovery in North Queensland, indeed in the northern half of Australia. The first gravity stamp mill was built in 1870, and the township of Ravenswood was surveyed. A year later the town had 1,000 people including a large Chinese population, 100 claims, 4 gold batteries and 30 pubs. But as the mines went below the water table, the mill yields began to fall. Ravenswood's mundic ore was a metallurgical nightmare to the millers, with the gold mixed with lead, arsenic, copper and zinc in a complex matrix of sulphides. Larger goldfields were discovered at Charters Towers in 1871 and the Palmer in 1873, and Ravenswood lost its premier position. However the gold reefs were so rich that even partial extraction could be profitable, and Ravenswood remained viable, even prosperous, throughout the 1880s and 90s. A silver mine at Totley nearby attracted a government railway line to Ravenswood in 1884. Those decades were spent in experimentation with a multitude of techniques: smelting, chlorination, the Pollock and Cassell processes and electrolytic refining. In 1888 Ravenswood saw the first experiments in the southern hemisphere with the MacArthur-Forrest cyanide process, but results were disappointing, and the plant was moved to Charters Towers in 1892. The breakthrough came in 1899 when Archibald Wilson floated New Ravenswood Ltd with London capital to purchase a block of the major mines on the field and the Mabel Mill. Wilson abandoned its chlorination works and equipped the mill with Wilfley tables, patented in 1896 and never before seen in Queensland. His tactics were to concentrate and separate the complex ores into treatable gold, polymetallic sulphides and galena. Wilson treated what was possible locally, and shipped the rest to the experts at the Aldershot smelter in southern Queensland. He quadrupled gold output from the mundic ores, and Ravenswood boomed for the next ten years. The population rose to 5,000, and a new generation of commercial buildings appeared in the town. The surviving ones form the distinctive two-storey brick Edwardian streetscape of Macrossan Street. The good years lasted until the First World War, although there were signs of decline after 1908. Wilson wasted a lot of money on deep shafts, based on fanciful geological theories. For an innovator, he strangely ignored cyanidation and flotation, which were transforming world metallurgy at the time. A bitter strike in 1912 didn't help. The New Ravenswood company closed in 1917, and Ravenswood slept for seventy years until Carpentaria Gold resumed production from its first opencut pit in 1987.



1 Railway Hotel (1902) 2 Court House (1884) 3 Post Office (1885)
4 Imperial Hotel (1902) 5 St Patricks Church (1884) 6 Thorp's Building (1910)
7 Ambulance (1904) 8 Chinese Oven & Temple (1880s) 9 Cake Shop (1880s)
10 School of Arts Hall (1884) 11 School & Residence (1873) 12 London North Mine (1903)
13 London Mine (1902) 14 Mabel Mill (1871, 1885, 1899) 15 Partridge's Mill (1938)
16 Lady Blanche Mill (1870) 17 Eureka Mine (1934) 18 Grand Junction (1903)
19 Deep Mine (1902) 20 Duke of Edinburgh (1947) 21 General Grant (1869, 1899)
22 Sunset Mine (1869, 1899) 23 Grant & Sunset Extended (1903) 24 Buck Reef West Pit (1987)

Ravenswood

Building the Lady Blanche Battery at Ravenswood, August 1870



Underlie headframe of the Sunset Mine, largest producer on the Ravenswood field

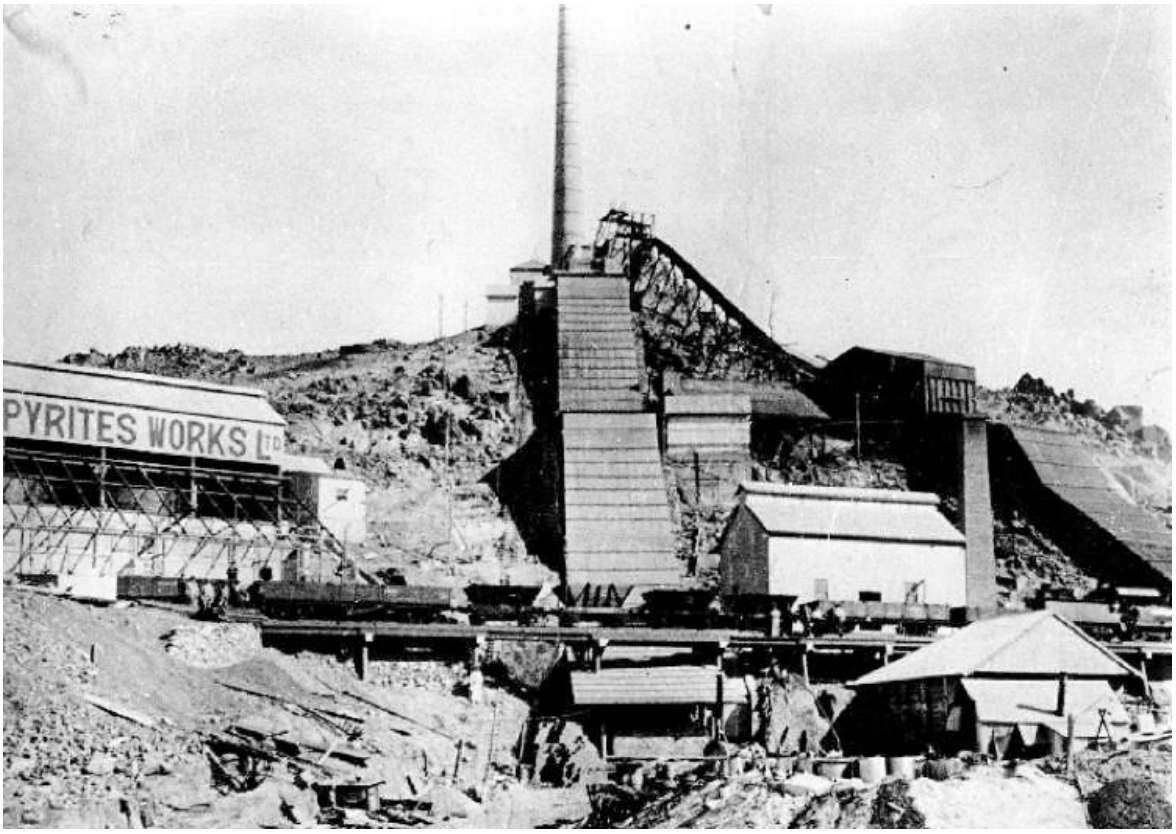
The Venus Battery

The Venus Battery crushed Charters Towers gold ore for a little over a hundred years. It opened in July 1872 under the ownership of Plant and Jackson in the first flush of excitement after the discovery of gold. In its original form it was simply a small set of stampers, but it expanded as later technology was added. Plant and Jackson had also built the Lady Blanche Battery in the town of Ravenswood two years earlier, only to be discouraged by its recalcitrant ores. Edmund Plant went on to be one of Charters Towers' leading mining entrepreneurs, and his home is now the campus of Blackheath & Thornburgh College. As mining in Charters Towers wound down, the Venus Battery was taken over by the state in 1919 as part of the Labor government's program of providing assistance to the mining industry by the provision of state-owned treatment works for small miners. This probably ensured its preservation in its present form, for a steady run of work over the next fifty years meant that it never fell into disuse, but on the other hand, frugal state management ensured that it was only modernised in conservative increments and never underwent major refurbishment. As a result it has a remarkable collection of nineteenth and early twentieth century machinery intact: gravity stamps, amalgamating tables, Berdan pans, Wilfley tables and cyanide plant, most of them still serviceable, complete with its assay room, forge, workshop, spare parts, office and weighbridge. The state battery closed in 1973, but its heritage value was already recognised as Queensland's oldest surviving - and one of Australia's best-preserved - historic gold batteries. It is now operated as a museum by Charters Towers Regional Council.

Mines Inspectors Ernest Laun and John Douglas visit the Venus Battery about 1936

Pyrites Works, Towers Hill

As Charters Towers mines went deeper, the mills had increasing difficulty extracting gold from sulphide ores. The Pyrites Works which opened in 1886 was designed by metallurgist D.A. Brown to deal with the problem by means of chlorination. Ore was roasted in a long furnace running up the eastern slope of Towers Hill. The heated ore was exposed to chlorine gas, which formed a solution of gold chloride, from which metallic gold could be precipitated out by ferrous sulphate. The plant was very successful at first, but within a few years chlorination was superseded world-wide by the much cheaper MacArthur-Forrest cyanide process, which was introduced to Charters Towers by the Australian Gold Recovery Company in 1892. The Pyrites Works expanded its operation in 1898, building a larger furnace which was topped by a 50m brick smokestack, but never really recovered from the competition. The plant was converted to the cyanide process in 1900. The legacy of the new technology can still be seen in the waste dumps, which abruptly change from the brick red of chlorinated tailings to the bone white of cyanide sands. Brown, the works manager, was not qualified to operate a cyanide plant. He was kept on, but his salary was reduced. At a sensational meeting of the Pyrites Company board in 1901, Brown produced a revolver and shot the chairman dead. He then attempted to shoot himself, but failed and was executed for murder. The works never repaid the expenditure on new plant, the company was wound up and the plant demolished by 1904. A newspaper wrote its obituary: "The Company occasioned the loss of two lives, and nearly £60,000 in cash" (*North Queensland Register* 12 December 1904) The towering brick stack remained as a monument on the Charters Towers skyline until 1942 when it was demolished by the United States Army Air Force, who were building a bomber base nearby and apparently thought the stack was a hazard to aircraft.



The Pyrites Works after extension, about 1900, older furnaces to right

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