

THIRD AMHA CONFERENCE, NEWCASTLE, 1997

ABSTRACTS OF PAPERS

Charlie Fox

The Mt Lyell Mining & Railway Co. and the State

The paper explores some aspects of the relationship between the Mt Lyell Mining and Railway Company and the state. The state intervened in the Company's affairs in many ways. At the Commonwealth level the Government set tariffs on imported machinery, encouraged the processing of Mt Lyell ore in Australia, while the arbitration system regulated conditions of work. It provided migrant workers while taking company workers off to war and it both quarantined and provided aid to Tasmania during the influenza pandemic. At the state level, the level which concerns this paper, it regulated the company's day to day operations through the Mines' Departments, leased it crown land, bought electric power from it, prescribed conditions of work through local wages boards and regulated its railway to the coast. It provided for workers compensation and employer liability, policed the Mt Lyell towns and set up coroners' courts to inquire into accidents, and much more besides.

In general the Company fought hard to limit state intervention in its affairs. When it could it pulled strings in Parliament to reject or amend legislation it thought was intrusive. When such legislation was imposed, it tried to obstruct, limit or shape the practical effects of the legislation. By using examples from the relationship between the Company and the

Tasmanian state, such as conflicts over the work of local mines' inspectors, over judgements handed down at Coroners' courts and over legislation regarding wages boards, this paper suggests that the Company engaged in a continuous struggle against state intervention. It used a range of strategies to defeat enemies and threats where and when they appeared and did so on the whole with great success. But it was never able to relax, partly because the idea of an interventionist state was abhorrent to its management ethos, and partly because its own workforce kept proposing further state incursions into its domain.

Rebecca Parkes

Camel Camps and Mining Towns: Archaeology and the role of Afghan cameleers in Australian mining.

It was in 1837 that the idea of bringing camels into Australia was first put forward, but it was not until 1860 that a truly successful importation took place. This was also the first time that Afghan camel handlers were brought out with the camels. Then in 1866, the first of many large scale importations organised by Thomas Elder and Samuel Stuckey occurred. From that time until the 1920s, the Afghan led camel teams were one of the main means of transport to outback mining settlements.

From western New South Wales and Queensland, across to Western Australia, wherever there was mining activity, there were at one time or another camel teams. Often there were permanent or semi-permanent Afghan settlements associated with mining towns such as Broken Hill, Coolgardie and Cloncurry.

It is the aim of this paper to examine the role of the Afghans and their camels in the transport of provisions, equipment and ore to and from the mining settlements in Australia. Furthermore, this paper aims to highlight some of what the archaeological record tells in relation to these activities. Examples will mainly be taken from the Flinders Ranges, and the area around Broken Hill where I have been undertaking fieldwork over the last six months.

Michael Tracey, Jennifer Tracey, Peter Evans and Peter Smith (presented by Michael Tracey)

A light industrial tramway - Adelong Goldfields.

In the mid 1850s gold was found in Adelong Creek. Mining entrepreneurs undertook the construction of small-scale mining infrastructure such as batteries and hydrological work to enable successful processing of the extracted ore. The predominantly sulphide ores while rich in gold were difficult to process. The location of the mines atop steep hills also presented particular operating problems. The transportation of ore from the mine to the batteries usually situated in the valleys to avail the use of the almost constant water supply from Adelong Creek required special engineering incentives. The transport of the ore was undertaken by a light railway system with specially constructed engines capable

of handling steep gradients leading to the mines. In the later days of operations the railways system was sold and shifted to other mining interests further down Adelong Creek at Gibraltar Hill. Here the engine was used initially to transport ore and was later modified to drive a lifting motor to a cable system for the cages in the mines.

Patrick Bertola

Capitalisation and its implications in the early phases of mining in Kalgoorlie.

Within two years of the discovery of gold at Kalgoorlie in mid-1893, virtually all of what were to become the main mines on the field had been incorporated, principally in London. As McCarty has pointed out, this process resulted in only a fraction of the capital raised being directed to the actual processes of mining in Kalgoorlie. Instead, much found its way into the pockets of a group of finance capitalists operating out of the City of London.

This paper outlines some of the preliminary conclusions of research into the period between discovery of the field and the incorporation of the main companies, particularly focussing on the processes by which finance capital maximised profits during this early phase. The paper also notes the results in terms of the structure of capital at Kalgoorlie and explores some of the implications for the future development of relations among labour and employers in Kalgoorlie (and Boulder).

Lyndon Megarrity

British investment in overseas gold mines in the late nineteenth century: the Queensland experience.

British investment in overseas mining during the period 1880-1914 was immense. This paper examines the nature of the London market and how its way of operating impacted upon the Queensland goldfields at

that time. It will be shown that the British trend towards over-speculation in 'fashionable' mining areas was highly detrimental to the economic health and reputation of the 'host' country. In the 1880s, Queensland was a significant early victim of the London money market's pattern of over-capitalising mines in one area to the exclusion of all others, and then abandoning that area when 'Wild Cats' had had their disillusioning effect. The poor reputation of Queensland's goldfields in London mining circles lasted well into the 1900s.

Mel Davies

Leakages and boomerangs - whatever happened to overseas dividends? The case of John Benjamin Graham & his South Australian made mining fortune.

There is perhaps one flaw in the excellent work of Bill Rubenstein when estimating the wealth accrued in Australia during the 19th century, for while he does a magnificent job in quantifying the accumulated wealth of residents from probate records, there is no way

in which he has been able to capture the wealth that was generated but which left in the pockets of Europeans and others who returned home. John Benjamin Graham was the major shareholder in the Burra Burra Mines, SA, who made his fortune from the mines between 1845-1877. When he left the colony in 1848 to live in England and Germany, his fabulous earnings from the mines went with him and continued to follow him until his death in 1877. What is of interest is the destiny of this fortune, not only in the type of conspicuous consumption that almost inevitably accompanied successful venturers associated with mining but also in terms of the back-flow of funds to South Australia. JBG invested heavily in property mortgaging but also in sheep farming and this paper outlines why he continued to be attracted by South Australian opportunities and examines some of his strategies used to maximise his outlays

Philip Hart

Maori and Mining: A case-study of Te Aroha.

Te Aroha in 1880 was on the frontier of European settlement. The land on which gold was to be discovered, and a township built, was owned by Maori. From the time of the discovery of gold at Thames in 1867, local Maori had been in increasing contact with miners, and were hospitable to the increasing number of Europeans visiting Te Aroha. In part this was because of the income derived from people visiting the hot springs. Goldfields revenue from Thames mining also encouraged Maori chiefs to permit prospecting in the hope of reaping financial returns.

Maori were also very involved in prospecting and to a lesser extent mining and share speculation. This was not a new development, but started with the first discoveries in New Zealand. Limited skills meant Maori were mostly prospectors, and the structure of Maori society meant that revenue from mining mostly benefited the chiefs.

Hone Werahiko was the discoverer of gold at Te Aroha. Lavishly praised by Europeans for his skill, he led prospecting parties of Europeans and directed initial work on his main finds. His life was an interesting case-study of inter-racial harmony because he lived up to European ideas of worthiness and was able to work with Europeans as an equal.

Betty Cosgrove

Mount Morgan social history - the making of a culture 1890-1917

The town of Mount Morgan clings to life, after more than a century of rise and decline that preceded ultimate closure of the mine. The dynamic of the place in its prolonged survival without an industry is the relic of a town mentality independent of the mine. The aim of this paper is to present the townspeople of early decades, a diverse population whose backgrounds and traditions were integral to the forging of a Mount Morgan culture. Such a study must also address the question: What neglected aspects of social history - this invariably masculinist and mine focussed, to the exclusion and historical invisibility

of women, children, Aborigines and Chinese - support the argument for an inclusive social tradition?

Barry McGowan

The Mining on Private Lands Act of 1894: miners versus capital.

In the period 1850 to 1900, mining and gold mining in particular, was one of the most important industries in New South Wales; at some stages it was the most important industry. Access to private land for mining had been an issue since the earliest gold rush days, and the *Mining on Private Lands Bill* sought to address this issue. The debate on the legislation during the 1890s involved primarily the question of coexistence of title, and can be looked at from a number of aspects. Such issues involve, for example, the conflict between the Legislative Assembly and the Legislative Council, the role of the then fledgling Labor Party, the role of Government in addressing the 1890s depression and the perennial conflict between those who purported to support the 'working miner' and those who wished to encourage capital. This paper will focus primarily on the latter aspect, although attention will also be given to other issues mentioned above.

Ken McQueen

Difficulties with refractory ores: history of the Tolwong Mines, Shoalhaven Gorge, NSW.

The Tolwong copper-tin-arsenic deposits were discovered around 1904 by John Siverwright as exposed outcrops in a tributary of the Shoalhaven Gorge, 10 km southeast of Bungonia. The deposits occur as cross-cutting lodes in dilational fractures within tightly folded Ordovician slates and sandstones in an area intruded by Carboniferous granites. Mineralisation consists of abundant arsenopyrite with lesser amounts of stannite, chalcopyrite and galena, and minor sphalerite, pyrite, tetrahedrite and bournonite. Quartz and fluorite are common gangue minerals.

In 1907 the Tolwong Mineral Company was formed to exploit the deposits. Typical ore assayed 6 - 10% copper, 2 - 5% tin, 1 - 15% As, 30 - 60 g/t silver and trace gold. The main lode was developed by numerous small workings and several interconnected tunnels. Difficulties with the steep terrain were overcome by using two electrically powered aerial tramways, one from the top of Shoalhaven Gorge to a treatment plant on the river, and a second from the mines to the plant. The presence of stannite as the main copper-tin mineral led the company to model their smelting plant on the Oonah Proprietary Zeehan in Tasmania where similar and unusual stannite ores had been encountered and were being experimentally treated. A roasting plant, complete with arsenic collection chambers, and a reverberatory furnace were constructed at the site between 1909 and 1910. The roasting process was an important adjunct to smelting to remove the deleterious arsenic from the ore. Ore production commenced in 1910 and the first attempts at smelting were in 1911. Approximately 350 tons of ore were smelted in 1911 for production of 10 tons of 55%

copper matte worth £237. Smelting at the site was abandoned at this stage with attention focussed on arsenic oxide production from ore roasting and sale of the roasted product for smelting elsewhere.

Production from the Tolwong mines continued sporadically until 1913 when the Tolwong Mineral Company went into liquidation after expenditure of £23,000. Total ore production was probably less than 1,500 tons. The refractory nature of the ore, and in particular the presence of stannite as the main copper-tin mineral, was a major factor in the failure of the venture. Details mineralogical studies by the author have confirmed the complex nature of the Tolwong ore assemblage and its refractory nature.

Jennifer Tracey

Gold beneath Gibson's Plains: working the Kiandra Deep Lead on New Chum Hill 1860-1883.

Initially the rich alluvial claims on the Kiandra Goldfield in south western New South Wales were generally confined to the small creeks leading up to the basalt-capped hills which stretch for a distance of fifteen kilometres north and south of Kiandra. By tracing the auriferous deposits up the creeks it was found that the ancient river drift existed in large quantities under this north-south extension. Working these deep leads by tunnelling deep into the hills brought problems that were overcome with ingenuity and versatility. Capital investment saw the materialisation of extensive infrastructure including the construction of a large dam on Three Mile Creek and the cutting of water races to bring water down onto the claims.

This paper examines the methods of mining used on New Chum Hill during the period 1860-1883, including various applications of tunnelling and finally hydraulic sluicing. In particular, it investigates the erection of a stamper battery, officially reported to be forty-head, to crush the auriferous conglomerate alluvium extracted from the Great Emperor Tunnel. Reports of this battery's operation are scarce and anomalies in the description of the battery exist in the historical record. The extent of the hydraulic sluicing claims has eradicated much of the archaeological evidence of the earlier workings and the battery site. The battery only operated for four years before being sold to the Perseverance Gold Mining Company. It was transported by bullock teams over the mountains to the Adelong Goldfield where it was re-erected on the banks of Adelong Creek. There it was used to crush auriferous quartz from the reef mines on Victoria Hill.

Ruth Kerr

Mount Morgan and Dr Robertson - enigmas in Queensland mining.

The landscape of the Mount Morgan mine site in central Queensland symbolises the harvest of human behaviour in nineteenth century mining-entrepreneurship, greed and environmental change. The skills of Dr John Robertson, magnate of Hunter and Illawara coalfields, who investigated many prospective mining investments in Queensland, were

inappropriate for assessing the type of mineral deposit in the mountain in 1882. The freehold title of the land determined much about the forms of mining and financial management. Throughout the period of spectacular profitability, the Mount Morgan Mining Company paid no royalties on the gold. The paper focuses on the entrepreneurs and the administrative and legal issues of mining illustrated by Mount Morgan history, and the legacy of cultural apathy in the broader community toward the site.

Chris Carter

Adjungbilly Creek, NSW - An Alluvial Mining Landscape.

The mining of alluvial gold in Australia has left distinct landscapes as a result of human actions. However, in many areas, increased activity and technological development, together with natural erosive forces, often combine to leave little evidence of the early mining activities. A site containing evidence of several mining phases, separated by both time and space, can, therefore, provide a valuable insight into the history of mining activity within a particular area.

Adjungbilly Creek is a tributary of the Tumut River in NSW. Gold was first discovered in the area in 1855 and a small 'rush' followed, including both Chinese and European miners. The amount of gold reported from the area was never considerable but returns were sufficient to warrant continued activity until early this century. However, the landscape surrounding Adjungbilly Creek is, in itself, an artefact demonstrating the impact of alluvial mining from 1855 to present day. Evidence of all phases of mining, including surface sluicing, hydraulicking and dredging, is visible along the creek as are remains of a number of huts, representative of the homes of the early miners. The landscape has also been altered as miners dammed and diverted the creek to control the water for their activities. However, documentary evidence is scarce and official records provide little detail of the mining activities within the area.

The area surveyed for this study contains a microcosm of alluvial mining. Using archaeological techniques, this paper seeks to demonstrate the history of mining on the Adjungbilly Creek using this landscape itself as the primary source.

Ross Mainwaring

More than meets the eye - the interpretation of what you don't see in a mining scene.

This is basically a visual presentation that will involve the interpretation of photographs of a mining landscape at Hillgrove goldfield, New South Wales. This will be accomplished through the use of either slides or an epidiascope. Furthermore, the underground features will be exhibited by superimposing drawings on the landscape which will exhibit that to a degree the above ground features of the landscape were determined by the geology and underground developments.

Wendy Carter

The Australian Prospectors and Miners Hall of Fame - a 2001 odyssey!

It is hoped that the Australian Prospectors & Miners Hall of Fame, based in Kalgoorlie-Boulder, will be opened in the year 2001 for the Centenary of Federation. That centenary is significant in more ways than one, for it was the people of the Eastern Goldfields of Western Australia, many of them 't'other siders' with allegiances to the eastern colonies who swung the balance in the vote to determine whether Western Australia should join the Federation at the turn of the century.

That the Hall of Fame should be based in Kalgoorlie-Boulder is appropriate in that the area is one of the few that has enjoyed a history of continuous gold mining since the late 19th century and despite the vicissitudes of activity over the years it is still today one of the major gold producing areas in Australia.

Part of the structural complex for the Hall of Fame has already been arranged, as the Hannans North Tourist Mine with an estimated value of \$10 million has already been pledged by Kalgoorlie Consolidated Gold Mines to the organisation. While the major centre will be located at Kalgoorlie-Boulder, it is planned for satellite centres to be located at mining towns around the country. Among other aims, will be the collection of a central data base on mining which can be tapped by researchers throughout Australia.

By the time that this paper is read, an architectural competition for the Hall of Fame should be underway. The speaker who is on the Management Council for the Australian Prospectors & Miners Hall of Fame will provide an outline of the history, developments and future plans for this exciting project.

FOURTH AMHA CONFERENCE, SYDNEY, 1998

ABSTRACTS OF PAPERS

Peter Bell - *The Wallaroo and Moonta Miners' Strike of 1864*

For ten weeks in March to June 1864, Australia's largest copper mines at Wallaroo and Moonta in South Australia were closed by a strike. It was not the first major strike in the South Australian copper mining industry; sixteen years earlier in 1848, the miners at Burra had closed the mine for three months in a dispute over the fairness of the company's assay procedures. In both strikes, a union was formed to achieve specific objectives, and dissolved when the campaign was over. There was no continuing industrial organisation, and the ideological component of the disputes was very small.

The 1864 strike was remarkable for several things: the focus of the industrial action on incompetent management which threatened the miners' livelihood, not on the companies or on capitalist ideology; the strength of community support, which emphasized ethnic Cornish solidarity; the pragmatic response of the company directors, who realised half-way through the strike that they were on the wrong side; and the completeness of the miners' victory, for they won every one of their initial demands.

One outcome of the 1864 strike was the appointment of Henry Richard Hancock as Chief Captain and Superintendent of Moonta Mines in August 1864 (and the amalgamated

mines after 1889), ushering in a period of competent management for the remainder of the century.

Patrick Bertola - *'Racially restrictive provisions in WA mining legislation'*.

This paper outlines the evolution of provisions within legislation that sought to exclude certain 'non-Britishers' from working in or around mining leases in Western Australia up to the early 1970s. In so doing, it surveys the rationale for the legislation and the circumstances surrounding its application in a number of instances in this century. The paper then discusses the eventual modification of legislation in the early 1960s when the WA government faced the dilemma of challenges to the validity of iron ore leases on the basis that Japanese technical staff (that is, in legislative terms, "Asiatic aliens") were working on those leases. Finally, it also examines the repeal of the racially exclusive provisions in the early 1970s. While the main focus of the paper is the question of race, the paper also examines the presence of Southern Europeans in the mining industry and the attempts that were made to limit their presence, particularly in the gold mining industry, in the period before World War II.

Ralph Birrell - *Thoughts on the Psychology of Mine Development on the Bendigo Goldfield in the Nineteenth Century.*

Bendigo Mining N.L. has recently announced that research by its staff indicates that there are an estimated ten

million ounces of gold under the old workings of the central Bendigo goldfield. The company has raised capital of thirty-five million dollars, in a difficult market, to fund the development of this orebody. This announcement raises the question "Why did not the miners, early this century, also make this deduction as most of the evidence available to Bendigo Mining was on record at the turn of the century". It also raises the question whether other Victorian goldfields have unexplored orebodies below the existing workings. The paper investigates these questions and discusses whether the decline of the Victorian goldfields after 1900 was partly a psychological problem as owners and managers were unable to see beyond the narrow mind set developed on these fields during the first fifty years of mining.

Gordon Boyce - *Hammersley Iron: Inter-related contracting processes for a joint venture project*

Based on company records held by the University of Melbourne, the paper examines the multi-lateral negotiations that led to the creation of Australia's largest iron ore mine. HI was a joint venture between US-based Kaiser Steel and Anglo-Australian firm CRA/RTZ. Development of the Mount Tom Price deposit in the remote north west part of Australia was dependent upon securing consents from the WA and Federal governments, winning a large, long-term sales contract with Japanese steel mills, and attracting funds from a consortia of US banks. If any one of these agreements could not be negotiated

successfully, the venture would collapse. Thus, HI officials had to juggle 5 sets of negotiations concurrently. They succeeded by reversing the tables on the parties involved, using potential affiliation as leverage. The study identifies a number of transaction cost reducing devices used by HI staff as well as accepted conventions and a universally recognised sequence of stages that propelled the negotiating process. The paper goes beyond analysis of the dynamics of bilateral contracting to expose generic tactics that can be employed in multiple player scenarios typical of large-scale development projects.

David Cameron - *With "grit and perseverance": The rise and decline of the Queensland mining industry, 1900-1930.*

At the time of the federation of the Australian colonies the Queensland parliament held high hopes for the development of a vibrant and enduring mining industry in Queensland. A successful mining sector promised to be a great stimulus to the economy and to the alienation of vast tracts of the state for development and closer settlement, especially in Central and North Queensland. Prior to the Great War, as the mining sector rapidly expanded, these hopes appeared to have been realised. The war itself created new opportunities for mining as existing metals markets were dislocated and metal prices rose as demand for the minerals of war increased. This was a boon for the metalliferous mines in the north of the state, and the Labor government, dominated by North Queensland parliamentarians, eagerly directed policies and investment towards the greater exploitation of the state's mineral resources in the North. However, shortly after the war, as military plants in Europe were converted back to peacetime production, there developed a serious disparity between production and consumption. A short post-war boom was followed by dramatic currency fluctuations in response to the burdens of war debts and reparations, global demand for minerals and metals declined, and prices fell. In Queensland wage inflation led to higher costs of production, outdated methods of mining and processing were maintained, and the mining industry began to spiral into decline during the 1920s. The collapse of the sector by 1930 was so complete that an official of the Queensland Mines Department described it as being 'a regular debacle'. Nevertheless, the mining sector's ultimate survival demonstrated something of the 'grit and perseverance' of an industry that was not only able to continue despite such difficult conditions, but to eventually develop into the greatest export industry of the Queensland economy by the mid 1980s.

David Carment - *The Cultural Heritage of Mining at Tennant Creek*

The Tennant Creek district in the Northern Territory was the site of an important Australian gold rush in the 1930s. Since then mining in the area has continued. The paper discusses and illustrates the physical evidence of mining activity. First, there are mining remains in the area surrounding the town of Tennant Creek that document technological, economic and social developments. Second, there are buildings in the town that provide insights into living conditions, the provision of services and the establishment of forms of social control.

Mel Davies - *Ballast or Cargo?: Copper shipments in the days of sail.*

Marketing mineral cargoes overseas involved a plethora of costs and decisions for Australian producers, such as for example, whether to ship cargoes 'direct' or to ship them via other ports or to tranship via other ports. Minerals could be shipped either as cargo or 'dead-weight' (ballast). Costs could vary according to port costs, contract arrangements with various agents, or with changes in insurance rates, which in turn could shift quite dramatically according to the type of ship utilised or because of such exigencies as war. The paper sets out to examine the shipping arrangements and problems met by South Australian copper and copper ore producers both before the ending of the Navigation Acts in 1849 and up to the end of the 1870s, with particular attention being paid to the arrangements made by the South Australian Mining Association.

Philip Hart - *Jam tarts, mud pies, and the Kelly Gang*

Class distinctions and conflicts were muted in the small mining townships of Te Aroha and Waiorongomai by constant social interaction, although there were attempts at exclusiveness by the 'jam tarts' of the title. Some small businessmen considered themselves to be 'gentlemen', while some middle class women bullied their servant girls to indicate their own superiority, but at the same time there was considerable social mixing in hotel bars, at church, on the sports field and race track, and at social functions

and dances.

The 1880 goldrush attracted a variety of men who were not normally miners, including the 'Kelly Gang' of younger sons, some of them remittance men, of the English upper classes, whose roistering ways were aped by some colonial lower middle class youth. These men soon left once the initial excitement was past, but Te Aroha then became unique amongst New Zealand mining towns for having a steady and increasing influx of middle and upper class visitors, some from overseas, attracted by the allegedly therapeutic properties of the thermal springs. Some of these visitors had close and friendly social relations with miners and other residents, whilst others behaved snobbishly, leading to their being mocked rather than being deferred to.

The 'socially republican' nature of social life in the townships and in the mines obscured but did not remove underlying economic and class conflicts, although only a small degree of worker militancy can be detected in the late nineteenth century.

Lyndon Megarrity - *Sir Robert Philp and the Queensland Mining Industry*

Sir Robert Philp was co-founder of Burns, Philp & Co. and a conservative member of the Queensland Legislative Assembly from 1886 to 1915. He was also Premier of Queensland between 1899 and 1903, and again in 1907-08. Philp's mercantile and political career

was marked by heavy involvement with the Queensland mining industry. Indeed, unsound investment in North Queensland mining companies was a key factor in causing Sir Robert's near bankruptcy during the 1890s depression. While still struggling to pay off mining debts, Philp had ironically been promoted to the position of Queensland Minister of Mines. This paper will discuss the extent to which Philp's close association with the mining industry affected his policy decisions as Minister of Mines.

Barry McGowan - *A measure of production: a suggested method of assessing gold production on historic mining sites*

The problem of accurately assessing gold production, particularly on alluvial fields, has bedevilled historians for some years. The problem is acute enough when measuring total production for individual colonies, but almost insurmountable when addressing production on individual fields. Endless numbers of mining wardens and registrars lamented the difficulty of assessing production, a difficulty applicable to both European and Chinese miners. This paper addresses this issue and suggests a method for achieving some approximation.

Diane Menghetti - *Moral Economy and the Mining Crowd*

In 1971 E.P. Thompson explored the phenomenon of the eighteenth century working class commodity riot. He concluded that these riots were not instinctive reactions to distress but deliberate, disciplined and often successful attempts to restore the 'moral' price of food. In my paper I suggest that the mining 'roll-up' might share some of the characteristics of the English commodity riots. If this be so, I suggest that there are some interesting questions to be asked about the reproduction of pre-industrial behaviours in the mid to late nineteenth century, at the opposite end of the earth.

Bobbie Oliver - *The 'Riot' at Fimiston, 1919*

Serious industrial unrest was triggered on the Western Australian Goldfields in November 1919, when a group of 'Nationalist' workers attempted to re-register the defunct Coolgardie Branch of the Federated Miners' Union (FMU) in the Arbitration Court. The AWU Miners held a general meeting and members voted not to work with 'non-unionists' as they regarded FMU members. At 7 am on Thursday 6 November a crowd of about 2000 AWU miners gathered at Boulder Block to hear an address by their Secretary, Thomas Bradley, who urged the men to adopt peaceful tactics, but to attempt to persuade the FMU members to join the AWU. 'We can win this fight, not by violence

but by logic', he told the crowd. Although the violent incidents were remarkably few, police waited until the demonstration was over and then arrested sixteen miners in their homes in the middle of the night, and charged them with incitement to riot. The miners were eventually acquitted in the Supreme Court in Perth the following year.

Using a variety of documentary sources ranging from contemporary media reports to ALP Minutes, Premier's and Police Department files and Supreme Court records, this paper examines the various roles played in the so-called riot by the miners, the local RSL, the police and other members of the community. It also discusses the existing tensions which divided families as well as classes within the community, and the agenda of the powerful players, in particular the Chamber of Mines and the Mitchell National Party government. Finally, the paper draws some conclusions about the ramifications of the Fimiston riot for the Labor movement and the RSL.

Michael Pearson - *The early copper mining industry in Central Queensland—history and place*

Copper was the first metal commercially mined in Australia, commencing in

South Australia in 1844. The Peak Downs Copper Mine, commencing operations in 1862 at Clermont in Central Queensland, was the first successful copper mine outside South Australia, and the first rich mine in tropical Australia. The company developing the mine, headed by Thomas Mort, a prominent Sydney entrepreneur, brought miners and smelters from Burra in South Australia to operate the mine, and in 1872 imported 200 Cornish miners and their families. The mine closed in 1877 due to the inability of the owners to make such an isolated operation profitable. The mining and smelting expertise gathered at Peak Downs was then available to other small copper mining ventures around the state. Mount Perry Mine, managed by ASR Osborne (who went on to have a chequered career in Queensland mining), was opened in 1871. Miners and smelters were employed from Peak Downs and South Australia. The mine had fluctuating fortunes, changing hands a number of times and for a time in the 1890s becoming a French-directed company.

A series of small copper mines and smelters were established during the 1870s, years of high international copper prices. Flanagan's, Mount Clara and Mt Coora, Teebar, Great Blackall, Adolphus William and Mount Orange Copper Mines, all in Central Queensland, were operating in this period, but most were closed down in the same decade.

In the 1880s copper mines were established at Cloncurry and in the Chillagoe area in the 1890s.

The paper traces the history of the copper industry in Queensland in the 19th century, and looks at the sometimes surprisingly well-preserved physical evidence of it.

FIFTH AMHA CONFERENCE, HOBART, 1999

ABSTRACTS OF PAPERS

Carol Bacon

Convict Coalmines at Salt Water River, Tasmania.

Abstract to be forwarded.

Peter Bell

The Chinese on Australia's Mining Fields: some Historical and Archaeological Problems

While it is probably no longer necessary to describe the history of the Chinese in Australia as "a neglected topic", there is still a lot that we do not understand. This paper points out of the poorly-understood areas in our knowledge of the Chinese on Australia's mining fields: the varying means of immigration and supply infrastructure, giving rise to diverse social organisation and material culture among the Chinese in Australia; the effects of European discriminatory measures on Chinese communities; the nature of internal Chinese migration between Australian mining fields, and the role of violence between Europeans and

Chinese, both in folklore and reality. The paper also considers some parallel puzzles in the archaeological evidence.

The net effect of these problems suggests that the degree of diversity among Chinese communities in Australia was so great that it is not very useful to think of "The Chinese" as a single group. To do this invites superficial generalisation at best, and racist stereotyping at worst. Historians seeking to make sense of topics involving the Chinese on Australian mining fields in future will need to do more work on who they were, where they came from, and why they were there.

Patrick Bertola

Kalgoorlie's mines in the 1920s

In the 1920s many gold mining companies in Kalgoorlie, and indeed worldwide, faced serious threats to their survival. While the increases in costs they had experienced during and after the war had to some extent been offset by the premiums on the standard price of gold, those premiums declined markedly from the early 1920s and, in effect, were negligible from 1923. On the one hand, profits fell sharply, and on the other, companies could not finance the new developments they had curtailed during the war and that now were critical for their survival. This paper examines the responses of mining companies to the developing crisis. It identifies four main categories of action: direct attacks on the wages and conditions of labour; attempts to modify the arrangements under which mining was carried out; re-structuring of companies; and attempts to elicit state support for the industry. It suggests that labour suffered a major reversal in terms of the numbers employed and its social relations with employers, and that these were critical conditions for companies to proceed with new developments. Further, it proposes that the most successful companies at the end of the decade were those who were also able to marshal new capital and, to a lesser extent, to establish a positive relationship with the state in regards to its proposals for re-structuring the industry in Kalgoorlie.

Ralph Birrell

Claims and Leases in the Bendigo Mining District — the First Twenty years

Early Victorian governments took years to develop a consistent policy on the issue of mining claims and mining leases for goldfields. Pastoralists, businessmen, miners and mining companies alternately exerted their influence. At the time of the initial discovery of gold in mid 1851, the government followed the policy adopted by the government of New South Wales. However, in subsequent regulations it endeavoured to implement the policy of the local pastoralists so as to force the miners to return to their previous employment. When the contribution of gold to colonial development was realised the local businessmen pressured the government to encourage mining but the pastoralists prevented any reduction of the licence fee for a mining claim.

Whereas English mining companies influenced the early regulations on leases, the miners frustrated these regulations by pegging claims on the areas advertised for leasing. After Eureka, the miners effectively gained control of the regulations for claims and indirect control of the size of leases, though by 1859, the government had regained total control of leases. Regulations under the Mining Statute of 1865, brought relative stability.

This paper discusses changes to the regulations between 1851 and 1873, and in the process will analyse statistics associated with claim applications, forfeitures, amalgamation of leases, and the effect of quartz mining and changing economic conditions upon the changing scenario.

Protecting Mining Heritage — The Gipps Creek Mineral Field

The Fingal Valley - Ben Lomond area of Tasmania has a rich mining heritage for both metallic minerals and coal. Coal was known to exist in the area from the early 1840s, while gold, which has been mined intermittently ever since, was discovered at Lord's Nook (later Mangana) in February 1852. Tin and tungsten were discovered on the southern flanks of the Ben Lomond Plateau in the early 1870s.

Several mines in the Gipps Creek area were worked from 1872, many of them using a separation plant at the Great Republic Mine. While all the mines had closed by had ceased to operate by the turn of the century, one or two reopened for short periods in the early 1900s and during the Second World War.

Small dormitory towns, connected by a network of bush tracks and small gauge bush railways grew up along with the mines. The townships have long since disappeared but a heritage of artefacts and foundation 'drawn' plans are evident in the reclaimed bush. Ready access by the public and proximity to forestry operations today pose a potential threat to the integrity of the sites. As the sites lay near an education camp at the old mine site of Storeys Creek, they have the potential to become a rich educational source for visiting school groups. The camp already contains a historic photographic and artefact display of the area and has the potential to supplement activities carried out at the mine and the dormitory town sites. Safety on the sites is, however, a concern and Mineral Sources Tasmania has co-operated to bring up the safety standards thus making them suitable for use by large groups. The paper briefly discusses the mining and associated social history of the area, the work that Mineral Resources Tasmania are carrying out to make the area safe for public use, and how the area may be used as an educational resource.

Christopher Carter

Where Old and New Worlds Collide.

Potosi, Bolivia, was the world's richest silver mine during the late 16th and early 17th centuries. While the early miners simply gathered rich silver ore from the surface and exposed veins, production increased from about 1575 following the introduction of Old World technology utilising water power and mercury amalgamation. The success of both extraction and processing resulted in Potosi becoming the largest city in the New World by 1620. Potosi's history is well recorded and there are numerous publications detailing its wealth, development and systems of enforced labour. The archaeological evidence demonstrating the adaptation of known technologies to suit the site, particularly in the early years, has been less well studied.

This paper seeks to highlight the importance of the utilisation of technologies developed in Europe and their implementation in foreign and often hostile environments. It also highlights the cultural and industrial heritage of Potosi and how such aspects of mining history require management practices to ensure their protection and conservation for the future.

Betty Cosgrove

'The Captain' — Company man or pragmatic manipulator? G. A. Richard at the Mount Morgan Gold Mining Company Limited.

The Mount Morgan Gold Mining Company management paradigm was not unusual in its concept for the progress of a large enterprise. The resident general manager was the authority in a hierarchical system that encompassed section managers, shift bosses and every section of the mine and Works. In the role of 'company man' the general manager had also to honour responsibility to Board and shareholders. This paper will focus on the space and place of metallurgist G. A. Richard, during his term (1904-1912) as the fourth of six general managers of the mine, which closed in 1927.

Richard's term was paradoxical, for in many aspects of administration he was agent, yet in others, victim. His experience encompassed the rise to highest office and fall from company favour, the latter in an era of failing economy and emergent industrial conflict at the mine. The paper explores his pragmatic use of authority at management level and also as it impacted on the workers. A sometimes visionary for the industry, Richard dealt with the challenges of production, marketing, and labour that embraced the wider sphere of the union movement. However, to his detriment, he was not privy to the inner politics of a profit directed Board. In collapsing time to attempt an interpretation of the era and the man behind the Richard persona, the paper begs questions of perceived character flaw and the ultimate vulnerability of power.

Greg Dickens

A Hundred Years of Mining in Tasmania

Mining in Tasmania has a long and varied history. The Tasmanian aborigines were the first to become involved, mining flints, salt and ochre on a small scale. However, it was the result of the 1851 gold rush in Victoria that stimulated an interest in local mineral exploration. The first payable gold was found at Mangana in the northeast in 1852 and this was soon followed by the discovery of hundreds of small to medium sized alluvial and lode gold deposits in the surrounding areas.

The most important mineral discovery occurred in 1871, when a large tin deposit was located at Mt. Bischoff. This led to the progressive discovery of the other major West Coast mineral fields at Corinna, Heemskirk, Zeehan, Dundas, Lyell, Rosebery and Farrell. Since 1903, there have been few significant mineral discoveries, with the exception of King Island, Rossarden, Cleveland, Savage River, Que River, Hellyer and more recently, the Henty Gold Mine.

With an estimated 4,000 mines and prospects, it indicates that Tasmania is highly mineralised for its size, and with some of the above-mentioned producers it has mines of world class in terms of grade and production. The intention of this paper is to provide a brief history of the major mining developments in Tasmania during the first hundred years of European settlement.

Denise Gaughwin

Managing Historic Mining Sites in Tasmania's Wood production Forests

The long-term management of mining heritage presents a number of challenges in wood production forests. The nature of much of the historic mining means that large areas of the landscape contain workings and processing areas. These have been abandoned long enough to have mature forests covering the sites. As the forest industry moves from harvesting native forest and regeneration to clear fall and plantation development, the number of competing interests for the land increases. Water races present another land management difficulty as they may criss-cross many harvesting coupes.

This paper will outline the problems in managing these competing interests and the methods employed to ensure effective management of significant sites for the future. Management options include generating as full an inventory as possible, field recording of sites, assessing the significance, and developing management options. The principles of the Burra Charter are embodied in the Forest Practice Code and guide the management of these sites. On-site management is promoted as a first option, with avoidance of sites normally recommended. Removal of component sites is only recommended as a last resort.

Geoff Hansen

The Chinese on the Cape River Gold Field, North Queensland

Tense race relations between Chinese and Europeans feature largely in the historiography on north Queensland's nineteenth century gold fields. Although varying in degrees of moderation, the relevant works provide a single message - the tensions were the result of white racism. Research on the Cape River gold field (north Queensland's first viable field discovered in 1867) revealed that there was another side to Chinese-European relations on the Cape. Predictably, there were records of some clashes between Chinese and European diggers. However, the research also revealed that harmonious relationships existed in various ways. The evidence signals another side to Chinese-European relations on north Queensland's gold fields. While not denying the importance of racism on these fields, this new evidence may help contribute to a more balanced presentation of Chinese-European relations.

Richard G. Hartley

Filter Presses and Vacuum Filters in Kalgoorlie's rise to World leadership in Gold Metallurgy 1901 - 1908
The 1900s were years of remarkable creativity and innovation in Kalgoorlie gold metallurgy. New types of equipment for processing the telluride-containing sulphide ores were introduced in rapid succession and competition for cost reductions led to process costs being reduced by a factor of three between 1901 and 1905.

Kalgoorlie's most important contribution to gold metallurgy was not so much the introduction and refinement of new equipment such as the filter press and the tube mill, but rather the development of a new approach to ore treatment. In this sphere, all ore was processed as slimes in what was initially called the 'Australian all-sliming process'. Essential to success was the use of equipment that was capable of holding cyanided slimes while gold was removed from them in solution. The Kalgoorlie filter press was rapidly adopted for this purpose on many goldfields around the world, except in the USA where the type of equipment most favoured was the vacuum filter.

This paper looks at the competitive international development of the two filtering systems and, in particular, at the Ridgway vacuum filter, the first fully automatic continuous-flow vacuum filter in the world. This system replaced filter presses at Kalgoorlie's leading mine, the Great Boulder, in 1906. The history of the rapid international adoption of the Ridgway filter and its equally rapid fall from favour offer some interesting insights into the international nature of mining between 1900 and 1915. It also highlights the disadvantages faced by Australian inventors trying to market new technologies, especially those that were technically far in advance of others in general use.

Nic Haygarth

The Life and Times of James 'Philosopher' Smith up until 1876

As discoverer of tin at Mt Bischoff, James 'Philosopher' Smith is probably the most important figure in the history of mining in Tasmania. Mt Bischoff was not only an enormous economic boost to the colony, but provided the impetus to exploration which resulted in the discovery of the rich western mining province, including tin at Renison Bell, and the Zeehan silver-lead field, Mt Lyell.

Smith is not as well known as his discoveries. Earnest, scrupulous and scholarly, he is regarded almost as a saint in Tasmania. This paper provides a careful insight into his character and speculates as to how it developed. Focus will concentrate on the most active part of Smith's life up until his resignation as a director of the Mt Bischoff Tin Mining Company in 1876. By this time he had married, settled down and given up long prospecting tours. Regarded as the elder statesman of mining in Tasmania, prospectors found in him a model of industry and perseverance. One of his proteges was George Renison Bell.

As well as painting a picture of Smith's life and his influence over Tasmanian mining, the paper also discusses his early mining career and experiences in the bush. Particular reference will be made to his geological activities on the learning grounds of the Penguin-Dial Range and Forth River-Middlesex areas

Adrian Hutton and Leonie Knapman

Problems Associated with the Mining of Kerosene Shale at Glen Davis

Although the mining of kerosene shale (torbanite) took place near Glen Davis, New South Wales, during the latter part of the 1800s, it was not a major part of Australia's kerosene shale mining history until World War II when the venture came into existence because of an act of the Commonwealth Government of Australia.

Kerosene shale mining at Glen Davis is closely linked with that at Newnes. Built in 1905, Newnes was the hub of the Australian oil industry from then until the 1920s. Retorting started there in June 1911 but technical and financial difficulties brought operations to a stop four months later. Other sporadic attempts at mining were undertaken after this but the high cost of production and labour problems forced the company to close in January 1923. During the 1930s there were a number of attempts to re-establish the Newnes site but in 1938 the works were moved to Newnes North. This site became Glen Davis.

In this paper we look at a number of problems that beset the fledgling Glen Davis venture and the engineering projects that were undertaken to solve these. In all cases, one question has to be asked: were the solutions in the best interests of Glen Davis and its people, workers and families alike?

Greg Jackman

90 years at the Marie Louise: Cycles of Tin Scratching and Head Scratching on Blue Tier

The Marie Louise formation on the Blue Tier tin-field, North East Tasmania, was the focus for dozens of discrete prospecting and mining operations from the 1870s to the 1960s. Early opportunistic surface mining by local syndicates developed into moderately capitalised industrial operations during the 1890s boom, before regressing again into small scale fossicking activities predicated on lines of social allegiance.

The Marie Louise was one of the most consistently misunderstood elements on Blue Tier, and is presented as a case study for charting the impact of local dynasticism on long-lived marginal mining fields.

Roger Kellaway

Oil Shale at the Mersey: The West Bank 1924-1934

Oil shale was discovered in Northwest Tasmania in 1851. Early attempts were made to exploit the deposit but significant development occurred only after 1910. The first retorts were located on the east bank of the Mersey River at the point where it exits the Great Bend. Whilst the original company was not a success, this site became the focus of the dozen companies that followed in attempting to produce crude oil by the distillation of tasmanite. However, the history of operations on the east bank is almost incomprehensible.

Company after company littered the landscape with shafts, adits, tramways and retorts without any discernible strategy.

My aim is to investigate operations on the west bank of the Mersey. This location, directly opposite the above site, has two advantages. Firstly, it is significantly less complex having had only three companies involved in retorting over a ten-year period. Secondly, the works established by the Australian Shale Oil Corporation in 1924 were erected at a grand scale. The company's retorts were intended to process all the shale mined in Tasmania. It was the intention of the State Government that this facility would overcome the chronic problem of small, under-resourced companies attempting to mine, distil and refine on their own account. The establishment of this "monopoly" was immediately controversial and eventually unsuccessful. The Bronder retort, like all others on the field, worked efficiently for only a short period. The company was forced to cease operations in 1928 after producing only 65,000 gallons of crude. The property was taken over by L and N (Tas) Ltd in 1929 and the Shale Oil Demonstrating Company in 1932 with similar lack of success.

Ruth Kerr

Ruffashell Street and the Tin Battery at Rocky Bluffs on the Stannary Hills Tramway, 1902

The Stannary Hills tramway in the Cairns Hinterland stimulates excitement and curiosity from both historians and railway enthusiasts. Constructed in 1902 by a South Australian company, the Stannary Hills tramway extended 14 miles from Boonmoo on the Chillagoe railway and had a branch line from Stannary Hills to Rocky Bluffs on the Walsh River. The tin battery there operated from 1903 to the early 1920s and a town that included a school, sprang up around the battery in the period 1905 to 1911. The town, tramway and battery are all typically representative of the raw frontier of north Queensland mining investment, social life and engineering developments. This paper surveys the role that the Rocky Bluffs town and mill played in the north Queensland mining industry and assesses the significance of the site today."

Barry McGowan

The Chinese on the goldfields — a case study in stereotypes and historical neglect

When discussing the Chinese on the goldfields almost all historians refer to the more sensational incidents such as the Lambing Flat and Buckland riots and the violent and racist nature of the goldfields fraternity. A few historians acknowledge that most contemporary observers found the Chinese to be law abiding, hardworking and honest but say little else.

Lydon, Ryan and Bell have commented upon the narrow focus of most historians in this area. Ryan for example, comments that the 'token fragments' of Chinese experiences in Australian histories reveal stereotypes of Chinese in various roles as coolies, gold-diggers, market gardeners and cooks. She states that the histories ignore the different cultural backgrounds of the Chinese and the different conditions and circumstances to which they responded. Peter Bell has commented that it is unusual for the amateur historian to give other than an updated version of the nineteenth century stereotype of the Chinese and that what we read now is usually bigoted, at best condescending.

In the paper, the often conflicting evidence for racist based violence on the goldfields will be discussed, as will the broader question of race relationships, and the wider contribution of the Chinese to Australia's economic and cultural life. Examples will be taken from more recent studies, in particular in southern New South Wales and northeast Victoria. I will suggest strongly that in hiding behind a number of convenient stereotypes, historians generally have missed an important opportunity to make a serious contribution on the role of the Chinese in colonial and post-colonial Australian society.

John Miedecke

Heritage issues associated with the re-opening of the Historic Beaconsfield Gold Mine

The Beaconsfield gold mine located in the township of Beaconsfield in Northern Tasmania operated from the late 1880s to 1914. It was famous for its high-grade ore body, water inflows and the associated pumping equipment, which was state of the art at the time. After its closure in 1914, the mine site progressively fell into disrepair as old mine buildings and shafts collapsed. By the late 1970s, the only remains were the magnificent brick mine buildings. These buildings are listed by the National Trust and are on the register of the National Estate.

Since 1979, various companies have been involved with the reopening of the shaft and dewatering of the old workings in order to develop the famous Tasmania reef below. Now in 1999, seventy-five years after its closure, the mine has reopened by the Beaconsfield Mine Joint Venture and modern mining is progressing beneath the historic 455 metre level.

The paper addresses heritage issues associated with the mine's reopening, in particular the magnificent mine buildings constructed from 1903 to 1904. The subsequent recovery and display of Cornish pumping equipment (the only ones of their type on the surface of the world) and other items of heritage are also covered. Of the three mine buildings, two are now part of the Grubb Shaft Museum and the other, the Hart Shaft building, has now been refurbished and is the production winder house.

Jan Penney

The Australasian Number 2 Mining Disaster: Can we do it nightly?

One of the worst mining disasters in Australian mining history occurred at Creswick in 1882 when 27 men were trapped underground as a result of a drive suddenly flooding. Only five men survived this terrible ordeal. The others slowly drowned or were asphyxiated, several leaving haunting messages for their loved ones who waited on the surface. The heroic rescue efforts involved the boiler engine driver who pushed his boilers past all acceptable limits to try and lower the water level. Men trapped underground who cared for their mates until they died. Navy divers who rushed to the scene via steam train but brought lines which were too short and diving suits not able to be used. Teams of fellow miners working for days to reach the survivors. And one of the largest funerals in the district.

At Sovereign Hill we have often wished to present this story to our visitors to demonstrate the dangers of Deep Lead mining and the ever-present risks of death. Our success with our night show, Blood on the Southern

Cross, has convinced us that our audiences respond to a strongly dramatic historical story based on fact. But the question is can we do something similar with this event. How to tell this story in such a way that we highlight the heroism of the participants without reducing the dramatic impact? How to develop dramatic effects which impress the visitor, yet not demean the story? How to keep to the facts of the event, yet develop it into a meaningful experience for our visitors? In short - can we do it nightly?

Lou Rae

Abt Railway: Its role in the development of the Mt Lyell Mining Field

The Abt Railway was the first of two such systems constructed in Australia and connected the mining town of Queenstown with the seaport of Regatta Point, located near Strahan on Macquarie Harbour.

Built, operated and owned by the Mt Lyell Mining and Railway Company Limited the railway was the lifeblood for the mines in the Mt Lyell area and the communities that had developed around these operations. Rail traffic was the only means of access into and out of Queenstown up until 1932 and, consequently, the railway played an integral role in the every day lifestyles of most people.

Finally, in 1963, the railway was closed after sixty-seven years of continual service. The route which passed through some of the most spectacular countryside in Tasmania was left to become overgrown amid the rainforest. The many bridges had also begun to decay and by the 1990's many had fallen down making walking the route a difficult exercise.

In 1998, the Commonwealth Government approved funding for the restoration of the railway. Work has now progressed on the necessary planning and studies stages and by July 1999, the tenders are ready to be let for the construction of the railway.

This paper looks at the history of the railway, its operational links with the Mt Lyell Company's mining activities and the everyday role it played in the lives of those living in Queenstown. It will also cover various developmental and cultural heritage issues and will include an update in the construction process.

The paper is supported by slide and historical video films (of limited duration).

Glyn Roberts

Professionals and the Tasmanian Government in the Early Development of the Metal Mining Industry.

The paper examines some of the problems faced by professional geologists and surveyors in the Tasmanian public service during the second half of the nineteenth century. Five will be considered: three geologists, Charles Gould, Gustav Thureau and Alexander Montgomery, and two surveyors, Charles Sprent and E. A. Counsell. Each faced problems in maintaining professional standards in the face of interference by Ministers of Lands and Works, and departmental heads. The latter officials were often unable or unwilling to relate to their professional staff or perceive the long-term value of systematic and careful recording of fundamental data for use by prospectors and mining companies.

Gould was diverted from his stated task as Government Geologist to conduct mineral searches for gold. Various Ministers failed to understand Thureau's Germanic background and attitudes nor to appreciate his professional standing as a mining engineer and geologist. Montgomery built on the achievements of his colleagues but was driven out by financial stringencies.

The two surveyors, Sprent and Counsell, struggled with the total failure by their superiors to recognise and react to changing circumstances and consequently Tasmania did not build upon and improve the good basic survey principles set up in the 1850s. Successive Ministers were unwilling to spend sufficient money to cope adequately with the volume of work and the accuracy required for the high standards required to service the mining industry.

Peter Ryle

Elusive Black Gold: The Search for Coal in The Cooktown Area

The mining industry in North Queensland during the first fifty years of European occupancy is best remembered for the discovery and exploitation of gold resources in areas such as Normanton, Croydon,

Charters Towers, and the Palmer River. The gold retrieved from these districts undoubtedly helped the Colony

of Queensland achieve economic stability. However, the history of other minerals, like copper and coal, exposed a significant predisposition on the part of many mining entrepreneurs of the period to make decisions based on feeling, rather than on scientific exploration. The Chillagoe Smelter and its associated infrastructure, and the Mount Molloy Smelter and railway, are prime examples of the results of insufficient exploration work prior to investment.

Attempts to exploit coal reserves in the Cooktown district were in stark contrast to the Chillagoe and Mount Molloy experiences. Entrepreneurs here continued to invest funds in spite of scientific investigations that consistently reported the field as not viable. Logan Jack inspected many surface coal deposits in the district and expressed doubt as to their prospects. Subsequent exploration by diamond drill confirmed his opinions. Despite these results, investors continued to have faith that "black diamonds" would replace gold as an economic generator for Cooktown.

The first attempt to establish a coal mining industry in the Cooktown area occurred soon after the town was settled. Despite the euphoria surrounding the project, it failed to live up to expectations. Coal again came into prominence when the Cooktown to Maytown railway was debated in Parliament. Proponents of the railway claimed that coal reserves near the proposed route would provide fuel for the trains, and revenue from cartage of the coal for export. The railway proceeded to Laura, but the promised coalmines never eventuated. Since that time, successive miners have attempted in vain to prove viable reserves. As recently as the 1980s, miners attempted to locate a viable coal deposit in the Cooktown district. They were no more successful than their predecessors.

Sachiko Sone

Japanese Coal Mining — Social life and relationship on the Chikuho coalfield from the late nineteenth century to recent times.

The Japanese coal-mining industry was phased out from the 1950s and ended on 30th March 1997 with the closure of the Miike mine, Japan's largest coal mine. Until recently, despite a history extending over 100 years, Japanese historians have shown little interest in the industry and especially in social and labour aspects. The strong Marxian school in particular paid little attention to industrial relations in the industry because non-unionisation of the miners suggested a lack of militancy and because prudishness probably made them resistant to the sexual nature of gender relationships commonly recognised among the coal mining fraternity.

More recently, has come an interest in the social configurations of Japanese industrialisation. From collections of oral materials coming out of the 1960s a wealth of information has highlighted many aspects of popular culture that are proving invaluable to historians. Primary among materials released in 1997 were work songs, which for the first time revealed the arduous life of the miners and the forms of resistance undertaken to ease the burden. My interest, in particular, lies with the voices of the women who worked alongside the men. Turning to the issue of voice — unlike men, women above ground had no time, no public space and no authority to express their feelings. Below ground, women sang while they worked with the men. Their themes include topics both anticipated and surprising: the gruesome labour conditions; relationship to contract bosses; comic songs; songs against social prejudice; and women's songs about love and sexuality.

The paper attempts to illuminate the social world of Japanese coal miners through a gendered cultural history approach, together with the techniques of oral history, including a consideration of poetics as told through the work songs.

Steve Sorrell

Mt Bischoff — Mountain of Tin

For many years, the Mt Bischoff mine, discovered by James ‘Philosopher’ Smith in 1871, was one of the world’s richest tin mines. From 1878, regular dividends were paid to shareholders, with several of them making fortunes. James Smith was not among them.

Originally, the tin ore was treated by sluicing, and then crushing as the ore grades fell and the rock became harder. By 1914, forty stampers, each of 1,000lbs capacity were in operation. The ore was so rich in places that it was simply shovelled into bags and shipped to the smelters located in Launceston.

From about 1910, the grade of ore began to decline, and with tin prices falling heavily in 1914, the mine operated at a financial loss. From about 1929, the mine was worked on tribute, until the demand for tin rose in World War 2, when it was worked by the Commonwealth Government.

After 70 years of continuous production, the Mt Bischoff mine, the mountain of tin, finally closed in 1947. Since then, mining ventures have only been spasmodic. Exploratory drilling, however, has indicated that there are still substantial reserves of ore, perhaps more than six million tonnes. If only the price of tin would rise!

For those interested in mineralogy, more than 100 different mineral species have been recorded from Mt Bischoff. These include aesthetic specimens of colourless, blue, green or purple fluorite, radiating topaz crystals, cassiterite nuggets of many kilograms in weight, as well as rare minerals such as ralstonite, sellaite, bavenite, and prosopite. Steve will take us through 100 years of mining history of the 'Mountain of Tin', and will show some of the minerals that have been and still can be found there.

Ian Terry

Bricks and Mortar: Convict Quarrying on Maria Island

In 1825, a convict station was established on Maria Island, lying off Tasmania’s east coast. The convicts sent there were those who had committed further crimes after arrival in the colony. Within a few years, clay and limestone were being quarried to make the bricks and mortar required to build structures more permanent than the original log and plaster huts. Nearby brick clamps and limekilns were used to process the raw material which was sent to Hobart with the aim of establishing an island industry. A sandstone quarry on the waters edge provided ‘freestone’ for stone buildings.

The physical evidence of this mining activity remains on the island, albeit in places obliterated by quarrying and mining in the late nineteenth century and the 1920s. The paper explains the history of convict quarrying on the island with a brief reference to the physical remains extant today.

James Verrier

Development and Decline of a Mining Town: Balfour, 1906-21

Alluvial tin was discovered on the Balfour Mining Field in the late nineteenth century but it was copper that spurred its growth in the early decades of this century. Like so many other fields, Balfour promised much but delivered little. Only one mine, the Reward Mine, ever succeeded in producing copper ore for sale. Its initial success led others to take up leases in the area. A speculation boom occurred and by 1909, the Balfour mining field stretched from the Arthur River to the Pieman, a distance of over 50 kilometres.

In spite of the size of the field, only one town emerged as a population centre. Not surprisingly, the town grew next to the Reward Mine. It inherited the name of the field, Balfour. The speculation boom ensured that both the town and the field would receive more attention than they truly warranted. To the present day, myth and half truths have created a picture of a town of not less than 1,000 souls whose fortunes vanished overnight with the copper ore of the Reward Mine just at the time an epidemic forced a mass exodus of inhabitants. As is often the case, the truth is less glamorous than fiction. None the less, the history of the town of Balfour is a familiar mining town story.

As befits a mining town, Balfour developed a strong community spirit. Sporting and cultural groups reflected the diversity of interest among the inhabitants. The town's temporary structures belied the strong belief of residents of the town's future but were demonstrative of the speed with which Balfour grew. As a feature of that growth, the town suffered the effects of unplanned development and unreliable communication with the settled districts. These problems were never properly resolved as Balfour's fortunes died with the mines it serviced. Its population had peaked at roughly 300 in the period 1912-14. By the 1921 census, the town had only 46 residents and Balfour took its place among Tasmania's glorious mining failures. The paper recounts the social history of Balfour, and in doing so, reveals the links between the town and the principal mine.

David White

Prelude to black coal mining by the State in Victoria

The black coal potential of Victoria had been known since the 1840s, principally from sea cliff exposures at Cape Patterson and Kilcunda. The limiting factors in development of the resource had been the lack of railway transport, poor government geological research and adverse official opinions of the quality of Victorian coal. Despite the vigour of Parliamentary Committees and Royal Commissions, the provision of rail subsidies and sidings, encouragement of private tramways and head hunting for coal mine managers in the West of Scotland, Victoria's independence from New South Wales coal production had been put to question. This occurred in 1903 with the 'lamentable strike of coal miners' in Victoria, which reduced an annual output of 225,000 tonnes in 1902 to only 64,000 tonnes.

Common opinion would claim the prime cause for State Government establishing a publicly owned coalmine in November 1909, as being the then current New South Wales coal strike. However, for some time, Australian Labor and New Zealand Labour Party policy had been set to bring coal mining into the public sector. In Victoria, a report on readily mined black coal resources had been forwarded to Premier Bent in November 1907. By the time the immediate intention was announced by Minister for Mines, Peter McBride, on 15 June 1909, Crown Land at Wonthaggi had already been reserved to the Government for coal mining purposes. The apogee of activity at the State Coal Mine, Wonthaggi, occurred in 1929-1930 with 662,000 tonnes being produced by some 1,800 personnel.

This paper sets out to examine parochialism and political patronage v the practicalities of private coal production *in explaining* the establishment of the State Coal Mine, Wonthaggi, Victoria.

Lindsay Whitham

The Railways and Tramways of Zeehan

The discovery of rich silver-lead deposits in dense rainforest near Mount Zeehan during 1882 marked the beginning of the boomtown of Zeehan. Within twenty years, the town had grown to hold more than 8,000 inhabitants, which made it Tasmania's third largest centre. Because of the climate and terrain of the area, rail transport became the preferred means of servicing the mining field. In fact, rail provided Zeehan's only link to the rest of Tasmania for the ensuing 50 years.

Railway construction was commenced by the Government in 1892, to connect Zeehan with the port of Strahan on Macquarie Harbour. By 1900, a link had been established with Burnie on the Northwest Coast. Furthermore, there were many government and private lines built to connect Zeehan with surrounding mining fields and to service local mines. Tramways were also established to access nearby timber resources. Zeehan became the railhead for branch lines to the mining communities of Comstock, Renison Bell, Dundas and Williamsford. In addition, there were the privately built narrow gauge tramways that provided a link to numerous mines associated with the Zeehan mining field. As a result, there was a brief period during the early 1900's, when Zeehan was regarded as the busiest railway station in Tasmania.

The paper sets out to illustrate the important role that the railway and tramway network played in the development of the mines and mining communities that surround Zeehan.

SIXTH AMHA CONFERENCE, ADELAIDE, 2000

ABSTRACTS OF PAPERS

David Carment - *Presenting Mining's past in the Northern Territory*

How do individuals, communities and government agencies think about mining history in the Northern Territory and how is this history presented as part of wider strategies concerned with cultural heritage management? This paper discusses the orientation of mining history in the Territory in the light of growing 'heritage awareness' and mining history's role in selected agencies and organisations. Attention is given to the interpretation of mining activities in a national park, museums and heritage trails. Within the Arltunga Historical Reserve there are a visitor centre and tours that encompass drives and walks to conserved mining sites. A number of Museums including the Pine Creek Miners Park and the Tennant Creek National Trust Museum are concerned with mining history as are such trails as The Northern Territory Heritage Trail that includes the Northern Goldfields Loop. The standard of the interpretation strategies varies widely. At Arltunga, the interpretation is of a high professional quality but this is not the case with some museums, which, reflecting the priorities of their owners and keepers, often present an overly romantic picture of mining history that avoids the widespread social conflicts and tensions in the industry. The paper emphasises attitudes, memories and imagination that endow physical forms of the Territory's mining past with particular meanings.

Ralph W. Birrell - *The Role of Minerals Separation Ltd. in the development of the flotation process*

The story of the flotation process for the concentration of ores, since the first patents were granted in the nineteenth century has been well documented. Also highlighted are the contributions of engineers, chemists, metallurgists and entrepreneurs to this development in England, Broken Hill and the Americas. Several relevant patents are accredited to The London Company, Minerals Separation Ltd, which was involved in litigation over these patents. However, the role of the company and staff, in developing the process between 1905-1913, in Broken Hill and elsewhere has not been adequately described. Documents have recently come to light that give insight into the conduct of applied technical research in a period when scientific methods were being introduced into the Australian mining industry. They reveal cases of industrial espionage, attempts to corner markets and glimpses of the inter-personal relationships of people in the mining industry. Blainey has commented that American histories hail the flotation process as the fruit of American ingenuity. This paper looks at how the staff of Minerals Separation Ltd. was at the centre of development of the process in Broken Hill and elsewhere in Australia, and was the key to the transfer of technology to the Americas, both south and north.

Mel Davies - *Burra Connections - routes and transport options 1845 - 1870s*

There were a number of transport options open to the South Australian Mining Association to service their Burra Burra Mine at Koorunga. The options related both to routes and forms of transportation. These options included following the direct inland route or the shorter Port Wakefield to Koorunga road, and transport that involved options and combinations of water transport, bullock, donkey, horse and rail conveyance. Why the Burra directors chose some options over others will be the subject of this paper.

Greg Drew - *Mining Heritage in Mexico*

Proficiency in melting, soldering and casting of precious metals was the hallmark of the Aztecs long before the Spanish arrived in Mexico in 1519.

Within a few years of the establishment of New Spain in 1521, the Spanish began to locate the sources of Aztec wealth and by the mid 16th century, large quantities precious metals were being exploited, and sustained populations in Guanajuato, Zacatecas, Pachuca and Taxco. Today, a few mining towns retain the atmosphere associated with mining. Real Del Monte near Pachuca, which developed around the mines in an irregular fashion, is now protected by Federal law. Following independence from Spain in 1821, English capital was required to revitalise the industry, and with it came the steam engine and Cornish miners. By 1850, most mines had been acquired by Mexican companies but during the first half of the 20th century, investment came mainly from the United States until nationalisation of mines in the late 1940s.

The history of mining in Mexico is traced through its mining heritage and illustrates the colonial, Cornish and American influences. The remaining Cornish engine houses at Fresnillo, Pachuca and Real Del Monte and their similarity to South Australian examples is highlighted.

Sue Harlow - *Life on the Maranboy tin fields from 1913 - 1950*

The small tin field of Maranboy in the Northern Territory was the principal producer of tin for thirty-six of its forty years of mining. As with many other mining communities in the north of Australia, the residents of Maranboy discovered that the field's isolation was its greatest obstacle to realising their expectations of acquiring wealth. This isolation highlighted the importance of social groups such as women and Aborigines whose presence and contribution to the field's life are often overshadowed. Male and female Aboriginal labour was essential to the continuation of mining. Women, in their capacity as housekeepers, nurses-com-social workers, boarding house owners and miners led to an increase in living standards for many residents. These economic and social correlations influenced the life of all on the field, from its optimistic beginnings until its decline four decades later. Supported by slides, this paper examines the people behind the industry, the men and women from a diversity of cultures and backgrounds, who laboured to make a living in difficult times. Maranboy is today a ghost town some three hundred and seventy kilometres south of

Darwin, where only scattered remains of the dwellings and mine sites are evident of the once thriving community.

Philip Hart - *Salting the Sands: a case-study of a fraud*

At the end of 1886, a farmer in Waitoa, New Zealand, who was also a prominent public figure, discovered what he took to be gold. Investigations by experts suggested that a payable field had been discovered, despite being in a geologically unlikely area. Investors formed syndicates and one mining company, and there was hope that thousands of hectares would prove to be auriferous, thus solving both the financial depression. However, closer examination revealed that gold sovereigns had been filed to provide the high returns sometimes obtained from the samples. Although for a time many were unwilling to admit that a fraud had been perpetrated, further tests proved that salting had indeed taken place. The method used was to salt the bags in which samples had been collected for testing: but the identity of the man or men responsible for the salting was never discovered. This case study highlights some of the problems facing investors in the fraud-ridden world of mining investment, how some experts failed to detect salting, and the difficulties in proving who was responsible for the latter.

Nic Haygarth - *SB Emmett: a Pioneer Tasmanian Prospector, from Bendigo to Balfour*

In 1871 James 'Philosopher' Smith sparked the Tasmanian mining industry by finding immense deposits of tin. However, but for misfortune the title 'discoverer of the Mount Bischoff tin mines' might have belonged to another prospector, Skelton Buckley (SB) Emmett, the champion of the Arthur River system. His efforts to follow the Arthur to its headwaters near Mount Bischoff were frustrated by confused exploration reports and maps and government scepticism. Instead of finding Mount Bischoff, this supreme optimist had been satisfied with a minor goldrush and a discovery of tin at Balfour, which turned into a meteoric copper field, a 'poor man's' Mount Bischoff or Mount Lyell.

Roger Kellaway - *Oil shale at the Mersey: prelude to development 1851-1901*

Discovery of oil shale on the Northwest Coast of Tasmania in March 1851 attracted scientific attention that focused on the nature of the resinous material, the oil content available for extraction and the geological relationship between the oil shale and the nearby coal. Syndicates formed in Hobart and Launceston in the late 1850s and early 1860s attempted to discover whether it had practical use. The Scottish model was obviously critical. Lighting kerosene and lubricating oils featured in proposed developments, as was production of town gas and use as both fertilisers and insecticides. Mining at the 'Great Bend' was limited to a few quarries and exploratory shafts and adits. Interest briefly revived in 1880 when the Mersey Tasmanite Company was formed in Melbourne. It was planned to use the shale to produce a range of unusual products, from foundry mouldings to silver polish. The company quickly disappeared leaving queries about the credentials of the promoters and their activities. However, it served the function of redirecting attention to the Great Bend where Frank Richards of Devonport began systematic exploration in the 1890s. His work saw formation of the Tasmanian Shale and Oil Syndicate in 1901. Ten years later, this company erected the first retorts.

Barry McGowan - *The environmental affects of alluvial mining; an historical perspective*

Alluvial mining at its worst was a form of accelerated erosion and the scars left on the landscape are in many instances both unforgettable and permanent. There are some who would insist that such landscapes have their own charm and significance and others that lament their very existence. Regardless of the point of view they cannot be ignored. This paper includes a discussion of the technologies used in all types of alluvial mining, in particular, the more capital intensive forms such as hydraulic sluicing, and centrifugal and bucket dredging. The main focus, however, is the environmental effect of alluvial mining, for example, siltation, pollution, erosion, and deforestation. Some of these effects are still very visible today, but others are much less so and are now incorporated into the landscape. Examples will be taken from mining fields in south east NSW, particularly in the Braidwood area, and in north east Victoria, for example, Beechworth,

Yackandandah, Omeo and Mitta Mitta. Of particular note will be the debate on the effects of alluvial mining in Victoria, which occurred in the mid 1880s and early 1900s. Some of the material to hand on these debates suggests that this may be a neglected area for both mining and environmental historians.

Zelda Martin - *The Rise and Fall of Central Victorian Gold Mining Towns*

This paper is part of a thesis examining the rise and fall of gold mining towns in Central Victoria in the period 1851-1871. More specifically the paper highlights the usefulness of business advertisements from country newspapers in building up an overview of the town's development in its early years. An important feature of the early gold field towns was the movement between gold fields of both the miners and the businesses that served their needs. Newspaper advertisements, combined with directories such as Bailleries Official Post Office Directory, also provide valuable information about the movement of these people around the gold field towns.

Bernie O'Neil - *Johannes Menge - an illustrated update of recent research findings (in 2 parts)*

i) Biographical detail; ii) Illustrations

Johannes Menge (1788-1852), regarded as 'The Father of South Australian Mineralogy', was a modest but multi-faceted person. Menge had an eventful and colourful career as a self-taught mineral dealer/mineralogist/geologist in continental and offshore Europe and Eurasia, and as a language teacher in London. A true cosmopolite, he arrived in South Australia in January 1837 as the South Australian Company's 'Mine and Quarry Agent and Geologist'. Losing that position within 18 months, Menge then eked out a living as a mineral collector, an agent for George Fife Angas, a soil/garden experimenter, a teacher, the first editor of the first bi-lingual newspaper in Australia and even as a basket-weaver! He died on the Victorian goldfields in October 1852. Just as in Europe, his life in Australia reveals a character of contrasts, at once seemingly simple-minded and eccentric (as said by more than a few of his fellow colonists) while in retrospect appearing to be far-sighted, extraordinarily worldly and perceptive in his comments and observations. The talk will describe diverse aspects from the wholeness of Menge's life and will update the latest findings. It will be accompanied by illustrations from my recent research in Europe, the United Kingdom, the United States of America and Australia.

David Palmer - *'Progressive' Management in Traditionally 'Non-progressive' Industries: American Shipbuilding and Australian Mining Compared, 1910-1941*

Internationally, companies in certain major industries have been classified by business and labour historians as having 'non-progressive' management styles because they refused to fully establish peaceful relations with unions. American shipbuilding and Australian metal mining have been stereotyped in this way. A detailed investigation of managerial practices at the Broken Hill mining companies (Australia) and Bethlehem Shipbuilding (a division of Bethlehem Steel in the United States) between 1910 and 1941 reveals that these companies actually pioneered 'progressive' management and employment relations practices, despite their strong anti-union positions. Executives and managers in these companies acted not only from their immediate experiences in production, but also utilized ideas drawn from ongoing connections with industry executives and managers overseas. This dual process of developing managerial policy indicates that the 'globalisation' of corporate policies, including employment practices, was far more widespread in the early part of the twentieth century than many presently believe.

Gilbert M Ralph - *Gold Dredging in Central Victoria*

The gold dredges operated by Victoria Gold dredging Co and Central Victoria Dredging Co near Newstead and Avoca between 1938 and 1958 were amongst the largest in Australia. In total they treated 33 million cubic yards of alluvial for the recovery of nearly 175,000 ounces of gold. The conventional bucket dredges

were designed by Alluvial Mining Equipment Co of Sydney and were built by Thompsons Engineering and Pipe Co of Castlemaine. This paper describes, and illustrates, aspects of the design, construction and operation of the dredges, their remarkable efficiency, low cost of operation, technical difficulties and the successful land rehabilitation that followed.

Glyn Roberts - *Past Government Assistance to the Tasmanian Mining Industry. Was it necessary or effective?*

Between 1880-1914, the Tasmanian Government adopted various strategies to assist the Tasmanian mining industry that can be categorised as follows:

1. Exploration - Enthusiasm for diamond drills purchased in the early 1880s to assist with exploration of mineral deposits at depth fell away rapidly as expectations were unmet. Additionally, just before WWI, money and effort expended on surface prospecting for new metalliferous provinces on the West Coast was unsuccessful.
2. Deep Sinking - Financial assistance was concentrated on the gold mining industry at several fields but later focus shifted to a lead-silver mine in the Zeehan field.
3. Access - Government money was expended from the late 1880s in providing rail access to various mining areas and mines.
4. Government Management of Mines - In 1914 the Government took over the Beaconsfield gold mine and a silver-lead mine at Zeehan in unsuccessful attempts to maintain production.
5. Provision of Water for Alluvial Tin Mining - A privately built water race in the North east tin fields was purchased and run on a quasi-commercial basis from the mid-1880s.

Following a discussion of the background and progress of such assistance and involvement by the Tasmanian government, the effectiveness or otherwise of such actions will be analysed.

Naomi Segal - *The emergence of the Chamber of Mines of Western Australia (Inc.): the first stage*

The emergence of the Chamber of Mines of Western Australia (Inc.) as a peak employer group coincided, more or less, with Parliament's passing of the Western Australian Conciliation and Arbitration Act 1900. Was there a relationship between the two events and, if so, what was it? As a first step in an attempt to re-examine this question, this paper describes early industry attempts to organize the gold mining industry and assesses the importance of the activities of predecessors of the Chamber in forging corporate consciousness of mutual interests, including in relation to labour.

Patricia Summerling - *A conflict of interest: Using a social network to analyse the major players involved in the establishment of the Moonta and Wallaroo Mines between 1859 and 1868*

The Wallaroo and Moonta copper mines were discovered by the shepherds of a sheep-farmer, Walter Watson Hughes, in 1859 and 1861. At the time he was in debt, to Adelaide firm, Elder Stirling & Co. However, this in no way impeded his pursuit to befriend two of the firm's directors who came to his aid when the Wallaroo Mine was discovered. Within six months they became involved in a partnership deal.

Using a social network framework it will be revealed how Hughes was able to use his family and business connections to obtain these mines. The tale does not end there, for the Moonta Mine was fought for by rival syndicates who alleged that Hughes claimed and possessed the Moonta Mines by fraud. The fight for Moonta lasted until August 1868. Legal investigations into the allegations spawned a government select inquiry, the first case in SA to be heard in the Privy Council, and appearances in the Supreme Court. The battle was finally won, not because Hughes and partners were legally entitled to own the Moonta Mines but because they, as the capitalists with the biggest bank balance, simply wore down all other rivals until an out of court settlement was agreed upon.

Barry Sykes - *Mines, Railways and Railfans*

Railways featured long before the age of steam, with the first recorded wooden ways being recorded in a Nottinghamshire coal mine at the end of the 16th century. Since then, there has always been a symbiotic link between mining and railways and that has been as true for Australia as with developments in other countries. Some of the Australian railways were built as part of state railway system, either to serve private or state owned mines. Others were built as private ventures and often as general service providers as well as servicing mines, while a third group was associated with mining companies specifically for mine development purposes. This paper provides a bird's eye view of such developments, while also looking at some of the technological detail and the establishment and functioning of such 'railfan' organisations as the Australian Railway Historical Society and organisations intent upon preserving mine/rail heritage.

D.A. White

Serial publications of the Mines Department/Geological Survey of Victoria: overview, comparisons, effectiveness and responsibility to the mining industry and constituency of greater Victoria.

The discovery of gold and the issue of Colonial Government to Victoria were closely timed. Reporting of detailed mining activity from the gold fields to prospective miners was initially in the hands of a Board of Science. Responsibility passed to the Secretary of Mines in the form of quarterly Reports of the Mining Registrars. Dissemination continued to 1889. Mine safety statutory issues were dealt with by concurrent Annual Reports of the Secretary for Mines and results of geological discovery were carried in Progress Reports of the Geological Survey from 1874 to 1899. Monthly Progress Reports to March 1900 followed with Special Reports and Rapid Surveys filling in the knowledge gap. Memoirs (complete treatises), Bulletins (shorter complete reports) and Records (collections of short reports) opened twentieth century mining and geological reporting. The Records were last issued in 1937 and a biennial Mining and Geological Journal published. Geological Survey of Victoria Reports issued by the Department of Natural Resources and Environment are the principal source of technical information by the State of Victoria for the mining industry of Victoria today. This paper considers issues of organisation, capability, and performance and public responsibility connected with the history of mineral production in Victoria.

Nicola H Williams

Oertlings and Assay in Australia

From the middle of the nineteenth century, discoveries of gold and other minerals were made all over Australia, making necessary the need for assays. Precision balances were an integral part of the assay process, being used in analytical laboratories in mints, at mines, and later in educational institutions. As

Curator of the Faculty of Science Instrument Collection at Monash University, my particular interest is beam balances, especially those made by the London firm of Oertling. In collaboration with two colleagues in the UK, who are writing a history of the firm and trying to trace as many as possible of the extant instruments and weights, we (my husband, Mike) and I have located a number of assay Oertlings in various Australian towns, usually those with a history of gold mining. In this short paper I will discuss some of the instruments and their importance, and the excitement of the search.

SEVENTH AMHA CONFERENCE, KALGOORLIE, 2001

ABSTRACTS OF PAPERS

Peter Bell - Sons of Gwalia: the mine that was too good to be true

The Sons of Gwalia gold mine, just south of Leonora on the Eastern Goldfields of Western Australia, produced gold from 1896 until 1963, an impressive lifespan for an Australian mine. It was one of the richest and one of the deepest gold mines in Australian history, and in 1898 its first general manager was Herbert Hoover, who thirty years almost to the day after he left Gwalia was elected President of the United States.

The purpose of this paper is twofold, first to identify and comment on some of the historical issues surrounding the Sons of Gwalia mine, and then to review it as one of the major case studies in Australian historic site conservation in recent times. For the Sons of Gwalia has been back in business again as one of Australia's great gold mines since the 1980s, and in the last fifteen years its operations have destroyed much of the physical evidence of its earlier career.

The subject matter of this paper is both an exercise in mining history and a study in cultural resource management. The heritage conservation issues raised here have been canvassed many times: how much can the community afford to keep from the past? The question is of course unanswerable; the community will always find means to keep things if it places enough value on them. The underlying question then is: how much should the community value things it has inherited from the past?

Ralph Birrell, - Pthisis and Clean Air

The first reliable, compressed air, percussion rockdrills were developed in the 1860s during tunnel construction in the U.S.A. and Europe. These machines doubled productivity compared with a hand drilling party, but as several machines were operated together, rates of advance increased rapidly. The mining industry adopted the new technology and many new machines were patented, including one by Ford in Victoria in 1867. All these were piston operated with integral piston and drill steel, all were heavy and required at least two operators. By the early 1880s rockdrills were in use worldwide and there were many manufacturers, including several in Victoria.

Miner's phthisis increased rapidly in the 1880s. In 1898, Geo. Leyner patented a rockdrill with water injection through the bit to minimise dust and which separated the piston from the drill steel. In the 1900s medical studies showed the need for better ventilation underground and most countries legislated for this; phthisis was eliminated. Improved metallurgical techniques overseas further reduced the weight but led to the demise of rockdrill manufacturing in Victoria, where secondary metallurgy was poorly developed.

In the 1940s the development of tungsten carbide inserts increased bit life. Air legs were in common use in the 1950s allowing one man operation. Modern machines operate from hydraulic rigs and are controlled by computers.

This presentation will examine the simultaneous development of the percussion rockdrill in Europe, USA and Victoria, Australia from the 1860s, the failure of the Victorians to compete after 1910 and subsequent developments in Europe and the USA.

David Branagan - Seeking Hidden Millions - Metallurgists and the Broken Hill Lode

The Broken Hill Orebody, with its complex mineralogy, provided treatment problems, and there was always interest in improving the recoveries of the metals. Little systematic study of the history of the treatments or of the metallurgists of Broken Hill appears to have been done.

This paper outlines the work of three metallurgists: William John McBride (1879-1970), Thomas Andrew Read (1886-1972) and George Kenneth Williams (1896-1974), who made significant contributions. Their work was interwoven, McBride and Read through the Broken Hill South Company, McBride and Williams through Broken Hill Associated Smelters.

McBride's contributions over 15 years (1900-15) included both experimental work on the ores and practical changes to the operations. He worked briefly at Broken Hill Associated Smelters in 1915 and postwar for some years.

Read, trained by McBride, spent all his professional life at Broken Hill South between 1901 and 1955. He continued McBride's laboratory and plant experimentation, particularly on selective lead and zinc flotation methods.

George Williams's work is perhaps better known. He carried out research for Broken Hill Associated Smelters between 1919 and 1948. The continuous operation he designed was "one of the great achievements in modern non-ferrous metallurgy".

Mel Davies - Heritage and Entrepreneurship – What motivated Claude Albo de Bernales?

While the entrepreneurial activities of Kalgoorlie based Claude Albo de Bernales (1876-1963) have received some attention by historians in recent years, little has been revealed as to his background. Using family papers and information found in British and German archives, and in US and British newspapers, it is possible to suggest what motivated this flamboyant character in his search for fame and fortune. The story that emerges makes it apparent that the traits of the fathers are often passed down to succeeding generations!

Greg Dickens - 50 Sluice-Heads: The Story of the Mount Cameron Water Race

The 1874 discovery of tin in Northeast Tasmania by George Renison Bell, attracted a steady influx of miners to the region. Within three years, there were numerous alluvial tin mines working, while at the same time, supporting communities were beginning to establish themselves. As a result, the region became known as Tasmania's tin province. Central to the area, the Ringarooma River provided the most productive source of alluvial tin, with mines at Branxholm, Derby, Moorina, Pioneer, South Mt Cameron and Gladstone. At Gladstone, many of the operating mines were struggling due to the lack of a permanent water supply. Therefore, the Mount Cameron Hydraulic Tin Mining Company decided to construct a substantial water race to carry water from the Great Musselroe River to its mining leases near Gladstone. However, the responsibility for the completion and operation of the water race was taken over by the Tasmanian Government, mainly for the benefit of the many small mines along its route. Since 1881, when construction commenced, the 50 kilometre long Mount Cameron Water Race has operated continuously to the present day. This paper looks at its fascinating history.

Warwick Frost - Historic tourism in the Victorian Goldfields: a reflection on the 150th anniversary of the Gold Rushes

Australian tourism is usually discussed and promoted in terms of natural attractions. With the very minor exceptions of Aboriginal culture, the outback and convicts, historical themes are generally rejected as having no more than local interest (and Aborigines and the outback are mainly depicted in a 'timeless' ahistorical manner).

This paper argues that such a view neglects history-based tourism in the Victorian Goldfields, which already exists as a major and successful tourism sector. Over the last twenty years, against a background of general rural decline, a number of Victorian gold towns have been highly successful in attracting tourists. Their success is the more remarkable given that they lack beaches, rugged scenery and other complementary attractions. Instead they have relied almost solely on gold and its heritage.

The paper outlines recent developments in attractions, comparisons with development in California and recent research on the type of tourist who visit the goldfields.

Anthea Harris - The British Royal Mint and the Australian Gold Mining Industry

Every man and his dog can find gold, but converting the gold pieces left in the pans into products for the world gold market takes considerable expertise. In the Californian gold rush, many 'mints' sprang up to treat gold, in the American spirit of free enterprise. In Australia, that great British institution, the Royal Mint, established its first branches. Gold was converted into sovereigns, coins worth exactly one pound that were legal tender throughout the British Empire. The first branch Mint opened in Sydney in 1854, a conversion of the old Rum Hospital and the first prefabricated factory buildings in Australia. Victoria opened the second branch Mint in 1872, a large, state-of-the-art facility in Melbourne. Gold discoveries were made in Western Australia and The Perth Mint opened in 1899.

The London Mint ensured that the products and operations of the Australian Mints were up to standard. The State Governments provided an annuity and collected surplus revenue. Miners and prospectors knew that they received a fair price for their ore. Today, only The Perth Mint survives to mint gold coins in its original premises. Its wealth of archival information gives new insights into the history of gold mining in Australia.

Richard G. Hartley - Western Australian Gold Smelters in the 1900s and the Northampton connection

The smelting of Kalgoorlie ores and concentrates played an important, though often overlooked, role in the development of the Kalgoorlie mines between 1897 and 1904. Nearly a third of the 0.8 million ounces of smelted gold bullion produced was processed in three Western Australian smelters, two successive ones at Fremantle and one at the Golden Horse-shoe's Boulder mine. Charles Kaufman, the controversial

American engineer, financed all three, and two of Kalgoorlie's most celebrated metallurgists were associated with their design and management, John Sutherland and George Klug. Though built within three years of each other, the Kalgoorlie smelter and the second one at Fremantle operated on different principles. This reflected the rapid changes in contemporary smelter technology and the large difference in capacities of the two smelters. The smelters were part of Kaufman's strategy to diversify into base metals for the armaments industry. Although his copper mining ventures failed, the Fremantle smelter was adapted to lead smelting, and during the First World War, assisted by the Commonwealth's export embargo, it operated very profitably treating ore from the Northampton lead mines.

Richard G. Hartley and Gerard MacGill - The Baddera lead Mine, Northampton Mineral Field

The authors will present an illustrated account of their heritage assessment of the mines, which were entered into the State Register of Heritage Places in 2000.

Baddera Mine was Western Australia's largest lead producer in the early decades of the twentieth century and was closely linked with early attempts to establish a works to smelt Kalgoorlie gold ores. Due to the state of preservation of their evidence, the Baddera Mines are important reference sites for the understanding of other sites on the Northampton Mineral Field, and illustrate the development of mining and processing technology over the first half of the twentieth century.

The Baddera Mine contains rare evidence of the application of steam power to mining and processing, and rare, and probably unique in Australia, evidence of the application of a Frenier pump. The North Baddera Mine contains a rare, and possibly the State's only, surviving in situ example of a once-common Huntington mill. It was the site within living memory of a tragic mining accident. The mines have links with important figures in the early development of the state's mining industry, including George Klug, W.G. Sutherland, and E. Protheroe Jones.

Brian R. Hill - Forgotten New Zealand mining entrepreneur – David Ziman (1862-1920)

Little known South African mining investor, David Ziman (1862-1920), played a vital role in the restructuring and modernisation of the gold mining industry at Reefton, New Zealand's second biggest gold field, in the late 1890s. Born in Czarist Poland, which he fled as a teenager, David Ziman was a barrow boy before emigrating to the Cape Colony where he became a trader in ostrich feathers. He was a founding broker of the Johannesburg Stock Exchange in 1887. He soon amassed considerable wealth, but was bankrupted in a collapse of the Rand market in 1890. With adroit trading, in a few years he restored his fortune.

On a holiday trip to New Zealand in 1895 to visit his wife's family, his attention was directed to Reefton by the Prime Minister, R.J. Seddon. The contemporary world-wide surge in gold mining investment, which was fuelled by the London share market boom, had bypassed Reefton which was in a slump and had been for twelve years. This was despite the favourable economic conditions for gold mining with deflation in New Zealand during most of this period.

Ziman devised an audacious plan to gain control of the main mines in Reefton, for floating in London. Denied the promoter's profit he sought by the collapse of the Kaffir Circus boom in gold shares, Ziman formed a substantial company, Consolidated Gold Fields New Zealand Ltd with Rothschilds, in which he had a founder's profit share. Ziman's company modernised and transformed the industry in Reefton. Although it operated for 55 years, Consolidated Gold Fields of New Zealand was financially successful in only its first fifteen or so years when it was able to mitigate cost increases due to domestic inflation, with improved methods and the introduction of new technology.

Ziman plunged the company into oil exploration and other ventures which failed. Forced out of the company, he became embroiled in protracted court actions, which he unsuccessfully appealed to the House of Lords. Ziman spent the last six years of life struggling to prove his disputed assertion that the orebody in the Blackwater mine extended at depth into the contiguous Prohibition lease, that he controlled. Vindication of his vision came only after his death.

Tin, jam, spice and brass: financing the Tongkah Harbour Tin Dredging Company 1905-1911

The IXL Prospecting Syndicate was established in 1905 as a partnership between Captain Edward Miles, Henry Jones and Khaw Joo Tok. Miles was a disgraced politician and shipping identity, Jones was an up-and-coming jam baron and Khaw was the Penang head of a prominent Straits-Chinese mercantile clan. Their objective was to explore the practicalities of dredging for tin in shallow waters near Phuket. The problems they faced were immense. The individuals involved had minimal mining experience; the technology of ocean dredging was unproven; and the company was working in areas previously off limits to European mining companies.

The aim of this paper is to examine the financial history of the public company that was floated in Hobart in 1906. The initial shareholders were almost exclusively Hobart businessmen. Mainland capital was soon required to finance the construction of better dredges and to cover the costs of beginning operations. The volatile price of tin, scepticism about the deposit, and the behaviour of market interests manipulating share prices tested the resolve of the Tasmanian directors. The first of many dividends was paid in 1911. This established Tongkah Harbour as a major company, the precursor of a dozen other Australian companies that were to dominate the Siamese tin dredging industry until 1941.

Ruth Kerr - The Life of a Mining Historian working in the Field of Native Title and the Mining Industry

Ruth Kerr has worked in the area of Native Title in the public service for nearly 15 years, five of those years in the Department of Mines in Queensland. The purpose of this paper is to outline the role that historians, particularly mining historians, can play in the field of native title within public administration and the world of native title litigation and the progress of native title claims - the modern history of the mining industry.

Sandra Kippen - Dr Walter Summons and the health of Bendigo Miners

In 1906 Dr. Walter Summons was commissioned by the Committee of the Bendigo Hospital to report on the condition of the goldmines in Bendigo Victoria. The first of the reports, *Miners' Phthisis: Report on the Ventilation of the Bendigo Mines*, which was forwarded early "owing to present public agitation about this important question" found that there was "insufficient provision made for ventilation on the Bendigo field" and that the clearest indication of this was "ill health amongst the miners". This report, with that following in 1907, has been represented as a watershed in mining in Bendigo. Much later, on his retirement from the Health Department, Summons reportedly claimed that he had been credited with the closure of the Bendigo mines and, if this was true, he was glad of it.

This presentation outlines the events leading up to the Summons' reports, when the concerns of the medical profession began to be reflected in the local media. The findings of the reports and the events following are then examined, and the judgement is made that, although the closure of the mines cannot be directly attributed to Summons, his work did have a profound effect on the lives and health of the Bendigo miners.

Leonie Knapman - Want to know more about the ghost town of Joadja Creek Southern Highlands of NSW?

The year 1878 marked the beginning of the Australian Kerosene Oil and Mineral Company, possibly the largest and richest of NSW pioneering industries. Retorts and refining plants for the extraction of oil from shale were set up with buildings erected to house the machinery and Scottish workmen. The company introduced large-scale production methods to produce kerosene, candles, wax, oil and other products that had earlier been imported. It solved its transport problems by building its own 61-km narrow gauge railway to Mittagong. A village was established and labour shortages overcome by enlisting experienced workmen and their families from mining areas of Scotland. After arriving in Australia they were taken by horse or bullock team to Joadja Creek where, they retained their Scottish habits and customs. Because of its isolation the village became self-sufficient and was one of the first country areas to have the telephone

connected. In particular, the 6,700 fruit trees', that supplied local and export markets proved a successful sideline. Over the next 12 years it seemed as though no influence from the outside world would deter this industrial community from achieving success. But it did! Production ceased in the early 1900s when the newly formed Federal Government dealt it a deathblow by removing the duty on imported kerosene, effectively killing another Australian industry in favour of overseas trade. By 1911 it was gone. Today only ghostly remainders remain to tell of the 2000 people who once lived in this remote valley.

The intention of this paper is to examine, through slides, 27 years of research into the story of Joadka Creek. Two books and a half-hour video have already been produced on the subject but there is still more to be recorded on an industry that has disappeared from our landscape..

Ronald H. Limbaugh - There is a game against us: W.J. Loring's troubled Australian years as Bewick-Moreing Company's general manager and partner, 1905-1909.

Brought to Australia in 1902 by Herbert Hoover, Loring proved his worth as manager at the Sons of Gwalia mine in Leonore, and by 1905 was supervising all B.M.C. operations in Western Australia.† Unfortunately, Loring's rise coincided with a period of decline in Australian precious metals mining. Deeper mining of lower-grade orebodies, increasingly complex milling problems, financial difficulties and upheavals in management personnel within the organization, all contributed to Loring's distress. Caught in the middle during the personal conflict between Hoover and C.A. Moreing, Loring was under heavy pressure and wrote agonizing letters to friends and even underlings in the firm. His papers provide first-hand accounts of the technological problems facing Australian mine and mill managers during the crucial first decade of the twentieth century. They also reveal the emotional strain of mid-level management in this important transitional period. My paper relies on personal correspondence as well as Bewick-Moreing files at Stanford University, the Hoover Presidential Library in Iowa, and other manuscript collections.†

Gerard MacGill - The King Battery and Mr Lidgley's grand vision for the Hampton Plains.

Though it operated for less than two years, the King Battery stands as a monument to an early attempt to establish a major goldmining enterprise on the Hampton Plains. Only the durable elements of the original battery survive, principally retaining walls and foundations, but the physical evidence clearly shows how the battery functioned. Features of particular note are the setting of the battery, built as it is into the hillside on the shore of Lake Lefroy, and the pillars of the giant tailings wheel. The pillars are the sole surviving of a form of bulk material handling once common on the Western Australian goldfields. The site is closely associated with the early development of the Eastern Goldfields region, and in particular with the various companies associated with Hampton Plains Estates Ltd, the successors to which remain influential to the present day. It has links to the early explorers Lefroy and Hunt; to the distinguished English mining engineer, Ernest Lidgley, sometime President of the Australasian Institute of Mining Engineers, who went on to pioneer an early, if not the earliest, application of geophysical mineral prospecting Australia; and to W.G. Manners, an engineer prominent in the development of the Eastern Goldfields. The battery site is in good condition for a site of its type. Localised repairs to fretting brickwork and crumbling concrete, combined with measures to minimise human impact, should ensure the survival of the remnants for the indefinite future. As a tourist attraction and local recreation spot, the site will benefit from unobtrusive interpretive signage and properly constructed barbecue facilities. A local management body should be established to oversee this work and to generally monitor the use and condition of the site. The King Battery is considered to be of sufficient significance to warrant entry into the State Register of Heritage Places.

Barry McGowan - Abstract. Subsistence men, entrepreneurs or proletarians: The working miners of southern NSW

Miners in the colonial and post Federation period worked in one of three ways: independently on their own account, in co-operative groups or as wage employees of companies or syndicates. The term working miners was used by contemporary observers and will be used in this paper to describe both those working on their own account and those working in cooperative groups. The paper discusses the relationship between working miners and their wage based colleagues and the relationship between the mining fraternity generally and other occupational groups, particularly in rural Australia. It is suggested that miners generally, but especially the working miners, and possibly many other 'working class' occupations, were

imbued with a measure of entrepreneurial ambition. It may be timely, therefore, to review some of the more popularly held assumptions on 'working class' attitudes. Examples will be drawn primarily from southern New South Wales during the period 1850 to 1914.

Glen McLaren - .The School of Mines: why and how it came about

In November 2002 the School of Mines celebrates its centenary. The factors underlying the formation of the School, which was originally based at Coolgardie, makes fascinating reading. Safety problems, "Shonky" engineering qualifications, and an educated minority within Coolgardie and economic concerns, gradually led to calls to establish a mining school in Western Australia. The Government was reluctant to commit itself financially and a circuit breaker was required. The Coolgardie International Mining Exhibition, which provided a handsome stone building, filled the bill and the Government reluctantly agreed to provide the necessary additional finance. Thus in November 1902 the School of Mines commenced classes at Coolgardie, but within a year the School had been transferred to the site it still occupies in Egan Street, Kalgoorlie. The intention of this paper will be to examine the factors underlying the foundation of the School.

Naomi Segal - Mining Employers, the Cost of Labour and the State Arbitration System, 1900-1915

Prior to the inception of arbitration in Western Australia, industrial disputation in the mines was mostly enterprise specific, or, in rare cases, district specific. While mining employers acted collectively in non-industrial matters since at least 1896, their collective approach to labour emerged fully only once a system of conciliation and arbitration had been established in Western Australia in 1900. This paper will focus on the collective strategies the Western Australian gold mining industry employed through the Chamber of Mines of Western Australia between 1900-1915 to reduce the labour component of the cost of production. The paper will examine mining employers' use of the State arbitration system, for example in classifying workers, work, and districts and in encouraging contract and piece work, and will evaluate the overall success of mining employers' strategies in seeking to reduce the cost of labour to them.

Sachiko Sone - Child labour: the dynamics of the family labour system in Japan's coalmines

Scholars of modern Japanese labour history have tended to underestimate or ignore the value of family labour. Even the most recent studies on Chikuho coalmining by non-Japanese scholars deal only briefly with the relationship of child labour as distinct from family labour. One of the problems associated with this research is that reliance solely on government statistics would leave wide gaps in the information. Though the labour of women and children was without doubt indispensable to the industrial development of Meiji Japan it is only in the 1990s that researchers of family strategies have turned their attention to the place of women and children in the workforces throughout the world. The work of UNICEF (United Nations Children's Fund) and the Instituto Degliinocenti, which have conducted case studies in Europe, Japan and Colombia, has been particularly valuable in providing a better understanding of the exploitation of child labour. The only detailed analysis of the role of children in early Japanese industrialisation focuses on industries other than coalmining. Its conclusions are nevertheless of importance to an understanding of the role of child labour in the Chikuho, the Japan's largest coalfield. The work reveals, for example, that children of destitute parents were not subjected to the national survey conducted in Meiji Japan, and that workplaces where there were less than five employees (ten in 1899) were ignored in the surveys. Since a large proportion of industries would have been small workplaces, such an omission compounds the problem of accounting for the 'invisible' workers. This is certainly the case in Chikuho, where there were significant numbers of small workplaces (mines), and where children of the destitute featured prominently as workers in the coalfields. This paper looks at the similarities and differences between the coalmining and other industries, and endeavours to reveal some of the realities of family life lying behind the statistics.

Previously invisible workers are revealed through records of school attendance and mine accidents. Specific matters addressed include: whether child labour did or did not increase with industrialisation in the Japanese coalmining industry; the influence of child labour laws and national compulsory education policy on child labour; why family labour, including child labour was utilised in the coal mines of the Chikuhō region until the 1920s, and why it disappeared within less than a decade.

Anne Beggs Sunter - Creating a nation; the golden thread linking Ballarat and Kalgoorlie.

This paper will examine the important links between Ballarat and the Western Australian goldfields, showing how the radical democratic tradition established on the Ballarat goldfield in the 1850s was taken to Western Australia in the 1890s by miners from Ballarat. Ballarat's influence on Kalgoorlie is demonstrated in a number of ways - through graduates from the Ballarat School of Mines who applied their metallurgical knowledge to problems on the WA goldfields; through the establishment of the Australian Natives Association, and through the transmission of the story of the Eureka Stockade, and its use to inspire political activists in Western Australia. I will contend that Ballarat exercised a powerful influence on the favourable vote for Federation from the Western Australian goldfields in 1900. Further evidence of the relationship comes from the 50th anniversary of Eureka Stockade celebrations in 1904, when Western Australia organised a series of special events. In particular I will examine the role of Monty Miller, radical socialist and youngest veteran of the Eureka Stockade, who became a leading activist in Perth during the early years of the 20th Century.

Michael MacLellan Tracey - The Mining Pick: Archaeological evidence for the identification of Chinese metalworking processes

Often the details of the tools of the mining industry are ignored amongst the social and political rhetoric currently dominant in the histories of early Australia. During the period of European colonisation it is arguably the design and nature of tools of iron coupled with human ingenuity and ability to adapt to confronting environmental conditions that encouraged settlement and enabled industrial development. The analysis of lithic technology is firmly established as the primary investigative tool of the prehistorian. Identification and the technical appreciation of iron tools are as equally important to the historical archaeologist. However, detailed physical descriptions, processes of manufacture and specific utilisation are often overlooked. Familiarisation with such utilitarian artefacts may cause the researcher to take such tools for granted.

The 'official' 1851 discovery of gold led to new settlements. To these goldfields came miners, blacksmiths and tradespersons of many ethnic backgrounds who plied their skill and influenced others. Chinese were known to be in the Shoalhaven area as early as 1848. It is arguable that metal working practises were introduced by Chinese metalworkers using methods employed in China as early as the 16th century.

ABSTRACTS OF PAPERS

David Bannear

Mount Alexander Diggings: The Australian Gold Rush Experience

In the first week of July 1851, Victoria became a separate colony, got its name and gold was discovered. By 1860 Victoria's population was greater than the whole of Australia less than 10 years earlier. The magnets attracting the gold seekers were Ballarat, Castlemaine and Bendigo. This paper deals with the gold rush heritage of the only one of these fields to have retained its gold rush character.

Most of the alluvial gold from the Castlemaine Diggings was obtained in the first four years and from the first 3 metres of ground. During 1852, monthly yields ranged from 250,000 to 350,000 ounces of gold. It was described as the bank-till free to all. The Diggings are located in a regenerating Box-Ironbark forest, largely cut down during the gold mining era, and now regenerating in a coppiced, multi-stem form. It contains many thousands of individual mining sites. Some 60 different industrial site types have been identified. Over 300 habitation sites recorded, of which a third consist of stone and mud mortar chimney bases. Distinct landscapes can be recognised in which the mining remains of a particular era or group of eras, or type predominate.

The landscape of the Mount Alexander Diggings is made more vivid as an example of the Australian gold rush experience because of an amazingly rich and powerful collection of contemporary writings, drawings and artworks. It is a subtle, internationally significant and fragile cultural landscape. The Victorian Government has determined it will become Australia's first cultural heritage national park.

Peter Bell,

Wonderful Optimism; Bad Geology: Edward Head and the Keelbottom Freehold Copper Mines 1872-1905

Few people have heard of the Keelbottom Freehold Copper Mines, west of Townsville. One reason for this is that they never produced any copper. They are remarkable for two things; first their curious orebody, and second the unswerving devotion of the company's principal, Edward Head, who, seduced by their green stones, poured capital into the mines in five or more episodes over thirty years, to produce nothing at all.

Peter Benkendorff

History of Portland Cement

It has long been proposed that Joseph Aspdin was the father of Portland cement because he used the name in a Patent dated 1824. However, evidence outlined indicates that he only produced hydraulic lime and further he was not the first to use the name Portland cement. The first to produce something close to Portland cement was William Aspdin in 1844. He did not patent his discovery and used the name Portland cement as a marketing tool. Others soon followed.

The available machinery and chemical knowledge on cement compounds held back production of quality cement until the late 1860s. The surge of production, particularly in Germany, led to the push for the world's first Standard published in 1877. This did not have a definition but an amendment in 1887 put in a definition, which required clinkering of the raw materials. Something similar was included in US and British standards first issued in 1904.

In Australia prior to 1977, it was generally believed that the first commercial Portland cement was produced at Portland NSW (named after Portland Cement) in 1889. Then, it was claimed that William Lewis made the first cement in 1882 at a plant in Adelaide. However, the evidence indicates that Lewis followed Joseph Aspdin and made no more than hydraulic lime for a few months. All the early producers struggled to match imported cement up to 1901. A new modern plant with rotary kilns (amongst the first in the world) started in 1902 at Portland. This plant designed, constructed and managed by the brilliant Dr Scheidel, expanded rapidly and by 1912 was producing 40% of Australia's cement consumption.

At Portland there exists the remains of 1889 Bottle kilns, 1889 millstone grinding plant, a number of buildings from the 1902 plant, quarries and a coal mine. It is the birthplace of the Australian cement industry and deserves recognition.

Christopher Carter

All that Glitters...Chromite Mining at Gobarralong, NSW, 1893-1910.

The formation of the Geological Survey of NSW resulted in the identification of new resources and the discovery of new deposits. New mines opened up across the state as attention moved from gold and silver to the lesser value minerals. Prospectors and mining companies alike worked new fields and expanded the industry. In some cases, the discovery of these potential sources of wealth led to the development of mines by those new to the industry – those who ‘bought in’ the required expertise to exploit the lodes. This included farmers some of whom capitalised on the discovery of minerals on their properties. Such ventures were common throughout NSW, many were profitable, others not, but collectively they contributed significantly to the mining and economic history of Australia. Chromite was discovered on land owned by Thomas Quitler, a squatter, at Gobarralong on the Murrumbidgee River in 1893. Looking at both its history and archaeology, the papers examines the development and operation of this small-scale mining enterprise that operated for around twenty years, providing a living to a number of miners and local contractors as well as contributing to the export industry of Australia.

Jan Domagala

Preservation of Mining Heritage in Queensland

The Queensland Department of Natural Resources and Mines is currently undertaking State-wide Rehabilitation strategies that include: preservation of significant sites by grating and fencing; containment, fencing-off and monitoring of contaminated sites; and simple backfilling of unstable, unsafe, less significant shafts. Criteria used to determine the rehabilitation strategic include: 1) safety and environment, 2) heritage value, and 3) available funding for rehabilitation. Another significant factor, which is very important in the more populated areas, is the attitude of local communities. An inventory of sites is currently being compiled by the Mining Support Units in the respective Northern, Central and Southern Regions of the State. The Department’s Mineral Occurrence Database (MINOC, with approximately 13,400 abandoned mine sites from data collected over about 80% coverage of the State) forms the basis of the inventory.

From a mining heritage perspective, the current period of time is quite unique. Looking to the future, the legislative requirements of mining companies to restore areas affected by mining to a sustainable land-use means that there will be precious little record of present and future mining activities. In contrast, a record of past mining activities is preserved in the existing old abandoned mine workings which are part of Queensland’s rich mining heritage. The Queensland Department of Natural Resources and Mines recognizes this and, in collaboration with the Environmental Protection Agency, Local Government Authorities and other relevant stakeholders, is actively taking steps to ensure that as much as possible of the State’s mining heritage is preserved for current and future generations. All these matters will be the focus of the presentation.

Brian A, French

Early Copper Mining in the Bathurst - Orange area of New South Wales

This paper traces the development of copper mining in New South Wales from its early beginnings in the 1840s to the second decade of the 20th century. The story examines the involvement of some of the principal adventurers including Lawson, Icely, Tom, Samuel, Lloyd, and others through contemporary newspaper and Directors’ Reports. The initial period and discoveries including those at Copper Hill, near Molong, Sommerhill, near Rockley, Carranga at Cornish Settlement, Coombing Park, Carcoar, and Cadia, near Orange prior to the finding of payable gold at Ophir in 1851, will be discussed in detail. It will include an eyewitness account of the bullock train of the first load of copper ore mined in New South Wales passing through Bathurst en route for Sydney. The contribution of leading Mining Consultants such as Christoe and Clymo is emphasised particularly in relation to their erection of reverberatory furnaces including those at Cadia, which have which have recently been excavated. The impact of the gold rush on the industry will be demonstrated to show its affect on the entrepreneurs and labour force especially in relation to the common occurrence of both copper and gold in close proximity. Social and economic factors will be examined with particular reference to static and itinerant workers. The life of the fortune seeking gold miner working on his own will be contrasted with the tribute earning Cousin Jacks and company employed copper miners whose movements were generally restricted to a limited area where they had developed roots and other interests. In conclusion a brief outline will be given of daily life in a mining community, welfare benefits as provided by Loyal Lodges of Oddfellows (Manchester Unity), schooling, leisure activities, and mortality rates.

Philip Hart

Self-Confidence and Self-Promotion: A Cast-Study of a Saviour who Failed

Many people associated with goldmining have attempted to create improved methods of ore treatment. In addition to the inventions of engineers and scientists, modifications were devised by enthusiastic amateurs, some of which were portrayed as breakthroughs that would revitalize the industry. Joseph Campbell, an Australian clergyman with geological training, dabbled in a variety of practical scientific experiments, first in metallurgy and later in North Queensland in cotton growing and other agricultural ventures. In the 1890s he devised a 'Thermo-Hyperphoric process' that he claimed would mean the cheap and effective treatment of refractory ore. In fact, he had merely modified other's techniques, and despite obtaining English capital and experimenting with New South Wales and New Zealand ores his process failed to live up to his extravagant claims. Campbell never admitted failure: his explanation was that the ore lacked either the quality or quantity required by his allegedly revolutionary process. This paper examines the New Zealand career of a man who claimed to be the potential saviour of several industries.

Richard Hartley

Zinc, Carbon and Electricity: A short history of the precipitation of gold in the cyanide process

The original cyanide process, devised by MacArthur and the brothers Forrest in 1887, was in two parts. In the first, dilute cyanide solution was used to dissolve gold from its ores, and in the second, gold was precipitated out from its cyanide solution. This paper discusses the methods used subsequently to effect this precipitation. MacArthur and the Forrests specified precipitation by means of zinc shavings, and for over twenty years this method was almost universally used. The exceptions were the Rand mines from 1896 to 1899, when a German electrolytic method, the Siemens Halske process, prevailed, and in Victoria where charcoal had the ascendancy during the 1890s.

In 1910, the American, C.W. Merrill, devised a way to substitute cheaper zinc dust for shavings, but it was not until 1919 that he and T.B. Crowe developed the Merrill-Crowe precipitator which for over 50 years was the most commonly used precipitator. A similar device had been invented in 1913 at Youanmi, in Western Australia, by Moore and Edmands. In 1916 Edmands improved its effectiveness by replacing the zinc dust with charcoal - the first modern use of carbon precipitation. In 1925, the US Bureau of Mines suggested using flotation to recover loaded charcoal, and in 1932, V. Edquist independently experimented with the recovery of charcoal by flotation at the Sons of Gwalia mine. The replacement of charcoal by hard granular activated carbon, after the war, improved the usability of carbon, and in 1960, in Nevada, J.B. Zadra devised new methods for carbon stripping and gold recovery, which led to the first large scale use of carbon precipitation. Subsequent developments, which led to the emergence of the distinctive 'Australian style' of carbon-in-pulp process in the 1980s, are also outlined.

Brian Hill

Snowy River Gold Dredging Limited: A successful Adelaide dredging company, 1938-1941

In 1938, Snowy River Gold Dredging Ltd was formed in Adelaide to build and operate a gold dredge in a distant river valley on the West Coast of the South Island of New Zealand. At first glance, this company appears to be cast in the mould of the free-standing British mining companies formed 40 years before in London, to operate gold mines in distant parts of the world. However, unlike the great majority of the 8,400 British free-standing mining companies which formed and failed, Snowy River Gold Dredging proved a very successful operation.

Unlike most companies, including those operating gold mines in Australia at the time, the key to this unusual success appears to lie in the promoters' perspicacity in appointing two local directors to the board. Resident in Greymouth, they were less than an hour's drive from the company's scene of operations, and it was this feature of control that perhaps allowed the company to stand out from other free-standing companies as described by Wilkins.

The Snowy River dredge worked from 1941-1957, dredging 300 hectares of valley floor, and treating some 13.5 million cubic metres of low-grade alluvium to produce more than two tonnes of gold. Profitably dredging alluvium that contained only one portion of gold for every 20 million portions of waste, the company paid dividends during every year of operation, distributing a total of 404% on its £70,000 capital. This paper will analyse the organization and functioning of the company in order to explain its success in a period when most other similar companies failed.

Ruth S. Kerr

State Batteries in Queensland

After their election in 1915 the new Queensland Labor government sought to assist workers economically in a number of diverse ways. They established a range of State Enterprises - butcher shops, hotels, batteries, smelters, pastoral stations. All of these State Enterprises were abolished by legislation under the Moore conservative government in 1932. However one of them survives legally - the Irvinebank Treatment Works - bought by the State from John Moffat's estate in 1919. This paper explains the establishment and operation of the State's mining batteries from 1916 and the advantages and opportunities they provided to small miners.

Alan Loughheed

Europe and the Western Australian Gold Mining Industry 1890-1914

While much has been written on the roles of Britain, Australia and, to a lesser extent, the United States in the development of W.A. mining, little has been uncovered on the influences of Continental European countries during the two decades before 1914. This influence is the subject of this paper.

First we discuss the role of European investors, principally in Germany and France, in advancement of the gold industry, with concentration on the companies operating on the Golden Mile which were of major interest to the Continentals. This includes an assessment of the importance of European funds to the W.A. industry. Second, some attention is paid to the direct contribution of Europe to the production of gold from its ores - the technical and individual human aspects.

Alan Mayne

History and Heritage: the Mount Alexander Diggings Project

This presentation describes a cross-disciplinary research project on the Mount Alexander Diggings in central Victoria. The project examines social life on the goldfield from discovery to Federation. Particular attention is being paid to Chinese settlers, who comprised the largest group of non-British immigrants on the goldfields. The project is a collaborative undertaking between the University of Melbourne, La Trobe University, and two industry partners: the Museum of Chinese Australian History, and the Mount Alexander Diggings Management Advisory Board. Two Australian Government Postgraduate Awards (APAI) for PhD research have been created for the project. One of these supports historical research, the other is for historical archaeology.

The Mount Alexander Diggings began in November 1851, and triggered the mass migration of overseas gold seekers to Australia. The Mount, is widely regarded as the greatest shallow alluvial goldfield in world history, and today the Mount Alexander Shire contains the largest assemblage of gold-mining artefacts in Australia. This relic landscape offers a tangible bridge whereby visitors to the region can better understand one of the key transformations in the European history of Australia: the gold rushes. However there is no comprehensive and deep-textured history of the Mount Alexander Diggings. Its surviving material culture has only been partially recorded, and is under-researched and under-conserved. It is nonetheless still possible to read the Mount today as one might a palimpsest, in which the layers of multiple and overlapping cultural landscapes are still recognisable and accessible.

Barry McGowan

From Booze and Bacchanalia to Socials and Suppers: Conflicting goldfield stereotypes

In the existing historiography on the culture of alluvial gold mining communities in Australia, there has been an overwhelming focus on the gold rush experience, and in the process the development of a number of conflicting stereotypes. There continues to be a dichotomy between the depiction of the digger as largely male, profane, drunken and violent and the description of the mass of miners as people who were often family men, and in any case generally 'law abiding, God-fearing, hardworking and upright'. The image of the miner as potentially dangerous and outside the control of the law is understandable, for the events and times of the early gold rushes were indeed often dramatic.

In discussing this topic I will refer to examples from the Southern Mining Region of New South Wales for the period 1851 to 1914. I examine the different periods of mining, the earlier more prosperous periods and the subsequent periods and the differences, if any, between the behavioural patterns on reef and alluvial

mining fields. Matters such as religious observance, sectarianism, racial tensions, public and community debate and politics generally will also be discussed. My overall conclusion is that the more commonly portrayed and volatile image of the mining fraternity has been overdone, and is only slowly changing. Mining society was considerably more complex and differentiated than many historians have suggested.

Keir Reeves

Identity, Activity in Dai Gum Sam - Chinese Diggers and Market Gardeners on the Diggings.

Fragmentary material culture of Chinese activity during the gold rush can be found today throughout the mining landscape once known as the Mount Alexander Diggings. Yet, until recently, little extensive historical research had been conducted into the lives of the Chinese diggers who came to "New Gold Mountain" as Mount Alexander was known. This paper will discuss the mining activities and every day experiences of the Chinese diggers. Specific reference will be made to the Chinese "Camp" at Guildford, which was the largest goldfields settlement of Chinese in the Colony. The former diggers who lived in a settlement on the Loddon River near Vaughan as market gardeners and their social and economic contribution to the local community will also be considered.

This paper will provide an analysis of European-Chinese relations in the area during and after the goldrush. It will also contend, while acknowledging that racism towards Chinese diggers was pronounced, that a more complex set of social and cultural relations existed between Chinese and Europeans on the Mount Alexander Diggings than conventional historians have previously suggested. This will be done by focussing on the everyday experiences of Chinese diggers and market gardeners, thereby making possible a depiction of individual Chinese rather than a stereotypical profile of a historically neglected group of gold rush pioneers.

Zvonka Stanin

Archaeology at the Mount Alexander Diggings

My purpose is to develop a coherent and comparative social narrative of Chinese life on the Mount Alexander Diggings, Victoria, on the basis of habitation remains, which have so far remained under-researched. The excavations of house remains are aimed at addressing a potentially broad set of issues that are a part of and act upon the creation of the social narrative in archaeology. The issues include material aspects of diet, work, entertainment, religion, land use, lack of self-representation in text, site identification, social networks, as well as ethnicity and gender.

Justine Thorp

The curious case of the disappearing gold mining town: the cultural landscape of the Clohesy River gold field, North Queensland

Clohesy township emerged in the 1890s to serve the needs of miners on the Clohesy gold field. This was a township which according to government and anecdotal records consisted of a battery, a post office, a butchery, a bakery, a general store, two hotels and "... a small settlement of thumbnail variety...". There were cries for the establishment of a provisional school, the Salvation Army visited fortnightly, St Patrick's Day was celebrated and politicians visited. Reputedly, the town was in existence until the 1950s - a period of at least 50 years. Despite this, no-one including government departments and descendents of early residents of the area are able to pinpoint its location. Indeed, many long-term residents of the area are not aware that the Clohesy area was once the scene of mining activity and that shafts and mullock heaps dot today's landscape. It is my intention in this paper to provide a description of the Clohesy gold field, pinpoint the likely location of the township, and offer explanations for its disappearance from collective memory.

Jan Wegner

Underground Prospecting Techniques in 19th Century North Queensland

Gold miners could call on a range of techniques to help them decide where to mine next. These ranged from the scientific, in the form of geological theories, to the decidedly unscientific. Most operated on the basis of previous experience, with variable results. The major technological solution apart from exploratory workings was the diamond drill, which suffered from a surprising number of drawbacks. The paper will conclude, from an examination of techniques in use on the Croydon Goldfield, that local experience and familiarity with ore bodies were the most useful methods for underground prospecting.

NINTH AMHA CONFERENCE, BROKEN HILL NSW, 2003

ABSTRACTS OF PAPERS

The Anatomy of a Strike: Wentworth Proprietary Co. Gold Mines, Lucknow, NSW 1897

Dr Clive Beauchamp
Charles Sturt University, Bathurst

This study analyses the background to and traces the course of the thirteen-week strike (involving 400 workers) at the Wentworth Proprietary Co gold mines at Lucknow, near Orange, NSW. in 1897. It discusses the company's motives for reducing wages and instituting "degrading" search conditions on employees. Were management's allegations of extensive ore pilfering merely a subterfuge? Why was the Mine Superintendent so intransigent in his dealings with miner's representatives? It also examines how ministerial interference with the role of the Mining Warden inadvertently led to the Management being granted a suspension of labour conditions (preventing the lease being cancelled). This allowed Management to continue operating by engaging "black-legs" from inter-state and re-employing surface workers- thus breaking the strike. Cessation of the strike: with searching relaxed and restoration of wage rates-but greatly reduced workforce.

Significance of the dispute: highlighted the need for compulsory arbitration system; ministerial

intervention provoked a political storm that threatened the Reid Government; and the involvement of Labor members in the strike demonstrated how the parliamentary wing of the party could assist workers practically, countering charges of elitism.

History of Portland Cement

Peter Benkendorff
Retired Consulting Engineer
Member, Standards Australia Committee BD/10-Cement

It has long been proposed that Joseph Aspdin was the father of Portland cement because he used the name in a Patent dated 1824. However, evidence outlined indicates that he only produced hydraulic lime and further he was not the first to use the name Portland cement. The first to produce something close to Portland cement was William Aspdin in 1844. He did not patent his discovery and used the name Portland cement as a marketing tool. Others soon followed.

The available machinery and chemical knowledge on cement compounds held back production of quality cement until the late 1860s. The surge of production, particularly in Germany, lead to the push for the world's first Standard published in 1877. This did not have a definition but an amendment in 1887 put in a definition, which required clinkering of the raw materials. Something similar was included in US and British standards first issued in 1904.

In Australia prior to 1977, it was generally believed that the first commercial Portland cement was produced at Portland NSW (named after Portland Cement) in 1889. Then, it was claimed that William Lewis made the first cement in 1882 at a plant in Adelaide. However, the evidence indicates that Lewis followed Joseph Aspdin and made no more than hydraulic lime for a few months. All the early producers struggled to match imported cement up to 1901. A new modern plant with rotary kilns (amongst the first in the world) started in 1902 at Portland. This plant designed, constructed and managed by the brilliant Dr Scheidel expanded rapidly and by 1912 was producing 40% of Australia's cement consumption. At Portland there exists the remains of 1883 Bottle lime kilns, 1889 millstone grinding plant, a number of buildings from the 1902 plant, quarries and a coal mine. It is the birthplace of the Australian cement industry and deserves recognition.

Outback Archives: Reflecting the Community and Region

Kathy Bennett
Information Services Officer
Outback Archives, Broken Hill City Library

An archive collection has always existed within the Broken Hill Library Service since its inception in 1906. Today the Outback Archives is a regional repository for State Records of New South Wales as well as a recognised community archive. As a collection it has predominantly reflected the mining, industrial, commercial and physical aspects of the city and surrounding region, with less emphasis on social development and little or none on indigenous history and the role of women.

One of the challenges of the Outback Archives is to maintain and develop the existing collection while redressing the inadequacies that exist. Another is to make the collection accessible while ensuring its conservation by the use microfilming and digital technology. The development of a digitised photographic database, both for the general collection and a special indigenous collection, has been a major component in responding to this challenge. The database includes thousands of photographs depicting Broken Hill's mining heritage, social, industrial and physical history.

This paper will discuss the history of the Archives, its place within the community, aspects of the collection – both in the strengths and weaknesses of its focus and the physical nature of the material, and those areas currently under of development.

Gold Amalgamation and Chlorination

Ralph Birrell
Electrical Engineer and
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Although the extraction of gold from crushed ores was described in detail by Agricola in the sixteenth century the introduction of the process in eastern Australia was accompanied by continuous debate on whether it was best to use mercury in the mortar box or not, whether mercury wells were effective, whether blanket strakes should be vibratory, whether mercury coated copper plates were better than strakes and whether to roast before or after crushing or not to roast. These issues were made more complicated when mine depths reached the water line and the presence of sulphides in the ore often sickened the mercury and reduced the amount of gold recovered. Years of experiment solved this problem for many mines but

the more refractory ores defied treatment. In 1875 the Plattner process to extract gold was introduced in Bendigo and Ballarat successfully but was expensive and further experiments in the 1880s developed a more effective and cheaper process which was used widely in eastern Australia up to WWI for very refractory ores until replaced by processes using cyanide. The paper will argue that the Australian mining industry of the nineteenth was more sophisticated in the use of science and technology than is often believed and will question Jan Todd's comment that 'despite some pockets of experiment with chlorination, the vast bulk of the gold mining industry was ignorant of chemical extractive processes and the scientific principles which governed them'.

Broken Hill South's Quest for New Mines: the Kanmantoo venture

Dr Ross Both
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University of Adelaide

The Broken Hill South Silver Mining Company was floated in 1885 to work Blocks 5, 6, 7 and 8, located immediately adjacent to the southern side of the Broken Hill Proprietary Company's property. The first dividends were paid in 1897 and Broken Hill South went on to become one of Australia's major mining companies, with investments in mining and industrial operations elsewhere in the country. Its most prosperous years were in the late 1940s and the 1950s. With falling ore reserves in its Broken Hill mine in the mid-1950s the company began an aggressive mineral exploration program on its mine leases, in the Broken Hill district in general, and elsewhere in Australia. The need for copper for the smelter at Port Kembla, partly owned by Broken Hill South, led it to carry out major exploration programs in the Cobar and Kanmantoo areas.

Copper ore had been mined at Kanmantoo in the eastern Mount Lofty ranges from 1846 until 1875, with production of about 19,000 tonnes of ore from several small mines. Exploration by the Austral Development Company in 1938 found evidence of a wide zone of low grade mineralization. In 1962 Mines Exploration Pty. Ltd., wholly owned by Broken Hill South, commenced an exploration program in the Kanmantoo region, employing geophysical methods. A strong induced polarization anomaly was tested by diamond drilling and an exploratory shaft, and samples for metallurgical testing were taken from underground development from the bottom of the shaft. The decision to develop an open pit mine was taken in October 1969 and an operating company, Kanmantoo Mines Ltd., was formed, with Broken Hill South the main shareholder (51 per cent). Mining commenced in August 1970. The mine produced good profits in the financial years 1972-73 and 1973-74, but thereafter incurred losses as a result of falling world copper prices and rising operating costs. The mine closed on 30 June 1976, having produced 4, 050, 000 tonnes of ore averaging approximately 1 per cent copper. At least 8 million tonnes of ore averaging 1.1 per cent copper remain beneath the now abandoned open pit.

Devices for Reducing Negotiating Expenses in Australian Mining

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Strangely, transaction cost economics devotes little attention to the expenses that parties incur when they actually negotiate deals. Instead, Williamson concentrates on the underlying variables (transaction-specific investment, the frequency of exchange, the number of bargainers, and the degree of prevailing uncertainty) that shape the institutional outcomes of negotiating processes. He also focuses on *ex post* adjustments that are undertaken to modify an initial agreement, and in this context he highlights the role of “communicating economies” that parties who have some shared affiliation can achieve (1985: 64). However, Williamson does not concentrate directly on the dynamics of initial deal making activities, and his framework treats bargainers largely as “given”.

In an effort to develop a more dynamic framework for evaluating co-operative inter-firm structures, Ring and Van de Ven (1994) introduced the idea of relationship building as a continuous process. This consists of three stages –negotiation, commitment, and execution-, which are repeated over and over as parties forge their first agreement and then, make refinements in an ongoing manner. This approach explicitly addresses negotiating activities, and it incorporates formal, legal, and informal social-psychological processes, all of which may shape outcomes.

The aim of the present paper is to build on the insights provided by Williamson and Ring and Van de Ven by exploring in detail the dynamics of non-intermediated dealmaking. While recognising that negotiations will subsequently affect the quality of inter-firm relationships, the discussion concentrates primarily on initial bargaining in order to identify cost elements and devices that parties use to mitigate these expenses. The paper focuses on costs rather than outcomes, although we do allude to the benefits of successful deal making, the records available do not support comparison of expectations with outcomes. Negotiating expenses (particularly those that are time related) can be very significant indeed, especially when highly complex agreements have to be arranged between a large number of parties who must engage in multilateral discussions.

These ideas are explored using evidence drawn from the records describing how the Western Mining Corporation structured its negotiations with Japanese and Canadian firms. The paper identifies distinct steps in the negotiating process, cognitive maps, devices that parties can use to facilitate transitions between these stages, and standard conventions that can be employed to accelerate progress.

References:

Ring, P.S. and A.H. Van de Ven. 1994. Developmental Processes of Cooperative Interorganisational Relationships. *Academy of Management Review*, 18 (1): 90-118.

Williamson, O.E. 1985. *The Economic Institutions of Capitalism: firms, markets, and relational contracting*. New York: Free Press.

The Dilemma of Abandoned Mines in South Australia

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The two major issues associated with abandoned mine sites in South Australia are the heritage significance of the site and its safety and/or environmental risk.

Systematic heritage assessment of mines has been previously undertaken to develop a statewide strategy for giving systematic priority to conservation and interpretive programs. This assessment has been the basis for most of the mining heritage conservation and interpretive projects undertaken. In South Australia there are only two options for conservation of mine sites – do nothing and allow the site to decay naturally, or conservation of ruins in their present state with minor restoration and reconstruction of structures to provide focal points or visitor centres. For the vast majority of mine sites the former is the only option.

The Office of Minerals and Energy SA (MER) has commenced an Abandoned Mines Project to create a database of historic mines with the ultimate aim of risk management of mine sites on Crown land. This will involve the identification of the various hazards on the site and the assessment of the overall risk of the site. A *Risk Score*, calculated using the hazard risk, and accessibility and exposure of a site, will be used in conjunction with its heritage significance to prioritise abandoned mine sites for risk management programs. Strategies for risk management will include isolating visitors from the site, backfilling, capping and fencing.

Gold Mining on the Mornington Peninsula

Jim Enever
Former Mining Engineer and CSIRO Scientist,
now Archaeology Graduate

Situated about 100km south of Melbourne Vic, the Mornington Peninsula separates Port Philip and Westernport Bays. Not noted among Victoria's gold producing areas, the Peninsula does, however, boast a small slice of gold mining history among its better known agricultural origins. Located on the Peninsula is an area of geology reminiscent of the central Victorian Goldfields, complete with auriferous reefs that have supported both alluvial and reef mining activities. Never of any great consequence in the context of the Victorian economy, these mining activities did, none the less, contribute to the development of the Peninsula. Leaving behind no signs of settlement and little in the way of extant evidence of mining activities, it is difficult to build any sort of a picture of the way things were in the second half of the nineteenth century on these diggings. This paper attempts to draw together this limited history and integrate it with some of the remaining physical evidence to give some insight into this little known chapter in Victoria's gold mining history.

Australian Capital in New Zealand: The Te Aroha Silver and Gold Mining Company

Philip Hart
Research Associate, Department of History
University of Waikato

In 1886, William Robert Wilson, a founder of BHP, visited America to obtain experts for the Broken Hill mine and battery. During his return, he was told by a director and manager of the Battery Company at Waiorongomai of the large lodes in their property which they could not develop through lack of capital. Wilson inspected the ground, was impressed, and formed the Te Aroha Silver and Gold Mining Company with leading investors in BHP. Under the supervision of John Howell, later of Broken Hill, the 'best battery in Australasia' was erected. Although this was claimed to operate successfully, an insufficient amount of good ore meant mining ceased. To replace expensive cartage using a tramway with three self-acting inclines, a 5,600 foot low level tunnel was proposed. As financial assistance from the government was declined, the company fulfilled its threat to remove the machinery to Broken Hill and abandoned its mines.

This paper illustrates the common practice of investors erecting an expensive plant before doing sufficient prospecting to ensure there were adequate ore reserves and cheap local fluxes for the smelter. Experts were proved to be fallible, and created loss to investors and a serious setback for local mining.

'To the Turon I Must Away': days of gold, decades of change at Sofala and the Turon Goldfield

Matthew Higgins
Historic Environment Assessment Section
Australian Heritage Commission

The Turon Goldfield, north of Bathurst, was one of the major goldfields of NSW and today Sofala remains as Australia's oldest surviving gold town. The Turon witnessed the intensity of the 1851 rush, significant technological developments spanning a number of decades, important political events and a high population of Chinese miners. Today's Turon landscape bears witness to the area's golden past, and the town of Sofala increasingly draws artists and film-makers.

Explaining the Reefton paradox

Brian R Hill

Economic theory has it that during the period of the gold standard, because of gold's fixed nominal price, the output of gold should have varied counter-cyclically with fluctuations in the level of economic activity. However, the history of Reefton, which was New Zealand's second biggest gold field, poses something of a paradox in the field's first 40 years to 1912.

Although Reefton's level of output varied during the periods of inflation and deflation, and then inflation again, in New Zealand during this period, the variations in the field's output of gold demonstrated the opposite to this theory from 1872 to 1912. Reefton's gold mining industry boomed during the inflationary Vogel boom in New Zealand,

and then was depressed during New Zealand's "long depression" from 1883 to 1895 despite the favourable economic conditions then for gold mining. Then Reefton's gold output expanded during the economic recovery and inflationary period in New Zealand from 1896 to 1912, even though the real price of gold fell because of its fixed nominal price.

This paper analyses the factors pertaining in Reefton from 1872 to 1912 the economic effects of which were more dominant than the effect of the changes in the real price of gold during this period, and explains the "Reefton paradox."

**A Mirage in the Desert?
Discovery, evaluation and development of the Olympic Dam Orebody, Roxby
Downs**

R. Keith Johns
Former Director-General
Department of Mines & Energy, SA

The discovery of extensive polymetallic mineralisation buried in a near-desert at a depth of 330m and its subsequent development into what has become one of the world's truly great mines owes much to the endeavours of a few individuals but a great deal more to coordinated team efforts over a period of about 13 years.

In the beginning, explorationists displayed flair in generation of ore model concepts and, perhaps, enjoyed some good fortune, not least of which was a supportive Board of Directors. There ensued a period of rare excitement as the dimension of the resource unfolded, and enthusiasm in preparation for its recovery and processing, and marketing its products - copper, uranium, gold and silver.

But it wasn't all plain sailing for Western Mining Corporation and the Olympic Dam Mine on Roxby Downs pastoral station. The developers would have to contend with politicians and government departments, not all of whom were favourably inclined - particularly as the orebody had a significant uranium content and all that entailed for the nuclear fuel cycle, for health, the environment, the greens and for the unknowing. Development would impinge on the Woomera Restricted Area and would have consequences for the opal mining industry at Andamooka and at Coober Pedy. And timing was coincident with moves directed toward achievement of Aboriginal land rights, a new awareness for recognition, heightened expectation of financial and other gain, and concern for protection of ancient traditions and sacred sites; Aboriginal land rights and emotive aspects of mining had become unfortunately and irrevocably linked. There were also counterproductive blockades, protests and demonstrations; attacking the project was, for some, an exercise bordering on the inane.

Inevitably, sanity would prevail and Olympic Dam was officially opened on 5 November 1988 - a mine that blinkered doctrinaire political opportunism had labelled as a mirage in the desert: some mirage, some desert!

The Broken Hillionaires in North Queensland

Ruth S. Kerr

Team Leader, Native Title & Cultural Heritage
Queensland Department of Natural Resources and Mines

The silver discoveries in north Queensland in 1883 at Mount Albion west of Herberton were quickly described as the new Broken Hill. From then on the north's entrepreneur, John Moffat, sought out Broken Hill and Melbourne capital to develop the mineral region. He succeeded at Chillagoe and Mount Garnet in 1896. Directors of Broken Hill Proprietary, William Knox of Melbourne, and James Reid formerly of Bowen and Ravenswood and editor of Broken Hill's *Silver Age*, were attracted to promoting new regional industrial complexes. They enlisted Herman Schlapp, metallurgist, and Alex Stewart, manager, of Broken Hill. Their enterprise transformed north Queensland, produced amazing share windfalls for the directors, but their smelters closed and had to be subsidised and taken over by the State to maintain local population centres for the next 50 years. This paper analyses what the Broken Hillionaires sought to achieve in the north.

Responses of Medical Men to Mining Disease on the Bendigo goldfields.

Sandra Kippen

La Trobe University, Bendigo

Mining disease, known variously as miners' consumption, miners' sickness, miners' phthisis, miners' tuberculosis or, quaintly, the disease of worn out miners, became an issue of public concern in the early 1900s. In Bendigo, the local general practitioners were called upon to manage the condition, which was bringing early death in epidemic proportions to the men working underground in the goldmines. The cause of the disease was a subject of much debate and the medical opinion was divided between a 'blame the worker' approach which held that the genesis of sickness lay in the constitution and intemperate behaviour of the miners, and a 'blame the employer' approach which placed the responsibility firmly on the conditions in which the miners were forced to work. This paper examines the responses of the medical practitioners who, in aligning themselves with or against the mining companies operating on the Bendigo goldfields, were instrumental in negotiating the working conditions for miners.

Hill Billy Coal: the coalfields of Kentucky and West Virginia

Ross Mainwaring

Coal Mining Historian

The coalfields of Appalachia provide a most interesting contrast with the coalfields of the different states of Australia. The early day remoteness of the mining towns, known also as 'patches', was dictated by the mountainous terrain and this isolation influenced the way of life of the miners and their families. Each mountain valley held captive its own mining town whose business revolved around a coal mine and a company store. In the days before paved roads and automobiles the railway was the sole transport artery linking mine to market; they still are of great importance for the transport of coal. The industrial and cultural background of the region is in marked contrast to Australian coal regions. The author has undertaken many field trips to this Appalachian region so this slide presentation will feature the many sights of the coal mines and towns of these valleys.

The Northampton State Lead Battery, Western Australia: history and conservation

Gerry MacGill
Gerard MacGill and Associates
Heritage Consultants, Fremantle

The State Battery Service was established in Western Australia in 1897, when the state Parliament approved the expenditure of £30,000 for the purpose of establishing state-run batteries. The principal aim of the service was to promote mining by providing plants for crushing, ore dressing, cyanide treatment or smelting in districts where large deposits of ore were to be found, but where plant was not available at reasonable rates, and where such plant was deemed necessary for the development of mining. At its peak the system ran forty batteries, predominantly treating gold ores. Exceptions were a tin dressing plant at Greenbushes, a small tin dressing plant installed at the Marble Bar battery, and the Northampton lead battery, established in 1954 to promote lead mining in the Northampton Mineral Field. The battery had a chequered history over its 29-year life. It is listed in the State Register of Heritage places, but its future is dogged by many difficult issues of conservation and the legacy of a highly contaminated site.

Karnu Yaakatyí or The Broken Hill: an Aboriginal perspective

Sarah Martin
Consulting Archaeologist
Broken Hill

The outcropping orebody of Broken Hill and many other surrounding landscape features are full of history for the Aboriginal people from the local area and as far away as the Flinders Ranges. Much of this history relates directly to the geology and landforms also of significance to mining history. This paper outlines some of the stories about creation ancestors, powerful rocks, significant landscapes, and the vitally important water resources. The creation of Broken Hill itself is discussed, the Aboriginal contribution to the identification of the famous lode, and the role Aboriginal people played in mining and the mining community. Other important landscape features such as the Pinnacles are described from an Aboriginal perspective, as is the role that the unique Broken Hill rocks played in the local and regional economy and social life prior to the rapid disruption that resulted from pastoralism and mining. The transformation of creation stories to incorporate new details about the mineralogy illustrates how elements of traditional culture adapted in an attempt to adjust to, incorporate and acknowledge the new order imposed by the miners.

Heritage Planning on the Line of Lode

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Managing Director
Austral Archaeology Pty Ltd

The Line of Lode comprises all the major mine sites in Broken Hill. These are the former North Mine, South Mine, Zinc Corporation and New Broken Hill Consolidated. As part of recent works funded from the Commonwealth Government's Federation Fund, a major Conservation Management Plan and integrated Interpretation Plan have been prepared for the Line of Lode. At the time of writing, parts of the site were still operational and plans are in

place to open up a new decline that will keep the mine going for another ten years or so. These documents consider the history and significance of the place as a basis for formulating appropriate conservation policies and interpretation strategies within an ongoing operational framework. This paper will provide an overview of the nature of the mining infrastructure at the site and summarise the approach taken for its conservation and interpretation.

Boom and Bust on the Barrier

Barry McGowan
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Australian National University

Fuelled by increasingly high, and at their peak, almost outrageous silver prices, mining turned the harsh, craggy landscape of the Barrier Ranges into a hive of activity in the 1880s, as one rich surface deposit after another was discovered. This activity gave rise to a number of towns, most of them based on silver mining, but others like Euriowie, based on tin mining or other minerals. The most significant and enduring of the towns was Broken Hill, but it was predated by Silverton and a number of other settlements, such as Thackaringa, Purnamoota and Day Dream. Falling yields and plummeting prices brought an end to the mines.

The early settlements were wild places and the scene of much drunkenness and disorderly behaviour. Eventually, however, they succumbed to the civilizing influences of commerce, church and family. At Silverton there are numerous sandstone buildings, including several churches, a masonic hall and municipal chambers. The remains of the other towns are less substantial, but still very compelling, for they also included churches, banks, hotels and the like. My paper discusses the growth of these settlements and their demise, placing some emphasis on their physical remains and heritage values.

The BHP Lockout of 1909: the view from three generations of Broken Hill miners

Bill O'Neil
Former President
Barrier Industrial Council

The industrial tradition of Broken Hill was shaped by the struggles of the early twentieth century. This paper describes the great lockout of 1909 from the union viewpoint. Michael O'Neil, miner and unionist, was a participant in the lockout. His son, Bill "Shorty" O'Neil was the youngest miner to take part in the strike that followed in 1919-20, and went on to become President of the Barrier Industrial Council from 1956 to 1969. The author of this paper is his son Bill, who was also President of the BIC from 1985 to 1995.

The paper describes the background to the 1909 lockout, its links with the shearers' strikes of the 1890s, and how its aftermath led on to the 1919-20 strike, which was a breakthrough for the trade union movement in Broken Hill.

The Past is the Key to the Present

Professor Ian Plimer
School of Earth Sciences
University of Melbourne

The sulphide orebodies at Broken Hill, from stratigraphic base to top, comprise C Lode (Zinc Lode), B Lode (Zinc Lode), A Lode (Zinc Lode), 1 Lens (Zinc Lode), 2 Lens (Lead Lode) and 3 Lens (Lead Lode). The Broken Hill ores are hosted by and formed at the same time as a sequence of incredibly complicated ancient overturned rocks that have been bent double thrice and then refolded and faulted at least six times.

In the 19th and early 20th Century, metals markets and metallurgy were such that only the lead lodes were mined for lead and silver (which reports to lead in Broken Hill concentrate), zinc ore was not mined and the zinc minerals in the Lead Lodes were discarded. Very high-grade silver ores were mined in the oxidised part of the Lead Lodes in the 19th Century. Some 57 Mt of ore was mined from Consolidated Mining Lease 7 (CML7) which constitutes the old South Mine comprising the original 7 leases and leases variously exploited by BHP, Sulphide Corporation, Junction, Junction North, North Broken Hill, South Broken Hill and Minerals Mining and Metallurgy. The Zinc Lodes, which constitute the greatest mass of sulphides in the Broken Hill field, were ignored and unmined on CML7.

At the southern end of field, the exploitation of 105 Mt of ore comprising both the Zinc and Lead Lodes financed the growth of CRA. The tonnage of mined Zinc Lodes exceeded the tonnage of mined Lead Lodes. In terms of revenue generated at Broken Hill, in the 1970s zinc surpassed lead and silver. The Zinc Lodes have been mined from the old Zinc Corporation Mine up to its northern boundary (CML6-CML7 boundary). The Zinc Lodes clearly have no respect for a legal lease boundary and continue into CML7 yet they were not intersected by underground diamond drilling by either BHP or Normandy Mining Ltd. Recent drilling by Consolidated Broken Hill Ltd intersected the Zinc Lodes in a south-plunging west-dipping monoclinical structure.

In 1913, BHP discovered the Western Mineralisation, a down dip extension of the Zinc Lodes. Because of the high costs due to labour, taxation, royalty, transport, smelter treatment charges, water, electricity and local government rates, the Western Mineralisation was too low grade for profitable mining. In the 1950s and 1960s, the Western Mineralisation was re-evaluated by Broken Hill South but was never exploited due to the above high costs. In the 1970s, the Zinc Lodes were discovered during deep drilling at North Broken Hill Ltd. In the 1983, the zinc-rich Centenary Lode was discovered under Broken Hill and in the late 1980s zinc lodes were exposed but not mined in the Kintore and Blackwood Open Pits.

Various Broken Hill geologists have argued that there is probably >30 Mt of unmined medium grade zinc ore on CML7 in the Western Mineralisation and, by the late 1990s, all of the high costs at Broken Hill had greatly decreased, there was high unemployment of miners and labour conditions had changed significantly. It was at this time that Consolidated Broken Hill Ltd negotiated to purchase CML7 from Normandy Mining Ltd and since purchase has re-evaluated 120 years of data on CML7. This data was on 7 different grids and in fathoms, feet and metres thereby requiring a complete resurveying of CML7.

Since acquisition, Consolidated Broken Hill Ltd drilled both the Zinc and Lead Lodes near the CML6-CML7 boundary, evaluated the remaining ore in the Kintore and Block 14 pits, drilled the remnant lead lodes in the Browne-Marsh Shafts area on the northern boundary of CML7 and undertook some 20,000 m of drilling of the Western Mineralisation. Since acquisition of

CML7, Consolidated Broken Hill Ltd has drilled more than 60 cored diamond drill holes, every one of which has hit ore. Further work on the Western Mineralisation includes infill drilling, metallurgical testing, mine modeling and bankable feasibility studies for what will be a new mine at Broken Hill, the Rasp Mine. The Rasp Mine will owe its origin to an understanding of Broken Hill geology integrated with an understanding of the historical mining, metallurgical and cost conditions in the Broken Hill field.

The Inspiration Consolidated Copper Company's Flotation Mill and the Beginnings of the Flotation of Copper Ores in the United States

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Consulting Historian, Specializing
in Mining and Metallurgical Technologies

The Inspiration Consolidated Copper Company began operating its new flotation mill near its mine in the Globe/Miami mining district of Arizona in 1915. It was the first production-scale flotation mill for copper ores to be built in the United States. This paper will describe the history of its development in the context of the history of the development of flotation technologies at Broken Hill and elsewhere, in the context of the transition from selective mining to mass mining in the U.S. copper industry, and in the context of Inspiration's place in the corporate hierarchy of that copper industry. Rudolf Gahl was Inspiration's metallurgist in charge of developing a concentrator for the company's new porphyry mining operation in Arizona. The paper will examine his experiments with flotation and his correspondence with officials of Minerals Separation Company, Ltd., and with metallurgists at the Anaconda Copper Mining Company, with which Inspiration was closely affiliated. Finally, the paper will offer some suggestions to explain why the mining industry in the United States waited nearly a decade after the successful implementation of flotation technologies at Broken Hill before fully embarking on adapting its own methods to the promises of greater recoveries offered by flotation technologies. The paper will be illustrated with slides.

The Broken Hill - Collins House Connection

Gilbert Ralph
Retired Engineer, Former WMC Executive
Kalgoorlie, Perth and Melbourne

This paper examines the links between Broken Hill and Collins House, Melbourne, which became the headquarters of all the major Broken Hill mining companies after it was built in 1910 by W.L. Baillieu on wealth accumulated from Broken Hill investments. It reviews the inter-relationships between these independent companies and their directors and the many new enterprises which emerged from their creative minds, including smelting, refining, paint, paper, chemicals, cables, tubing, aluminium, metal fabrication, bronze, electricity generation and aircraft. The paper refers not only to the building itself but the involvement of the Baillieu, Robinson, Fraser, Stewart, Clark, Somerset and Monash families.

The Forgotten Quarter: Chinese diggers on the Mount Alexander diggings

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Past simplification of the Chinese experience on the diggings has highlighted the need for a more complex interpretation of their role in Castlemaine society. A case in point is the European understanding of Chinatown, initially the primary place of residence for an ethnic group in the community. Later it took on a cultural rather than spatial form: that place where the Chinese could be contained, consigned to a marginal position in history, typecast as exotic and atypical. Clearly what this discussion of Chinese–European experiences on the diggings illustrates is that the cultural identity of the Mount Alexander goldfields community (or for that matter constructions of nineteenth century Australian identity) need not be seen from a solely European standpoint. This is a point that previous conventional and progressive narratives have failed to fully acknowledge. This paper will argue that Chinese–European relations on the Victorian goldfields were more complex than popular historical narratives portray. It will also be argued that it is only by using a broad range of primary sources including mining material culture, mining landscapes in conjunction with existing archival records can a history of the Chinese on the Mount Alexander diggings be written.

Charles Rasp, Founder of Australia's Silver City Broken Hill

R. Maja Sainisch-Plimer
University of Melbourne

Twenty years of research has uncovered the intriguing and fascinating life story of Charles Rasp, discoverer of Australia's famous Broken Hill silver-lead-zinc ore body and founder of a mining company that evolved into today's multinational Broken Hill Proprietary Company Limited.

For more than a century the story of Broken Hill's discovery was the fairytale of the German-born boundary rider Charles Rasp who struck it lucky by discovering the magnificent line of lode in the gossan-capped hill called the Broken Hill in the far west corner of New South Wales. Long shunned by prospectors and nicknamed the 'hill of mullock', the Broken Hill made him a multi-millionaire and Australia's Silver King.

Many have tried to uncover Rasp's pre-Australian life story, to no avail. Charles Rasp was not Charles Rasp. He had changed his name, hidden his noble background and tightly guarded his secret: the true reason for escaping to Australia. For the media, friends and even his beloved wife he had slipped into the role of a former clerk of humble origin who had worked in the export department of a chemical firm in Hamburg, Germany, and who had migrated to Australia for health reasons. The few who knew better had sworn to silence, and Rasp's secret was nursed and kept. It stayed intact for one hundred years.

It was Rasp's portrait, taken in 1886, shortly after the B.H.P. had poured out the first phenomenal dividends to its shareholders, that captivated me and caused a detective itch that did not leave until all mysteries surrounding Rasp were solved.

It took thirteen years of intricate research *in persona* in as many countries on three continents to unravel his true identity and piece together the turbulent lives of Rasp and past generations of his family, and of the man who had adopted Rasp's true identity, playing

havoc with my research. And it was to take further seven years of detective work to fathom the incredible events of Christmas Night, 1870 on the outskirts of Paris that had rendered twenty-three-year-old Rasp a fugitive for life and which prove once more that truth is stranger than fiction.

The biography of Charles Rasp is currently being written.

Brass Among the Gold

Nick Williams
Monash University

Assay office chimneys can still be seen in the remains of many Australian mining sites, such as Arltunga in NT, Cue in WA, and Wallaroo in SA. Assay offices required accurate analytical balances, which were imported from overseas firms such as Oertling in London. The development of the assay balance reflects the increasing sophistication of machining and metallurgical processes, but what has been the fate of these beautiful precision instruments? We have found balances, in various states of preservation, in many places in outback Australia, as well as in museums, tertiary institutions and private homes. This paper explores some of the background of mining areas and associated Oertling balances discovered during exploratory trips over the last ten years, particularly in 1995 and 2002.

TENTH AMHA CONFERENCE. NEWCASTLE, 2004

ABSTRACTS OF PAPERS

Dr. Peter Bell

The Mine that was Too Safe: the Mount Mulligan Coal Mine Disaster of 1921

In September 1921 the Chillagoe Company's coal mine at the remote North Queensland township of Mount Mulligan was devastated by a coal dust explosion, killing the entire underground workforce of 76. The death toll made it the third-worst industrial accident in Australian history. Ironically, the disaster was caused by work practices which had evolved in the knowledge that the mine atmosphere was free from methane, which was believed to be the cause of all coal mine explosions. The explosibility of finely-divided coal dust was only dimly understood in Australia at the time, despite the experimental findings on its behaviour that had been published in Europe and the USA for nearly ten years. This paper looks at the social, political and economic impacts of the Mount Mulligan disaster, and the role it played in the evolution of Australian mine safety regulations.

Dr. Patrick Bertola

Mapping Gwalia

Gwalia was a relatively small and spatially discrete settlement lying about 130 miles to the north of Kalgoorlie and almost at the terminus of the rail link that linked Kalgoorlie and Leonora. While the external boundaries of the town are well remembered, particularly in a broader sense of being quite separate from Leonora, the physical layout of the town, and its social and property structure are not so well defined.

This paper is very much a report on work in progress. It relates something of the background to the general research project and how knowledge of the structure of the population at various times and its location within the town might help advance historical understanding, not only of Gwalia but also of migrant communities in isolated mining settlements. The paper will also consider material gathered to date, principally that from rates books of the Roads Boards and Shire councils that controlled the area.

Ralph Birrell

Technical Education and the Australian Mining Industry

Despite the importance of the mining industry to the economies of the Australian colonies during the second half of the nineteenth century, and of the various states in the twentieth century, the several governments were loath to spend money on technical education for the community generally and also for the mining industry. This attitude contrasted with Spain, France and Germany where governments had earlier developed such institutions but was similar to that in Great Britain where the School of Mines in London was the only such organisation and that had been set up to provide trained people for the Geological Survey. In Victoria local initiatives at Ballarat led to the establishment of the Ballarat School of Mines in 1871 to be followed in 1873 by the establishment of the Bendigo School of Mines. In the next twenty years some 14 Schools of Mines and technical

colleges were established in Victoria with minimal government support but the teaching was mostly at certificate level. Schools of Mines and senior technical colleges were later established in the other colonies and together with the Universities of Melbourne, Adelaide and Sydney taught courses in mining engineering, metallurgy and geology. All schools suffered from a lack of funding and the absence of any planning for an Australia wide integrated system of technical education at secondary and tertiary levels. In the 1960s and 1970s the Australian government set up several committees to give advice on the needs of technical education. As a result funds were provided to upgrade some Schools of Mines and colleges to University status as Colleges of Advanced Education – ‘equal but different’. Eventually they were absorbed into the University system. This paper looks at community attitudes to technical education generally and to education for the mining in particular and why upgrading of resources and standards does not seem to have improved the attractiveness of the mining industry to students in Australia.

Mel Davies

Taking coals from Newcastle - smelting location and fuel costs at the English & Australian Copper Company, Kooringa, South Australia

Because it takes more than one ton of coal to smelt a similar quantity of minerals, and because coal is weight for weight less valuable than the mineral, it makes good logistical and economic sense to transport the mineral to the coal rather than *vice versa*. Yet in the 19th century at the Burra Burra mines, common sense appears to have been turned on its head. Not only was the smelter erected by the Patent Copper Company (later called the English & Australian Copper Company) located in South Australia, where at the time there were no proven coal deposits, but it was situated at Kooringa 100 miles inland from the main Port of Adelaide, and adjacent to the Burra Burra mines, thus making the decision seemingly even more illogical from an economic point of view. The paper sets out to examine the reasoning behind the decision to locate at the site.

Jim Enever and Rod Doyle

The ‘Thick and Thin’ of Australian coal mining

During the second half of the nineteenth and twentieth centuries, the demands for black coal grew dramatically in a rapidly industrialising Australia. From 1880 to 1930, the Northern Districts of NSW produced the lion’s share, an increasing proportion being produced from the Gretna Seam, which accounted for approximately 50 per cent of total NSW production by the late 1920s. During these years, 25 collieries were established in the triangle between Maitland, Branxton and Cessnock to exploit the seam.

To gain independence of supply from NSW, Victoria attempted to exploit its relatively meagre indigenous resources of black coal along the South Gippsland coast from the 1850s but by the 1880s serious attempts at a ‘home grown’ coal industry were put on hold. Industrial problems in the NSW coal industry, coupled with the discovery of new outcrops further inland in Gippsland, prompted a more vigorous attempt at a black coal industry from 1890, with private development of these discoveries culminating in ‘relative self sufficiency’ from 1896 to 1902. Failure of these activities after 1903, together with increasing industrial unrest in NSW, led to the eventual setting up of the Victorian State Coal Mines on the Powlett River Coalfield in 1909. From 1910 to 1930, local black coal production in Victoria increased from around 40 per cent to around 60 per cent of coal imported into Victoria from NSW, reflecting a determination to maintain a degree of leverage over NSW supplies. Almost all of Victorian production in this period came from the State Coal Mines.

From the late 1920s on, however, brown coal production in Victoria increased quite dramatically, quickly supplanting black coal as the State's major energy source and ensuring the desired independence.

The statistics suggest inevitable competition between mining operations in the Greta Seam and on the Powlett River Coalfield. A by-product of this history was the development of distinctly different mining practices to cope with the widely diverse geological conditions prevailing in the two areas. The relatively thick and continuous Greta Seam on the one hand, and the contrasting often thin to very thin and discontinuous seams of South Gippsland on the other, led to the evolution of innovative approaches to extracting coal from seams that departed from the generally accepted optimum of around two metres thickness.

The paper outlines the respective histories of the development of tailored mining practices for both areas, discusses attendant problems and compares productivity and recovery statistics.

Dr. Criena Fitzgerald

The 1925 Miners Phthisis Act in Western Australia: Translating medical understanding into public policy

Western Australian gold miners were the subjects of more Royal Commissions into their health than miners in any other State. The first Royal Commission in 1905 identified tuberculosis as the main cause of ill-health underground and public health physicians advocated medical examination for tuberculosis to prohibit the 'dangerous miner' from underground. Miners, however focused on their occupation as the main cause of their ill-health and wanted improved working conditions, better dust control and compensation rather than exclusion from work.

In the Western Australian goldfields medical diagnosis and separation of silicosis (a dust caused lung disease) from tuberculosis (a germ caused infectious respiratory condition) was almost impossible. The clinical response of most general practitioners was to label all miners' disease as miners' phthisis and advise their patients to leave the mine. In theory, miners' unions supported the exclusion of men with tuberculosis from the mines, but they were not prepared to endorse the practice without the provision of compensation for the men and their families.

The problem of tuberculosis underground was thus not addressed until the Miners' Phthisis Act of 1925 and only when the Commonwealth Government offered a Laboratory to assist in the examination of miners. The government wanted the removal of men with tuberculosis from underground because of the susceptibility of miners with silicosis to the disease, and because the conditions underground facilitated tuberculosis infection. It was important for the State that the 'health' of the mining industry be facilitated, and this meant having a healthy workforce. Tuberculosis in the mines therefore, became addressed as an occupational, rather than a public health disease and the public health consequences of tuberculosis diminished before the competing interests of the mine owners, miners and government.

Dr. Criena Fitzgerald

Mining the Gwalia experience: An oral history of a mining town

One way of capturing the essence of living and working in Gwalia was to interview the men, women and children who lived and worked there. The Gwalia Association was established in 1945 and people from the region have returned annually to share their experiences, meet friends and reminisce. A questionnaire was sent to members of the association, and from this we have been conducting interviews with people who lived in Gwalia or Leonora from 1918 until the closure of

the mine in 1963. This is a work in progress and so far we have collected over fifty hours of tape with people who remember their experience in Gwalia as miners, mine workers, cooks, prospectors, schoolchildren, publicans, store-owners, station-owners, policemen, wives and mothers. The Sons of Gwalia mine was the main employer in the town and its success as a goldmine effected everyone's life. In this presentation I will give a flavour of life in an isolated Eastern Goldfields mining town in Western Australia during the first half of last century.

Dr. Philip HART

Mining and Pollution: Te Aroha [New Zealand] 1880-1980

This paper considers changing public attitudes to the environmental impacts of mining. Locals who supported mining because of anticipated economic rewards for the district downplayed potential pollution while the Mines Department encouraged mining for the benefit of the country and considered environmental fears to be exaggerated. In the twentieth century, local bodies required to clean up the mess left by others, at first sought stringent controls but with minimal success. Because of its location on a steep hillside near a township and large farming district, protection of clean water was of concern from 1880 onwards. The Norpac mine, operating between 1968 and 1973, despite prior assurances, produced toxic waste that polluted streams and created a tailings dam high on the mountainside that remains as a source of continued concern to the township and is a 'horrible example' that faces environmentalists and official bodies. The consequences of this abuse by the mining company included tightening of procedures, the requirement of bonds and rehabilitation, and a general public resistance to mining that led to mining being banned on the whole of the Coromandel Peninsula.

Dr. Richard G. Hartley

Ten landmark inventions in non-ferrous ore size reduction and mechanical concentration since 1850

The historical backgrounds and significance of ten of the most important inventions that have been made since 1850 in non-ferrous ore processing are detailed in this paper. In size reduction machinery, three inventions stand out, the Californian stamp mill, the Washoe grinding pan and the tube mill. Two inventions in mechanical concentration probably would be on most historians' lists, the Frue vanner and the Wilfley table, to which have been added three Australian inventions, the Hancock jig, the vacuum filter and the Reichert cone concentrator. Magnetic and electrostatic separation make up the ten. The object of the paper is to stimulate further debate on the processes of invention and technological transfer in the mining industry,

Dr. Ruth Kerr, OAM

Women Associated with mine managers on the mining fields

Significant relationships formed between the few women who ventured onto the mining fields in association with mine and mill managers. They lived in the finest houses on the fields and organised and participated in the key social and cultural activities in the towns. A special relationship formed between a mine manager, Peter Moffat, who passed through Newcastle in 1884, and a Scottish woman, Jane Vary, who'd lived in Brisbane, Stanthorpe, Tenterfield and Irvinebank in north

Queensland. The development and outcome of the relationship illustrated the precarious nature of society in the remote mining towns of Australia in the late nineteenth century.

Gerard MacGill

The Art of Mining

Mining has been the inspiration for much art, but miners have rarely taken up the brush to express their emotions and to record their way of life. This illustrated talk takes examples of miners artwork from England, Japan and elsewhere, revealing aspects of mining and community life captured with a power of depiction far beyond that of print and photography.

Dr. Barry McGowan

Lasseter's Reef: myth, legend and Frederick Blakely

The story of the 1930-31 Lasseter's Reef expedition is one of Australia's enduring mysteries, which over the years has progressed almost to the realm of legend. Lasseter and his reef have been immortalised by countless books and journal stories, a Casino and a highway. Numerous expeditions have been mounted in search of this elusive El Dorado. All have failed. Both Lasseter and the expedition are still shrouded in contradictions and controversy, for the expedition was plagued with physical and temperamental difficulties of an extraordinary nature. An undercurrent of dissension and distrust were ever present, which appears to have endured to the present day.

My interest in the story is recent. I was one of a six-member party which erected a memorial cairn in 2003 to Frederick Blakeley, who was the leader of the 1930-31 expedition. The cairn was erected not far from Haasts Bluff, west of Alice Springs, where Blakeley's ashes were scattered many years earlier. My interest in Blakely was aroused by the reading of his two books, one of which was on the 1930-31 expedition. It was further stimulated by a remarkable series of events in which hitherto unknown aspects of his life were brought to the fore. My paper seeks to reinstate Blakely from the undeserved historical obscurity into which he has fallen, and address some important questions concerning the 1930-31 expedition.

Dr Pam Sharpe

Envisioning Heritage in the Western Australian Goldfields: Gwalia's Museum and Precinct

A team from UWA and Curtin Universities (Bertola, Sharpe, Fitzgerald, Fox) began to research the history of Gwalia in the Western Australian Goldfields during 2003 with a small scale oral history project. We are fortunate that Gwalia has a small museum and a restored 'Precinct' area. When the first Sons of Gwalia mine closed just before Christmas in 1963, there were immediate attempts to maintain some of the infrastructure. As a result, Gwalia did not disappear or become a ghost town in the same way that has happened to many other towns with closed mines across the Goldfields. The vision of Gwalia to date will be described in this illustrated presentation. Effectively, I will consider the history of public history at this miner's camp.

ELEVENTH AMHA CONFERENCE, BENDIGO, 2005

ABSTRACTS OF PAPERS

Robert W.P. Ashley

Mining the Victoria Government's Gazette

If anyone wanted an old gold mine, they would not expect to look in the inner Melbourne suburb of Collingwood, but that is exactly where the Collingwood Gold Mining Company set about mining for gold. The names of the shareholders, the legal manager and the initial capital of this mine are but a part of the history of Victoria and of the gold mania of the 19th Century.

After years researching, the idea developed, of producing a database, listing all the mining companies that applied to be registered in Victoria as Limited Liability Companies. Encouragement was given to the idea, and to also include the names of shareholders, legal managers and witnesses as published in the *Victoria Government Gazette*. It was decided to list all those companies that applied to be registered in Victoria from 1851 to 1958. So far, 15,963 companies have been recorded although some are for the same company under corrections, revised capital arrangements and other causes. To enable the project to be carried out satisfactorily it was divided into the main four periods of official registration as found in the *Victoria Government Gazette*. 1851 to 1860; 1860 to 1864; 1864 to 1871 and 1871 to 1958. The first period completed is 1860 to 1864 corresponding with the Vincent Pyke Act of 1860. Some 18,000 records are listed for shareholders. The list gives a picture of naming practices of mines and the place of operations. By analysis it shows the origin of capital and the participation by the working miners in their own areas of concern. The list of shareholders is a fascinating compilation containing the names of many that for a lifetime supported the mining industry and its development.

Patrick Bertola

Dust for Dust: Aluminium. Therapy in WA Gold Mines

Silicosis is a non-reversible outcome of exposure to silica dust, most often arising from hard rock mining activity. The only effective means of combating this occupational disease are prevention in the form of physical separation or effective extractive ventilation. In the 1950s one measure that was reactive to the presence of dust and that was adopted in WA mines was the so-called McIntyre Aluminium Therapy. In the 1930s Canadian research funded by mining companies and the Ontario Mining Association suggested that inhalation of aluminium dust could prevent the development of silicosis, albeit at the point of the miners' bronchial systems. Further, it was believed that the dust had a prophylactic effect. From 1943 the procedure was widely adopted by mines that were members of the OMA and, despite objections, the treatment remained in place until union action forced companies to abandon it in 1979. In Western Australia state bodies worked actively to promote introduction of the 'therapy' and from the early 1950s the process was used in the major gold mines of WA. However, by the early 1960s it had largely been abandoned.

This paper examines the circumstances surrounding the introduction of the Aluminium Therapy in WA and proposes some reasons why the measure fell into disfavour and was abandoned so much earlier than in Canada.

Anne L. Both

A Goldfields Entertainer

Winners of gold wanted to enjoy the fruits of their labour. For the successful, enjoyment of newfound wealth was paramount. Enjoyment came in varied forms - indulgence in sporting activities such as horse riding, boxing, foot racing, football and cricket games. These activities were accompanied by gambling and drinking '*the most expensive wines just because they were expensive*' and the company of women '*of doubtful respectability*', as observed by one John Sherer himself a seeker after gold. The miners also entertained themselves by making their own music, but with success in their search for gold they began to demand the 'professional' entertainment offered by paid performers. Numerous singers, dancers and actors visited the goldfields in the expectation that they also might reap some of the rewards. Among these entertainers was the notorious Lola Montez. After a career in Europe where her many alliances with prominent citizens of the countries that she visited and the somewhat risqué nature of her performances brought her to the attention of American newspapermen, she saw opportunity to further her performing career by going to North America. She performed not only in its principal cities but also on the Californian goldfields where her provocative dance and somewhat outlandish behaviour

attracted much attention. Her final performing days were spent on the Victorian goldfields where she appeared in Geelong, Ballarat, Bendigo and Castlemaine. She returned to North America after her Australian tour where her remaining years were spent on lecture tours and philanthropy. The presentation will briefly consider her biography and then examine the impact she made during the time she spent on the Californian Goldfields.

Peta Chappell

Tales of Merton's Reward: the gold that Fred won

In March 1899 about 35 km NE of Leonora in Western Australia, Beechworth-born prospector Fred Merton discovered the gold deposit which became the fabulous Merton's Reward gold mine. He took the highly unusual step, for a prospector, of erecting a battery and developing the mine himself, acting as his own mine manager, engineer, metallurgist, assayer – even as gold escort! In so doing, he earned himself a special place in the mythology of gold in WA. Not surprisingly, much interest has centred on the performance of Merton's battery and the gold that Merton won from it. Comparison with other contemporaneous mines in the Mt Margaret goldfield reveals outstanding early results. The erratic production recorded subsequently was due to lack of water rather than mechanical failure. Using detailed analysis of the production records for Merton's Reward, this paper assesses the efficiency of the battery and its proprietor and also explores some of the more scurrilous tales told of Fred Merton and his gold.

Ross A. Both and Greg J. Drew

The Glen Osmond silver-lead mines: Australia's first metalliferous mines

This paper examines the history of the silver-lead mines at Glen Osmond in the Adelaide foothills, which represent the birthplace of Australia's metalliferous mining industry. Mining commenced at Wheal Gawler in 1841 and was followed by the Glen Osmond mine (1842) and Wheal Watkins (1843). The mines closed in 1850-1851 when the miners left for the Victorian goldfields. Some further production took place in the late 1880s. Although the Glen Osmond mines proved to be small, historically they are of national significance. Their discovery came at a time of economic difficulty in South Australia and was the first indication of the important role mining would play in the State's economy.

Because of the spectacular views of Adelaide, the land in the vicinity of the Glen Osmond mines has been subdivided and most of the workings are now located on residential properties. Fortunately, two adits of Wheal Watkins were preserved on a local Council Reserve. In 1986 a South Australian Sesquicentenary grant to the Burnside Council enabled restoration work to be carried out, so that these two adits could be made accessible for guided underground public tours. The Burnside Historical Society has provided volunteer guides for these tours since their commencement in October 1986.

David Branagan

Captain Eugene de Hautpick – A Russian ghost in Australian mining and geological history

Captain de Hautpick is not a well-known figure in the Australian geological scene, and most present day geologists and mining experts have never heard of him. However, his presence in Australia during the 1920s caused a few ripples. He was born in Russia around 1880, had some mining/geological training and military experience and wrote on Russian mining, particularly oil, as the Russian correspondent for the British *Mining Journal* up to 1921. Journalist A.J. Wilson claims that 'in the early 1920s the long arm of the Bolsheviks reached out to him in Australia and he was eliminated. There cannot be many cases of leading mining men suffering political assassination'. De Hautpick was not assassinated in the early 1920s, although some mining investors might have felt like doing the deed. Was he an expert or a charlatan? Probably somewhere in between.

He was first in Australia between 1922 and 1924, plunging into the controversy about oil possibilities in the Coorong (South Australia) and got his (and others) fingers burned in seeking oil for the Mersey Valley Co., in Tasmania, among other activities.

In December 1927 he returned to Australia with geophysical 'inventions', seeking sources of radium, and still hopeful of oil discoveries using geophysical techniques. From his base in Adelaide he published interesting pamphlets on his chosen topics: radium; geophysics in mining; oil prospects in Australia. Thereafter all is, so far, silence. Did he leave Australia, did he die, or was he assassinated?

Greg Drew

The Cornish *fire whim* and its application at the Burra Mine, 1849-1877

Fire whim was an early Cornish term for engines used for mine haulage to distinguish them from horse whims. These engines were similar to Cornish beam pumping engines but were generally smaller with the outdoors end of the beam connected to a crank producing rotary motion – hence they are known as beam rotative engines. The rotary motion produced by these engines could be put to various uses; it could turn a winding drum (winding or hauling engine), power crushing and dressing machinery, and even operate pumps in distant shafts via horizontal flat rods. After 1850, the horizontal engine began to replace the beam rotative engine, which had virtually disappeared by the 1880s. The beam engine could never have matched the speed of the horizontal engine as the inertia of the moving beam and other parts retarded rapid acceleration.

Ten beam rotative engines imported from Cornwall, were installed at South Australian copper mines between 1848 and 1874. Three of these classic engines were erected at the Burra Mine between 1851 and 1861, during the early Cornish-style development of the mine. These engines were Crusher Engine (1851), Peacocks Engine (1858) and Mophetts Winding Engine (1861). The paper will illustrate how these engines were used for winding and crushing operations during the pre open cut period at the mine. When the mine changed to an open cut operation in 1867, the two remaining engines were modified to power a mechanised treatment plant and an endless chain haulage system to remove low-grade ore from the open cut. This interesting application of their power continued until closure of the mine in 1877.

Jim Enever

Victoria's other Eureka: The clash between British capital and the diggers on the Mt Alexander Goldfield

Two years before the dispute between the colonial authorities and the diggers over license fees came to a head at Eureka in December 1854, another issue came to the fore among the local mining population. Following news of the 1851 gold discoveries, mining companies were formed in Britain to take up what British capitalists saw as their rightful predominant place in the systematic extraction of the colonial riches. The Port Phillip and Colonial Gold Mining Company which eventually emerged as the most significant British capital company to feature in the early development of a sustainable gold mining industry in Victoria was one of these. In its early days, however, the Company found itself embroiled in conflict with the colonial authorities and the notoriously independent diggers over the issue of the granting of leases to mining companies. The diggers feared that such a system could potentially jeopardise the small claims that provided the livelihood for the mainly transient diggers. As the authorities attempted to come up with a formula for the most effective longer-term development of the goldfields, the diggers became progressively more apprehensive. The situation came to a head in October 1853, when the authorities attempted to exclude up to 1,500 diggers from their claims near Fryerstown on the Mt Alexander goldfield, in favour of a lease promised to the Port Phillip Co. Although there is no contemporary evidence of violence, the moment was charged with the possibility. In the event, the authorities on this occasion backed down, reneging on their arrangement with the Company and deferring the eventual introduction of a leasing system until a point in time when the mutual interests of capital and labour converged as mining activities became deeper.

Criena Fitzgerald

The Mine Workers Relief Fund 1915-1932: compromise, coercion and surveillance

In 1906 delegates to the first annual conference of the Westralian Federated Miners' Union called for the establishment of a 'Worn-out Miners Fund' to assist miners suffering from the effects of their occupation, and in 1908 called for miners' complaint to be classed, like accidents, as compensable. After the 1912 Royal Commission into the health of miners a voluntary fund called the Mine Workers' Relief Fund was established and in February 1915, at a conference of representatives from mining companies, miners and the state government each group agreed to contribute equally to the fund.

The Fund was managed by representatives from the contributors and a secretary whose job it was to ensure the funds were paid on time. Miners who applied for relief were assessed by the Board, and if their application was successful, were granted a weekly allowance, which prevented '...the improvident beneficiary from squandering at one time the whole relief granted'. Establishing the fund was a clear indication that the government and the industry recognised the economic cost of chronic illness and its effect on miners in particular. The fund was a compromise. It did not provide compensation or assist with medical expenses or the early treatment of illness; it provided 'relief' after the men became unable to work due to their illness.

The demands on the Fund were such that by the 1920s there were insufficient contributions to meet the requirements of sick miners and their families. It was not until 1932 when the MWRF Act that the Fund became a statutory authority and contributions to the fund compulsory for miners and mine owners in all goldfields in the State. Using case studies of applicants for the Fund, this paper examines the voluntary Fund in Western Australia, and explores the benefits and disadvantages of receiving 'relief'.

Brian A. French

Hard Times - schoolteachers in early copper mining communities

The establishment of a school following a petition by copper miners can be used to illustrate the relative importance of mines. High ore yields and its resultant population explosion created communities, often short lived when resources were exhausted. This paper will examine the fluctuating welfare of both miners' children and their schoolteachers in 19th century mining villages. It will also illustrate the relationship of the schoolmasters with the Board of Education and with the community in which they lived. Cadia and Icely will be used to demonstrate how diversification could enable a school to survive when mines were temporarily shut down when the price of copper fell.

Nic Haygarth

Mug or martyr?: George Renison Bell and the rewarding of 'successful' 19th-century Tasmanian mineral prospectors

By sparking a rich mining field, George Renison Bell's tin finds in north-eastern Tasmania in 1874 stimulated the island's economy. Bell derived very little financial benefit from these, however. Nor did he gain much from his 1890 discovery of the mineral lode later worked as the Renison tin mine, recently Australia's biggest tin operation, but which only became profitable long after his death.

Bell's career was a mix of achievement, bad luck and bad management. Was he also a victim of parliamentary ingratitude? A formal reward mechanism might have saved the impoverished Bell and his family many years of suffering. The *Gold Act* (1860) made provision for a reward of up to £5,000 for finding payable gold, but not until the *Mining Act* was passed in 1905 was there similar provision for rewarding discoverers of other metals or minerals.

This paper measures Bell's career against traditional images of the prospector as either wastrel or knight errant. It also examines the parliamentary treatment of 'successful' 19th-century Tasmanian prospectors, and discusses whether such men (and their dependants) were owed a living, or whether they were victims of their own choices.

Philip Hart

The Thames Miners' Union: Defending Miners and the Mining Industry

The Thames Miners' Union, modelled on the Amalgamated Miners' Association of Australasia, did not challenge the capitalist system. Instead, it sought harmony between miners and their managers, and united with employers and shareholders in defending the interests of their industry. They saw the interests of the miners as intertwined with those of shareholders, managers, and directors, and joined the latter in seeking government aid to develop the industry. It enjoyed strong support in the community. Although there were some defensive actions against managerial decisions, there was no challenge to the legitimacy of private enterprise. From its beginning, it acted as a friendly society, its leaders were pillars of the community, and small businessmen were honorary members. Examples will be given of its leadership, and the industrial conflicts in the Te Aroha district will be examined.

Richard G. Hartley

The forgotten reason why the iron ore export embargo was lifted in 1960: Griffin Coal Mining Company and the Scott River sponge iron project

On 1 December 1960 the Menzies Government approved a trial shipment of 500 tonnes of iron ore from Western Australia to Japan. The following day the Government announced the relaxation of its iron ore export embargo. The trial shipment was made, not by Mt Newman, Hamersley, Mt Goldsworthy or Western Mining, but by a long forgotten company, Minerals Mining and Exports (MME), a minnow in the mining world which was a joint venture between the Collie coal mining company, Griffin Coal Mining Co., and an international commodity trader, Heine Brothers. The company signed the first state government iron ore agreement made by any company, which involved mining shallow ore deposits on the south coast near Augusta, which are now covered by a National Park. The paper discusses the development of the project which was precipitated by the determination of the state Premier to fully honour an election promise made to the Collie coal miners. The project, which involved the manufacture of char from Collie coal for the production of sponge iron, could well have been implemented, well in advance of those of the larger companies, had it not been for the 1962 downturn in the Japanese steel industry.

Brian Hill

Reefton's forgotten War hero mine manager, Alfred Winter Evans

Unbeknown to the people of Reefton, the general manager of the Consolidated Gold Fields of New Zealand Ltd group there from 1909 to 1915, mining engineer Alfred Winter Evans, was a war hero of some distinction. Evans had been recommended for the Victoria Cross while a teenage soldier in the Boer War, and he had been awarded the DCM. He also performed heroically in WWI, being twice Mentioned in Dispatches and winning the DSO. Evans was killed in Flanders in October 1917 at the battle of Passchendaele. Consideration of his mining career illuminates an overlooked facet of the economics of the Reefton gold field (which is the second biggest in New Zealand) during a turbulent period in its history. In 1912, Evans led the company in a bitterly fought six-months' long strike: his industrial victory over the miners' union allowed him to introduce reforms to work practices in the Reefton mines which improved productivity substantially, enabling the mines to continue operating through the next two decades when cost inflation increased prices in New Zealand by some 67 per cent. Although dividends were sparse until prosperity was restored to the industry with the price deflation and increases in the gold price in the 1930s depression, the improvements instituted by Evans ensured the survival of the Reefton goldmining industry.

Adrian Hutton and Leonie Knapman

Safety in Oil Shale Mines – Joadja Creek and Glen Davies

A study of historical statistics indicate that patterns in Occupational Health and Safety practices and policy may not change, over time unless driven by external factors. Major accidents in NSW at one of Australia's earliest 19th kerosene shale (oil shale) operations, Joadja Creek, and a later kerosene shale operation at Glen Davis, generally resulted in a major review of occupational health and safety issues and in some cases changes to the legislation governing the industry, especially when lives were lost and widely publicized. Two recent NSW coal mine disasters - the Appin explosion that killed 14 men in 1978 and the Gretley water inrush accident that killed four men in 1996 show that the 'learning' process still goes on.

A review of the reported accidents that occurred during first four years of the Glen Davis kerosene shale industry show a total of 795 reported injuries. The National Oil Pty Ltd had to introduce a bogey or bonus scheme to initiate and promote increased safety and this appears to have worked in some of the works locations.

Whilst there is little recorded information on safety issues for the Joadja Creek kerosene shale facilities, newspaper reports show that accidents, particularly deaths, affected the community as a whole. The kerosene shale communities were isolated and lacked most of the modern facilities that are thought to be essential to every day living. Physical conditions were harsh, there was no basic medical service and working conditions and wages were poor but evidence clearly shows that serious accidents prompted the community to fight for better facilities. This paper reviews the work-related accidents at Joadja Creek and at Glen Davis (during the first four years of operations at the latter) to show how working conditions were improved and how Occupational Health and Safety issues in the industries were addressed.

R. Keith Johns

Uranium in South Australia – politics and reality

Geology and geography have conspired to assure South Australia a special place in the international uranium industry. Thus, during the past century Radium Hill, Mount Painter, Maralinga, Beverley, Honeymoon and Olympic Dam have, in turn, acquired special significance in evolution of the nuclear fuel cycle. Governments at the Federal and State levels were quick to accept the challenges offered and sought to maximize the benefits that might accrue from the mining, processing and utilization of uranium – at first for strategic military purposes and, since World War II, to power nuclear reactors for the generation of electricity.

Since 1975, uranium and the associated nuclear industry have become divisive issues for the politics of the Left. The ensuing debate which has given rise to negative perceptions of weapon proliferation, safety of nuclear reactors and disposal of radioactive wastes, culminated in protests, demonstrations and blockades in the 1980s. Opportunities that were presented for enrichment of uranium have been passed over through political expediency and the potential to add greatly enhanced processed value to product from the World's largest resource has been foregone. Likewise, the rejection, recently, of a national radioactive waste repository near Woomera could be interpreted as being counter-productive and another opportunity lost for the State.

This paper briefly traces significant events which relate to exploration, mining, processing and usage of uranium in South Australia – for medical research, in atomic weaponry and as a fuel to satisfy increasing nuclear power demand from overseas.

Ruth Kerr

McIlwraith: builder of the Melbourne to Bendigo Railway, Mining Investor and Queensland Premier

This paper looks at the construction of the Melbourne to Bendigo railway, one of the finest engineered railways in the nation, and then assesses the role of Thomas McIlwraith as a mining investor in Queensland during the 1880s when he was Premier. McIlwraith had an entrepreneurial vision for the construction of transcontinental railways in Queensland so as to stimulate the development of mineral and pastoral wealth. His personal involvement in mining investment in the Cairns hinterland mining fields and the Palmer River goldfield occurred in parallel with his political activities.

James Lerk

Robert Gray Ford – A man before his time!

Robert Gray Ford (1833-1891), blacksmith and mining inventor who eventually became engineer in charge of the Victorian Railways was a man before his time. He developed ideas for rock drills which were way ahead of any others in the world and he did so quite independently. Ford remains a virtually unknown man – an unsung hero who has been largely neglected by historians. This paper will attempt to shed a light on the man, his ideas and inventions.

Ross Mainwaring

Gold Mining on the Witwatersrand – a photographic essay above and below ground

Slide presentation of activity at a gold mine near Johannesburg in the late 1970s.

Barry McGowan

Earle's cave of gold: fact or fiction

In 1931 Ion Idriess wrote his best selling account of the ill-fated 1930 Lasseter's Reef expedition, a book which is only partly based on fact. But he chose his supporting material well. The foreword was written by Herbert Basedow, an eminent anthropologist and explorer. In it Basedow stated categorically that Lasseter's original discovery was no myth, for he 'remembered seeing years ago a sample of bottle-green quartz, richly studded with gold, which a prospector named Earle claimed to have found in the identical locality to that searched by Lasseter'.

Ironically two years earlier, before Lasseter came on the scene, another well-known explorer, Michael Terry also wrote about Earle's alleged gold find, but in an entirely different vein. He referred to overseas press stories about Australian's hunting for Aladdin's Cave of Gold. Even his own expedition had been connected with the search. He recounted briefly the sorry saga of Earle's expedition and the even more dramatic events of the two follow-up expeditions involving Cockrum and the Worman brothers

Some eight seven years later in 1937 Terry wrote another account of his Centralian travels, this time firmly focussing on the Lasseter story. He stated that the yarn of the lost reef was probably conceived in Lasseter's mind out of Sayce's book, *Golden Buckles*, set in the Musgrave Ranges, and the Earle's Cave of Gold story. He clearly had little time for the latter story or for Lasseter's account of a lost reef. My paper attempts to piece together the story of Earle's expedition, the public controversy that followed it and the drama of the two follow up expeditions. The story of Earle's cave of gold is probably even more dramatic than the story of the Lasseter's reef expedition. It is a tale of mystery, intrigue and murder, which today still defies resolution.

Kenneth McQueen

The Mount Boppy Gold Mine, NSW: A leader in its day and more to come

The Mount Boppy gold mine at Canbelego in northwestern NSW was one of the most successful gold mining ventures in Australia during the early twentieth century. The reef was discovered in September 1896 by Michael O'Grady in partnership with Thomas Reid. In 1897 they sold the deposit to the Anglo-Australasian Exploration and Mining Company for £1000. This company tested the deposit before floating the Mount Boppy Gold Mining Company Ltd in London in 1900. From 1901 to 1922 the operation produced 13.5 tonnes (0.433 million ozs) of gold from about 1 million tonnes of ore. Four years after start up the mine was the leading gold mine in NSW and until 1937 it held the record as the state's largest gold producer. By 1911 shareholders had received a 350% return on their investment and over the 21-year life of the first phase of mining the operation returned five times the original capital. Success was due to good management, use of state of the art technology, application of scientific exploration and development methods, and a high quality ore deposit. In 1922 there were 0.5 million tonnes of tailings containing 6 g/t of gold. From 1939-1957 attempts were made to reprocess these tailings. In 1974 a new technology was tried by Leighton Mining NL with the construction of the first carbon in pulp (CIP)

cyanide extraction plant in Australia. In 1975-76 this experimental plant produced 168 kg (5,440 oz) of gold from 200,000 tonnes of tailings. Although pioneering the revolutionary CIP process for Australian conditions this venture was not a financial success. In 1991 Polymetals Australia rebuilt the plant to extract silver and gold in flotation tailings from the Elura mine north of Cobar. In 1995 they turned to reprocessing the remaining tailings as well as backfill sands at the Mt Boppy mine. This resulted in a new open pit operation, which is accessing the old workings to extract the backfill and mine remnant ore. The history of the Mount Boppy gold mine illustrates many of the major developments in gold mining and processing technology from the late 19th to the early 21st centuries.

Gavin M. Mudd

From Radium to Uranium: The Importance of Australia's Radium Mining Efforts to the Cold War Uranium Industry

The discovery of uranium ore at what became known as Radium Hill in north-eastern South Australia in early 1906 led to a relatively small but determined mining rush for radium – a key decay product of uranium. In 1910 a second deposit was discovered at Mt Painter some 400 km to the north-west of Radium Hill. Globally, radium had been found to be 'radioactive' and was highly sought after for science and medicine with a price of the order of £10,000 per gram. Between 1906 and 1932, numerous efforts were made to exploit the new deposits at Radium Hill and Mt Painter, but with no real financial success. Although there has been some documentation of this history, the next phase during World War 2 was perhaps the most crucial for the post-war uranium industry and this period has received scant attention. Between 1941 and 1945, the Commonwealth and South Australian Governments carefully protected these uranium resources from private enterprise and, following the request from the British Government in May 1944 for uranium for the Manhattan Project (the Allied atomic bomb project), undertook systematic exploration at Mt Painter until mid-1945. This paper will review the history of radium mining in Australia, including some of the key scientists, explorers and metallurgists involved, followed by a detailed review of the role that key mining companies and industry figures played during the Manhattan Project work. Thus, the importance of radium mining in the establishment of our post-war uranium industry is clearly shown.

Greg Müller

The potential for lichenometric dating of mining sites in Central Victoria.

Lichenometry is a dating technique that utilizes the growth of lichens to determine the age of rock surfaces. The technique has primarily been used in geomorphological contexts in arctic and alpine areas, but some limited application has been found in the dating of archaeological structures, fluvial landforms, and tectonic surfaces). Apart from very limited application in dating river flow regimes no investigation of the technique has been undertaken in Australia. This is surprising since existing dating techniques are often limited in their usefulness either through lack of dateable material or records, or the expense of testing

The goldfields of central Victoria are considered to be an historical landscape of national and international significance. Sites and artifacts dating from the discovery of gold in the mid 1850s to the present are widespread across the bushland and forest reserves of central Victoria. Establishing chronologies for these sites is difficult, since record keeping in the early rushes was patchy, many sites were subsequently reworked, and materials from abandoned workings were scavenged for re-use at other sites. Archaeological and historical research often relies upon relative dating techniques based upon the presence or absence of artifacts, and evidence of mining styles, and can only give broadly indicative dates.

Lichenometric dating may enable the determination of minimum ages for many of these sites where concrete structures exist. If the technique can be extended to lichens growing on the local rock, then water races, buildings, and other structures may be assigned minimum ages. Individual workings where rock was extracted while mining, such as mullock heaps and diggings, may also be able to be dated.

Gilbert M Ralph

'We did our dough, in Bendigo'

In the mid-1930s Bendigo Mines Ltd, a subsidiary of Gold Mines of Australia Ltd, a sister company to Western Mining Corporation Ltd, spent over \$1 million reopening gold mines on the Bendigo Goldfield. With great fanfare BML established three new shafts, did extensive underground work, built a stamp battery and associated plant and acquired George Lansell's 'Fortuna Villa'. The short-lived effort was a financial disaster and led to the jingle, 'We did our dough, in Bendigo'.

In the 1970s WMC decided to reassess the Bendigo field using the data available to it from the 1930s work. They obtained exploration licences in 1978, re-opened the Williams United shaft and processed some bulk samples through a purpose-built plant. By the time a development proposal was prepared and an Environmental Effects Statement submitted the gold price had fallen. Great Bendigo Goldfields Ltd was incorporated in 1987 to

raise funds from WMC shareholders and residents of Bendigo, but the public float did not proceed. In 1992 after spending about \$20 million WMC withdrew from field and sold its interests to Bendigo Mining NL for \$1.6 million. Once again the jingle rang out, 'We did our dough, in Bendigo'. This paper endeavours to compare the factors which influenced the managements of BML and WMC to withdraw from the Bendigo field'.

Elaeanor Swent

Yanks and Aussies, a symbiosis: A look at some illustrative careers [Keynote Presentation]

This paper will draw from six oral histories conducted for the series on Western Mining in the Twentieth Century by the Regional Oral History Office at the University of California, Berkeley. Three of the six were born in Australia: Frank Joklik, John Turney, and Roy Woodall. Paul Schipke, Langan Swent, and Alexander "Bud" Wilson were Americans who worked in Australia. All of them recollect experiences which illustrate the significant changes in mining in the last half of the twentieth century: a globalized economy, environmental protection, and increased mechanization. Stark facts are made more vivid by their personal stories.

John Watts

Infrastructure Maintenance at the Central Deborah Mine

The Heritage listed Central Deborah Gold Mine (1938 – 1954) is the last of the quartz reef mines on the Bendigo Goldfield accessible to the public. The mine is operated by The Bendigo Trust on behalf of the City of Greater Bendigo. Contractors and mine maintenance staff are currently carrying out significant infrastructure upgrade. The works include the accreditation of the winder, the refurbishment of the skyshaft, shaft collar and shaft to No 3 level (85.2m).

The paper discusses issues encountered in maintaining a heritage-listed asset within current Victorian Mineral Resources Regulations. The work method to stabilise the shaft collar and on-going shaft refurbishment is illustrated and described, as are issues relating to the refurbishment of the skyshaft. Issues relating to sourcing replacement construction materials compatible with current engineering requirements, and at the same time sympathetic to the terms of the Burra Charter are examined. The upgrade of the winder is illustrated and discussed with reference to engineering resolutions needed to bring plus century old machinery to current standards.

Nicola H Williams

Continuing the Quest: Still 'Oertling' along'

In our continuing search for surviving instruments made by the UK firm of Oertling, especially analytical, bullion, chemical and physical balances, we have also come across unexpected pieces of Australian mining history. In this short paper, I'll discuss some of these historical snippets, as well as a few highlights from our recent Oertling searches.

TWELFTH AMHA CONFERENCE, KADINA SA, 2006

ABSTRACTS OF PAPERS

The Forgotten Twenty Years: Leaching the Waste Dumps at Moonta Mines 1901-1943

Peter Bell

Historical Research Pty Ltd Adelaide

Copper ore was mined at Moonta from 1862 until 1923, but copper metal was produced there for another twenty years after the mines closed. Copper was being extracted from the waste dumps by acid leaching from 1901 onward, and when mining ceased, the process continued for another generation. While the quantities of copper produced were never large, the process was capable of operating at virtually no cost, utilising principally seawater, by-product sulphuric acid and scrap metal, and consuming minimal labour and fuel.

The process was designed by Antonio Delgado of the Rio Tinto mines of Spain, an instance of the Wallaroo and Moonta Mining and Smelting Company's responsiveness to trends in international mining technology. Its principal significance to us today is that the relic industrial landscape we see at Moonta Mines was created to a great extent not by the first sixty years of mining operations, but by the final twenty years of leaching.

“Nor any Drop to Drink”: The struggle for water supply in the Copper Triangle

Anne L. Both

Burnside Historical Society

Lack of water was a major problem for the mining communities of the Copper Triangle for approximately thirty years after mining began. Low rainfall, mainly in the winter months, no natural watercourses of any note and poor catchment areas meant that settlers were dependent on sporadic rains for replenishment of their water supply. Prior to the commencement of mining in 1861 the area was sparsely settled by farmers and fishermen whose water supply came largely from known native wells for stock watering and the small tanks constructed to catch rain for domestic use.

Mining activity brought rapid population growth within a relatively short time span. This rapid growth meant that the necessary infrastructure to support such influx was totally inadequate or non-existent. The water from native wells and sparse rainfall rapidly proved insufficient for domestic and other needs and settlers suffered severe water shortages and zymotic disease for almost thirty years. State and Local Government strove to meet the water needs of the population, constructing water tanks to collect rainfall and introducing health regulations to combat the frequent episodes of infection. Local Boards of Health acting under the direction of District Councils and the Central Board of Health worked to improve poor drainage, inferior methods of refuse disposal and poor animal husbandry. In spite of the health measures precious water often became readily contaminated from domestic and industrial activity.

In 1890, the Copper Triangle saw the first reticulation of water from a Government reservoir and since that time has enjoyed water comparable to that of any modern township. This paper traces the struggle to obtain adequate uncontaminated water through the construction of reservoirs, and considers the roles of the mining community, the District Councils and the South Australian Government in provision of safe water.

Exploration and mining in the Moonta and Wallaroo fields following the 1923 mine closures

Ross A. Both

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The Moonta and Wallaroo mining fields are located in the easternmost part of the Gawler Craton. The ore bodies are veins hosted by metamorphosed volcanic and sedimentary rocks of Proterozoic age. An investigation of ore-controlling structures in both fields by S. B. Dickinson in 1942 (Bulletin 20, Geological Survey of South Australia) provided a geological basis for mineral exploration but, because of a complete lack of outcrop in the area, exploration has relied heavily on geophysical and geochemical methods, with

follow-up diamond drilling to test anomalies. Geophysical investigations were first used in the Moonta-Wallaroo area in 1928-1929 by the Imperial Geophysical Experimental Survey and the first application of geochemical reconnaissance was that carried out by V. P. Sokoloff of the U.S. Geological Survey on behalf of Zinc Corporation Limited during their 1947-1948 exploration program. A major exploration project by Western Mining Corporation Limited and North Broken Hill Limited from 1959-1988 found further deposits at Poona and Wheal Hughes, near Yelta, but failed to make any major discoveries. The project was sold to Moonta Mining NL who between 1988 and 1994 produced 187,843 t of ore averaging 4.76% copper and 1.45 g/t gold from Poona and 287,871 t of ore averaging 3.51% copper and 0.67 g/t gold from Wheal Hughes. Further exploration is currently being conducted by a joint venture between Adelaide Resources Limited and Phelps Dodge Australasia Inc/Red Metal Limited.

From Russia via USA (With Love): Australian Geochemical Mineral Exploration: it all began At Moonta

David Branagan

School of Geosciences, University of Sydney

Tradition has it that the Moonta – Wallaroo field began when Cornish men spotted ‘green stuff’ in soil dug from a wombat’s hole, and noticed that burning local bushes produced a green flame, all indicative of copper. Some people were sceptical. In the late 1940s, V.P. Sokoloff undertook the first systematic geochemical exploration in Australia at Moonta, apparently on behalf of the Zinc Corporation. The idea was that traces of copper could be held at varying levels in the soil profile above a mineralised zone in the bedrock. At Moonta the soil mantle varied from 2 m to more than 6 m. Sampling was carried out over a total length of 13 km, 326 soil profiles were examined and about 2000 samples were tested chemically. Three geochemical anomalies were located. The subsequent drilling revealed mineralisation in the bedrock, but not of economic grade. Thus the method proved technically sound, but un-commercial. The method was taken up elsewhere in Australia, with varying success. Sokoloff is virtually forgotten in South Australia. Where was he from, where did he go?

The Moonta-Wallaroo Mining District, 1859-1923: an Overview

Greg Drew

Senior Geologist, Mineral Resource Group, Primary Industries and Resources SA

The Moonta-Wallaroo Mining District covers an area of about 130 square kilometres on the northern Yorke Peninsula. The area is flat lying with a thin veneer of calcrete and soil overlying older crystalline basement rocks containing copper vein mineralisation. There was no surface expression of these veins. In 1859 and 1861, shepherds discovered brightly coloured copper ore which had been brought to the surface by the burrowing of native animals. W.W. Hughes, the owner of the pastoral leases covering the discoveries secured mining leases and formed two separate companies to work them – the Wallaroo Mining Co. and the Moonta Mining Co.

These discoveries which subsequently became the Wallaroo and Moonta mines, were made at a time when the earlier rich copper carbonate ores at Kapunda and Burra were declining and ensured the continuity of production and employment in the South Australian mining industry. While numerous leases were taken up in the vicinity of the two mines, none of the outlying lodes proved as rich or successful, and many were later incorporated into the Moonta and Wallaroo operations.

The Moonta and Wallaroo mines remained in almost continuous production for more than 60 years during which time their combined production was about 335,000 t of copper metal from 7 mt of ore. They were worked as separate ventures until 1889 when they amalgamated to form the Wallaroo and Moonta Mining and Smelting Co. Large smelting works were erected at Wallaroo on the coast, treating ore from the mines from 1861 until 1923. The amalgamation of the two companies resulted in the application of new technology and diversification including the Bessemer smelting process, copper sulphate plant and sulphuric acid works.

The mining and smelting of copper had a great influence on economic activity in the district. At the peak of mining activity in the mid 1870s, the mines employed more than 3000 and the district had a population of about 20,000, predominantly Cornish immigrants and their descendants. In particular, it resulted in the establishment of three significant towns - Kadina, Moonta and Wallaroo - which form the Copper Triangle.

This paper will provide an overview of the mining history, geology, mining methods and settlement patterns in the Moonta–Walleroo District and provide some comparisons with the Olympic Dam Mine which will eventually replace it as the longest continuously operating mine in South Australia.

Copper Mining in Victoria in the Nineteenth Century

Jim Enever

Although never of the significance of the copper industries in other Australian States, some copper mining and smelting was undertaken in Victoria during the second half of the nineteenth century and early twentieth century. Copper mineralisation was relatively widespread throughout the Victorian goldfields, but was not of commercial significance except at Berthanga, where early gold mining activities led eventually to the extraction of copper from the complex refractory ore of the area, and at the Coopers Creek (or Thompson River) Mine in the Wallhala District, where a relatively simpler copper ore body separate to the gold occurrences of the area formed the basis of an intermittently successful mining operation. Away from the goldfields, stand alone copper mining on a limited scale was undertaken during the latter part of the nineteenth century in far east Victoria at Accommodation Creek in the Mt Dedick Mineral Field, better known for its silver/lead mineralisation. Copper was also recovered from small deposits of mineralisation found in limestone of the Buchan district of east Gippsland from the 1870s on.

The histories of the three most significant Victorian copper mining sites of the period vary much in terms of the problems that had to be overcome in their development. At Berthanga, the issues were essentially metallurgical, while at Coopers Creek, difficulties in delineation of the ore reserves made for a stop-start history. In the case of Accommodation Creek, it was the relatively small size of the resource and its remoteness, by Victorian standards, that put the break on development. Taken together, Berthanga, Coopers Creek and Accommodation Creek provide an interesting insight into a relatively little known corner of the Victorian mineral industry of the nineteenth century and early twentieth century.

From Swansea to Black Hawk to Butte: The transfer of Copper Smelting Technology from Wales to Colorado, Montana, and other American States in the 1860s, 1870s, and after

James E. Fell, Jr.

University of Colorado at Denver and Health Sciences Center

The Pike's Peak Gold Rush of 1859 prompted the rise of mining in what quickly became first the Territory and then the State of Colorado. By the mid-to-late 1860s, however, the industry collapsed largely because of the inability to extract gold from deep ores containing small amounts of copper, iron, and other substances. In the crisis, Nathaniel P. Hill, a resourceful former college professor as well as mine owner, came to believe that the technology used to reduce copper ores at Swansea, Wales, was the solution to Colorado's technological impasse. After two trips to Britain and the Continent to study technology, he hired Welsh, Cornish, and German-trained metallurgists and workers, obtained the capital he needed, and founded the Boston and Colorado Smelting Company. In 1868, this enterprise opened a plant that used the Welsh technology so successfully that by the mid-1870s, it was reducing more than half of Colorado's total metallic output in terms of silver and gold.

Meanwhile, analogous technological problems in the small gold mining town of Butte, Montana, prompted a major mine owner there, William Andrews Clark, to visit Hill's plant to discuss the situation. Eventually, these talks led Hill, Clark, and others to create the Colorado and Montana Smelting Company, which established a plant at Butte in the late 1870s. This resolved the technological problem that Clark and others faced. But the long-term results were different. While the Boston and Colorado Company remained focused on using the Welsh technology to recover gold and silver, the continued development of Butte revealed the presence of massive copper deposits which became the focus of production as the gold and silver content of the ores there declined. As a result, Butte emerged as one of the world's greatest copper producing centres in the late 19th and early to mid-20th century. The technology brought to Black Hawk and Butte evolved dramatically in the western United States, and metallurgists from there transferred the technology elsewhere as well.

Michael Dineen O’Keeffe: Union Leader

Philip Hart
University of Waikato

O’Keeffe was an exception to the general rule that the first leaders of the Thames Miners’ Union were respectable and cautious mine managers. Although also a mine manager, of very small mines, he was a notable ‘character’ with an ‘Irish’ sense of humour.

Like many other miners, in his first years in New Zealand he had attempted to be a part-time farmer as well; unlike most other people, after becoming bankrupt he repaid all his debts, even though not required to do so. As president of the union, he was a strong advocate of its members’ interests. When the Arbitration ruled against the union’s application for increased wages and improved conditions, his trenchant criticism of the judge offended the respectable. Despite retaining the confidence of the members, he retired soon after this conflict, and returning to managing small mines on several fields.

O’Keeffe was an example of a genuinely popular union leaders whose efforts, although largely unsuccessful, were greatly appreciated by the rank and file.

Catch ‘em, hold ‘em, shave ‘em, shear ‘em: Cornish ‘practical mining’ and Tasmanian tin

Nic Haygarth

It is appropriate that Tasmania’s 19th and early 20th-century mining ‘capital’ was called Launceston, on the Tamar River, in County Cornwall, since Cornish and Devon ‘practical miners’ were often prized in Tasmania as mining managers and tin dressers. Under their guidance the Anchor tin mine developed, plus the Tasmania gold mine at Beaconsfield and the Zeehan-Montana silver-lead mine flourished. Yet in a colony in which German mining academy graduates such as Gustav Thureau, George Ulrich, Ferd Kayser, WH Twelvetrees and Robert Sticht were very influential, the methods and economy of Cornish miners were questioned. The Mount Bischoff tin field was a battleground between German and Cornish mining traditions. Expectations of tin lodes ‘living down’, as they did in Cornwall, were also disappointed. This paper examines the trials, tribulations and successes of Cornish and Devon mining managers WH Wesley, Richard Mitchell, James Hancock and William White in Tasmania.

A reinterpretation of the history of the acquisition of the Blackwater gold mine

Brian R. Hill

The story of prospectors receiving only a pittance for a mine they have found which goes on to generate great wealth evokes sympathy, and it is a not uncommon tale in mining. The historiography of the acquisition of the Blackwater gold mine in the Reefton Gold Field of the South Island of New Zealand follows a similar *leitmotiv*. The extensive literature concerning the history of this mine, which was the second biggest gold producer in New Zealand, is in agreement that the discoverers sold the mine for next to nothing to a speculator because they had no other choice; he then made a huge and unjustified profit in selling it to the biggest mining company on that gold field; and this company’s vendor profit in floating a new company to operate the mine is considered so unremarkable that it is not even commented upon. However, a more critical and rigorous analysis involving the calculation of a DCF Present Value of the mine at each transaction and comparing these values with the considerations paid, leads to a reinterpretation which indicates the opposite conclusion to these generally held views.

The Cornish at Burra

R. Keith Johns

Production of copper from the Burra Burra Mines during the period 1845-1877 was of great importance to the colony of South Australia in its early history, impacting on economic development, migration, roads, railways, ports, foundries, growth of townships which served the mining and related communities, and provision of capital for investment in other enterprises. The most important aspect was the employment afforded to numerous persons of many ranks and skills, since mining, smelting and the associated transport activities were highly labour intensive.

Mining practice was translated directly from Cornwall, and Cornish miners were recruited in large numbers specifically for work at Burra, since development there coincided with the decline of the tin and copper

mines at home. This paper briefly describes discovery and acquisition of the property, the mines, the townships and our Cornish cousins, at home, at work and at play.

‘Not enough to make a kettle’: copper mining at Badger Head 1877-1880

Roger Kellaway

University of Tasmania

Two local prospectors discovered an apparently rich deposit of copper ore in December 1877 near Badger Head on the north coast of Tasmania. In January 1880, work was abandoned and the Tasmanian Copper Company dissolved: its only assets being some office furniture and shafts from which no copper had ever been removed. This insignificant operation gains historical importance from two factors, viz: its ability to retain the enthusiasm of investors for almost two years despite the failure to establish a producing mine and through its contribution to the historical landscape of the Asbestos Range/Narawntapu National Park.

South Australian Investment in the North Queensland Base Metal Industry

Ruth S. Kerr

Queensland Department of Natural Resources and Mines

It is not well known that the North Queensland mining magnate, John Moffat, at the peak of his wealth but in a growing economic depression in 1891, sought to attract South Australian financial investment to his recently discovered Chillagoe copper field. The dabble by the Wallaroo and Moonta Mining and Smelting Company stimulated other southern companies.

Of greater impact on the north was the role of the Stannary Hills Tramway and Tin Mines Company Limited and the John Darling company in the Stannary Hills tramway opened in 1902 to serve an extensive tin field seven miles north of Irvineban. Likewise South Australian investment fostered mining interest in Arnhem Land. This paper examines the South Australian company formation, the role of directors and determination of investment opportunities in the North.

Suicide on the Bendigo Goldfields

Sandra Kippen and James Lerk

As a leading nineteenth century mining community, Bendigo was a scene of great wealth, but not all who came to this thriving town were able to avail themselves of the opportunities it seemed to be offering. Side by side with riches, mining activity helped to create for some a life of sickness, poverty and uncertainty about the future. In doing so, it inadvertently fostered conditions in which the taking of one's own life became a viable option. This paper explores suicides on the Bendigo goldfields as recorded through coronial inquests which were often reported in detail in the newspapers of the day.

Class, hegemony and localism: the Welsh mining communities of Currawang and Frogmore

Barry McGowan

The copper mining towns of Currawang and Frogmore in southern NSW were at their hey day in the 1870s. Though nowhere near the scale of the South Australian copper towns they were regionally very significant, and Currawang for a time was the largest producer of copper in the NSW.

One of the unique aspects, at least for NSW, of both mine communities was the close relationship between management and workers. Labour disputes were all but nonexistent, and management took a close interest in the welfare and well being of the work force and the communities generally. The common thread in both instances was the over arching presence of the Deer family, who were of Welsh extraction. In the case of Currawang there was also a very large proportion of Welsh people in the mine and town.

My paper seeks to look at the relationship between mine management and town from the viewpoint of localism (the elevation of local interest above all others, for instance, class), hegemony (the cultural supremacy of the dominant class) and agency (the exertion of power by the subordinate class). I also discuss the social mores of the communities and how these appeared to change over time and reflect the changing fortunes of the mines.

Hidden copper: The early history of the Cornish, Scottish and Australian (C.S.A.) mine, Cobar NSW

Ken McQueen

The Cornish, Scottish and Australian Mine near Cobar in western NSW had an inauspicious beginning. Thomas O'Brien discovered the gossan in January 1872 and a mineral conditional purchase was taken out by George Gibb (co-discoverer of the Cobar deposit), John Connolly and Bourke businessmen Henry and Richard Nancarrow. A company was floated but despite finding rich specimens, the early miners were unable to locate a payable deposit. Other groups attempted to develop the mine but it was not until 1905 that commercial mineralisation was located by the C.S.A. Development Syndicate under the direction of George Blakemore. This was rich secondary lead ore, and its discovery sparked an exploration boom in the region. C.S.A. Mines Limited was floated in 1906 to develop this discovery. Signs of economic copper were not found until 1910 by which time the various ventures had expended more than £100,000 on exploration and development with no return to shareholders. The early miners had been beaten by the strong near surface leaching and nature of the outcropping lodes.

By 1912, development extended to four levels and good bodies of copper ore had been located east of the old workings. The nearby Cobar Tinto mine was acquired in 1913 and a copper smelter constructed. Copper production steadily increased and in 1916 the estimated resource was 200,000 tons of 5.5% copper. A dramatic rise in copper prices during World War I led to major production and construction of a second larger smelter. Output peaked in 1918 before the collapse of the copper price in 1919. Production continued until 1920 when an underground fire closed the mine. In 1961, the newly established Cobar Mines Pty Ltd decided to reopen the C.S.A. Exploration and deep drilling by Enterprise Exploration in collaboration with the Bureau of Mineral Resources and the NSW Geological Survey had confirmed deeper extension of the mined lodes and located a new copper system. Persistent near mine exploration from the 1960s through to the present has discovered further major blind ore bodies. The C.S.A. is now recognised as the largest copper deposit in the Cobar Basin, containing an estimated 1.6 mt of copper metal. Between 1965 and 1996, the C.S.A. mine contributed more than 50% of the total copper production of NSW.

"Just Now the 'Merican expert is the Prominent Man": American mining engineers and the Australian mining industry, 1880s-1910s

Jeremy Mouat

Chair of Social Sciences & Professor of History, Augustana Campus, University of Alberta, Alberta, Canada

This paper will examine the role of American mining engineers in New South Wales, Western Australia and Victoria in the late nineteenth and early twentieth centuries. Their presence in Australia was less random than that of Americans during the earlier gold rush era, for in most cases these engineers had been recruited to carry out specific duties. The paper will argue that the presence of these individuals in Australia forms part of a broader shift in the mining industry, one that saw larger mines relying to a far greater extent on professional engineers. At the same time, mining engineers began to imagine themselves as members of an epistemic community with a global reach. Most engineers were trained in similar ways, shared a common approach to geological and technological challenges, participated in national engineering societies, and read the same technical journals. The presence of American engineers in Australia was less a reflection of American dominance per se than it was an indication of the mining industry's growing internationalization.

The Federated Engine Drivers' and Firemen's Association in Broken Hill

Bill O'Neil

Former Secretary, Barrier Branch of FEDFA

The Barrier Ranges Engine Drivers and Firemen's Association was registered as a trade union in New South Wales in 1889. When Federation came, the Barrier Engine Drivers were among the founding branches of FEDFA which was formed in Melbourne in 1907, and the seven members of the inaugural executive included three Broken Hill representatives. The move to Commonwealth jurisdiction followed the Harvester case earlier that year, which had established the basic wage. FEDFA initiated a further landmark case against BHP in 1911, in which Justice Higgins upheld the right of a union to take legal action against an employer, thereby establishing an important principle of the arbitration system which dominated Australian industrial relations for the next century.

The paper will describe the role that FEDFA has played in industrial relations at Broken Hill, where two generations of the O'Neil family dominated industrial relations for decades. The timing is appropriate, because FEDFA ceased to exist in January 2006 when its last branch amalgamated with the Construction, Forestry, Mining and Energy Union.

Researching the Adelaide Assay Office – some triumphs and some pitfalls for researchers

Dr Pauline Payne

Professional Historian and Visiting Research Fellow in the School of History and Politics, University of Adelaide

In 1852, the South Australian Government passed the Bullion Act. This act provided for a Gold Escort service and an Assay Office that operated in the basement of Adelaide's Treasury Building, services designed to encourage miners on the Victorian goldfields to send gold back to Adelaide where it could be assayed and sold. Research on the work of Benjamin Babbage and Edward Davy, who worked in the Assay Office, revealed large discrepancies in figures quoted for the amount of gold processed. The answer seemed to be to check the Parliamentary records. Now, parliamentary records contain a treasure trove of information but they are not always easy to use!

While this paper will discuss the challenges facing the researcher, it will also tell the brief but colourful story of the Gold Escort and the Assay Office, and outline the details that are to be found in the Parliamentary records and other sources.

Making Moonta: the Invention of “Australia’s Little Cornwall”

Philip Payton

Professor of Cornish and Australian Studies and Director, Institute of Cornish Studies, University of Exeter

This paper is about Moonta and its special place in the Cornish transnational identity. Today Moonta is a small town on South Australia's northern Yorke Peninsula. Along with the neighbouring townships of Wallaroo and Kadina, it is an agricultural and heritage tourism centre for the surrounding hinterland. In the second half of the nineteenth century, however, Moonta was the centre of a major copper mining industry. Many hundreds of Cornish miners and their families settled there, making the district arguably 'the largest Cornish community beyond Land's End'. There were plenty of other 'Cornish' settlements on the nineteenth-century mining frontier – elsewhere in Australia and overseas in places such as America and South Africa – but from the beginning Moonta cast itself as unique. As this paper seeks to demonstrate, although Moonta had much in common with these other Cornish settlements, it sought early on to distinguish itself as 'Australia's Little Cornwall', founding a myth perpetuated by later writers – popular and academic alike – that remains vibrant today.

Philip Payton obtained his first doctorate from the University of Adelaide for his thesis 'The Cornish in South Australia', and has written widely on Cornish emigration. Recent books include *The Cornish Overseas: A History of Cornwall's Great Emigration* (2nd ed. Cornwall Editions, 2005) and *A.L. Rouse and Cornwall: A Paradoxical Patriot* (University of Exeter Press, 2005).

Pictorial History of WMC

Gilbert Ralph

This brief history of the Western Mining Corporation (WMC) Group from its beginnings in the early 1930s to its demise in 2005 is illustrated with over 100 fast moving photographs and diagrams of its diverse world-wide operations and the people of vision and enterprise who led this once insignificant gold exploration company into a major Australian diversified exploration, mining and mineral processing company.

High-Tech Society

Ian Schomburgk

There is a popular misconception, on which many of us were brought up, believing that the new Province of South Australia was founded as an agricultural society. Most of us at this conference know that mining soon became important. Many know that both industries depended on a very large innovative metal working industry. In turn it provided a platform on which many new industries grew. The net result of these three industries was that within 20 years South Australia can be seen to have become the first integrated high tech society outside Europe.

If one considers the proportion of our population working directly in or directly for these industries one is fairly safe in contending that within the period say 1850-1875 it may well have been THE most highly integrated high tech society. During the following 20 years, three communications-based industries became significant - Randell's paddle steamer and the Murray Darling basin, Todd's international telegraph and education.

These early developments were enhanced by the appointment of some outstanding people to head up government departments and provision of the infrastructure. The claims and the factors underlying these developments will be examined and illustrated with particular reference to the contribution of the mining industry.

The Woolgar's Lost World: A framework of theory and method in an attempt to establish its provenance

Victor J Taylor

School of Archaeology & Anthropology, Australian National University

The remote Woolgar goldfield, first discovered in 1879 covers some 128 square kilometres along the southern edge of the Gregory Ranges, northwest Queensland. Following the 'rush' of 1880, three settlements were established along the banks of the Woolgar River. Two of these settlements became known as Middle Camp and Lower Woolgar and were the main processing centres for the goldfield. Approximately 10 km to the northeast of Lower Woolgar through some difficult country is a hilly area with alluvial workings not featured in the historical record. The area is known today as Lost World and in spite of what seems in places a clear archaeological record, its provenance is confused by conflicting oral histories. This paper is an account of the attempts to establish who worked the slopes of Lost World.

Gardening under difficulties: gardens on inland mining fields, North Queensland

Jan Wegner

As gardening could be considered the art of growing plants that don't belong, most parts of Australia can present difficulties to the gardener. However the mining fields of inland North Queensland were particularly challenging, and most residents simply didn't bother. This paper investigates the reasons why some did, and how they overcame problems such as poor or scarce water supplies, rocky soils, marauding animals, termites, extreme temperatures, and wet season humidity. They were motivated by the need for fresh food, modifying the effects of climate, aesthetics, nostalgia, class expectations and the "civilising" impulse.

A man we know and trust: Thompsons of Castlemaine

Mike Williams

For two generations the Thompson family owned and operated the engineering company of Thompson & Co. Castlemaine in Victoria. Their Australian fortunes were founded on successful gold mining on the Mount Alexander gold field, but the family successfully pursued flour milling before engaging in engineering work until a disastrous excursion into tin dredging equipment in the 1920s terminated their involvement in the company. This paper covers the Thompson family history from first arrival in Victoria in 1851, to 1925 when their association with the company ended. It describes the development of Thompson Co.; how it evolved what were its triumphs and disasters, and how the enterprise formed the basis of the only survivor on its original site of over eighty engineering companies established on the Victorian central goldfields during the nineteenth century.

ELEVENTH AMHA CONFERENCE, ARMIDALE NSW, 2007

ABSTRACTS OF PAPERS

Paul Adams, University of New England

The Holy Day of Football: Radical Organisers and the Strike for the 44-Hour Week, Broken Hill, 1915-1916.

In 1916 the Broken Hill underground workers won a 44-hour week. At the time, the Barrier unionists regarded the result as their crowning achievement, but the strike that produced it has received relatively little historical attention. The industrial battle has tended to be overlooked because it came amidst the turmoil of the most rebellious decade in the great mining camp's history, and it has been overshadowed by the horrific industrial confrontation that ended the decade; the Big Strike from May 1919 to November 1920. This paper looks at the strike for the 44-hour week in the Broken Hill mines. The paper begins by considering events and circumstances that laid the foundations for the dispute and shaped its participants. First of these events is the Great 1909 Lockout, which enhanced the Broken Hill's militant reputation as the Gibraltar of Unionism, and drew young radicals and radical organisations to the town. Also very significant for the strike was the disruption caused by the Great War and the continuing problem of industrial diseases and accidents on the mines. The course of the strike for the 44-hour week is discussed with special attention being paid to the roles played by its highly politicised union organisers. The paper includes consideration of the important, but sometimes exaggerated, part played by the Industrial Workers of the World (IWW).

Dr. Clive Beauchamp, Social Sciences and Liberal Studies, Charles Sturt University

The Dudley Mining Disaster, Newcastle, New South Wales 1898

In March 1898, a violent underground explosion at the Dudley mine resulted in the death of fifteen miners. The paper traces the history of the mine and details its operations. It describes the unsuccessful rescue attempts, the extent of structural damage, the resultant fire and the temporary sealing of the mine.

There is special focus on the Coroner's inquest and on the conclusions and recommendations of the Court of Investigation into the explosion. Evidence given at the investigation (regarding the presence of fire-damp and inadequate reporting practices) is examined. The impact of the disaster is considered, including the introduction of regulations requiring miners to be equipped with safety lamps, together with other safety issues.

Dr. Patrick Bertola Senior Honorary research Fellow) and Dr. Criena Fitzgerald (post Doctoral Fellow), University of Western Australia

Some Aspects of the Sons of Gwalia Workforce

In 1926, after a long period of political debate and discussion, the Collier Labor Government established a survey of all miners by which they sought to determine the extent of TB, silico-TB, silicosis and fibrosis among all WA miners, especially among gold miners. The first X-ray and physical examinations took place in Kalgoorlie during 1926 and subsequently at other mining centres around the State. The examinations in Gwalia of all persons employed at the Sons of Gwalia mine took place during 1927 and the results were noted on cards that also record the results of further examinations.

By way of introduction, this paper provides some background to the decision to implement the examination programme of miners.

The paper then provides some detail from the preliminary analyses of the data collected from the records of those miners; records that not only contain data on their state of health, but also on occupations and workplaces. In particular, the paper provides a descriptive account of the workers at Gwalia, including their ethnic backgrounds, their physical and social characteristics at the time of the examination, their employment in mining and elsewhere, and the migratory patterns they followed in the course of their lives as workers in the mining industry. The paper will also provide some brief comments on the extent and nature of work related ill-health among those workers though these aspects will be more extensively outlined in future reports of our research work.

Dr. Patrick Bertola, Senior Honorary research Fellow, University of Western Australia
Mapping Gwalia (2): 1922/23 to 1964/65

In a paper presented to the Newcastle conference of the AMHA, the researcher outlined some of the findings from a survey and analysis of rates books for the mining settlement at Gwalia between 1922/23 and 1933/34. This paper takes that work through to the time of the closure of the Sons of Gwalia mine under the control of the Bewick, Moreing Company in 1964. In so doing, it extends the survey through the boom period of the 1930s and the War period, and into the period of stagnation and decline that gold mining experienced in the 1950s and 1960s,

The paper demonstrates the continuing importance of the Gwalia centre to the region and graphically illustrates the effect of the closure on the population and local government revenue for the area when the mine closed. It underscores the continuing dominance of the Sons of Gwalia Company in the area and its increasing involvement in the 'town' as it sought to address the problems of labour shortages and a perceived lack of suitable accommodation, especially after World War 2.

Analysis of data on property ownership also provides the basis within the paper for comment on the ethnicity of the population, the shifts from sojourner labour to settlers, the changes in population that accompanied the Second World War, the arrival post WW2 of migrants from regions outside those which had traditionally supplied people to Gwalia (including displaced migrants from eastern Europe), and on the changes that took place in the area during the 1950s and early 1960s as it became increasingly apparent that the end of mining was not long distant.

Prof. David Branagan, School of Geosciences, The University of Sydney
Samuel Stutchbury (1798-1859) on the fringes of New England, 1852-1853

Following the upheaval of the gold discoveries at Ophir, on Summerhill Creek northerly from Orange, which pulled Stutchbury, Government Mineral Surveyor, from his general geological survey, he was able to continue this work, on the lookout for minerals deposits, of course, but more concerned to determine the broad geological structure of the country, which would serve as a more effective basis for determining the best regions for detailed mapping for such deposits. This was a course of action that Government officials did not appreciate. They wanted a tame prospector.

Between April 1852 and December 1853, Stutchbury pressed north to Dubbo, before turning north easterly to the Warrumbungles, Gunnedah, Boggabri, the Nandewars, Narrabri, Bingara, Warialda thence into what was coming to be called Queensland.

Stutchbury's reports presented a great amount of new information, much of it on maps, some on sketches, and he made a considerable collection of rocks, minerals and fossils. His work is receiving increasing recognition today and this paper sets out to highlight the importance of his findings.

Mr. Christopher Carter, Australian National University

Success: The Measure of a Mine?

Success: 1. the favourable or prosperous termination of attempts or endeavours, 2. the gaining of wealth, position or the like. *Macquarie Dictionary*, 1985.

This paper seeks to demonstrate that mining ventures can be deemed ‘successful’ without producing the profits that were often the goal in the first instance. The numerous smaller works that are common throughout the Australian landscape, and rarely mentioned in its history, collectively contributed to economic gains while often providing a livelihood for miners and their families. By using four case studies, each successful in a different way, this paper will argue that the output, profit and return on investment should not be the sole measures of a mine.

Mr. Greg Drew, Senior Geologist, Mineral Resource Group, Primary Industries and Resources SA

South Australia’s new mining boom – is history being repeated?

South Australia’s record breaking mineral exploration activity is translating into a mining boom. Minerals are now South Australia’s largest individual export item for the first time since 1850, earning more than \$1.7 billion in the last financial year. The majority of this comes from the world-class Olympic Dam Mine but there are a number of developing mines. Mining now directly employs more than 10,000 people and it has been predicted to be major driving force in the State’s economy for the next 30-40 years. This is a case of history being repeated as South Australia’s early economic development also relied heavily on the mining industry.

South Australia’s first mining boom began in 1841, with the accidental discovery of silver-lead ore at Glen Osmond on the edge of Adelaide. By 1850, with the mining of copper at Kapunda and Burra, South Australia had become a major mining location, producing 10% of world copper. The mining boom of the 1840s is now recognised as Australia’s earliest mining era – a decade when South Australia processed virtually all of Australia’s metalliferous mines. The discoveries of copper on Yorke Peninsula in the early 1860s brought further economic prosperity which waned after the 1870s.

This early mining boom also had significant impacts on:

- Immigration and in particular skilled miners from Cornwall
- Settlement patterns due to the first major decentralisation away from Adelaide
- Infrastructure especially transport networks.

These impacts are clearly evident today and will be identified in the paper.

Mr. Jim Enever

‘Another Broken Hill’: The Mount Deddick Silver-Lead Field

The Mount Deddick mineral field in far East Gippsland, Victoria was discovered in 1896. Soon after discovery it was being promoted as “another Broken Hill”, promising riches that would help the Victorian economy recover after the crash of the early 1890s. The discovery was made at a critical time when investment in Victorian mining was going through a resurgence after several years in the doldrums while investors concentrated on booms such as Broken Hill and Mount Lyell. The relatively large size of the field, coupled with the timing, meant that it would inevitably attract the interest of promoters and investors. From discovery in 1896 to 1898, the field was strenuously promoted by several members of the Melbourne Stock Exchange, with a large number of satellite properties being floated around the group of leases held by the original Mount Deddick Silver-Lead Co. This activity went on despite the very conservative view of the field’s worth offered

periodically by the Victorian Geological Survey. By the end of 1898, prospecting on the field's multitude of thin elongated lodes had all but ceased and investors had generally 'done their dough'. Rather than proving to be 'another Broken Hill', Mount Deddick had in fact proved to be another Victorian mining bubble.

Dr. Nic Haygarth, Honorary Associate of the School of History and Classics, University of Tasmania

Pen-pushers with pans: 20th century Tasmanian osmiridium mining

In 1914 two million fountain pens were produced world-wide. By tipping the world's biggest osmiridium producer, Russia, into revolution and civil war, World War I (1914-18) gave Tasmania a monopoly on Osprey metal, osmiridium, used almost exclusively for the nibs of gold fountain pens. Since nearly all the metal was recovered from detrital or alluvial deposits in streams, osmiridium fields such as Savage River, south-west of Burnie, and Adamsfield, west of Hobart, remained diggers' fields, not capitalists', worked by individual claim-holders and small parties. Osmiridium buyers took advantage of diggers, physical isolation and their failure to present a united front.

Two-thirds of Tasmanian osmiridium was won at Adamsfield, but perhaps the most interesting developments were on the West Coast. At Bald Hill (now Caudry's Hill), William Caudry tried to extract osmiridium by crushing the host rock, serpentine. At Burnt Spur, a 120-metre diversion tunnel allowed the bed of Savage River to be attacked with pick, shovel or gelignite. Hobart novelist Marie Bjelke Petersen chose Burnt Spur as the setting for her 1923 romance *Jewelled Nights*, the silent movie of which reputedly played to 300,000 Melbournians. The American launch of the ball point pen in 1945 killed the Tasmanian osmiridium industry just as surely as a Hollywood budget killed *Jewelled Nights*, the flawed attempt to launch a Tasmanian movie industry.

Dr. Adrian Hutton, University of Wollongong

Safety in Coal Mines – What drives improvement?

Occupational Health and Safety issues are important in all work place situations in Australia and mines are no exception. A previous study of the statistics at Glen Davis kerosene shale mine indicated that patterns in Occupational Health and Safety practices and policy need a forcing mechanism. In the same study a review of the accidents at one of Australia's earliest 19th kerosene shale (oil shale) operations, Joadja Creek, showed that accidents affected not only the miners and the downstream process workers but the community at large. Things are no different today.

This paper looks at two relatively recent coal mine disasters in New South Wales - the Appin explosion that killed 14 men in 1978 and the Gretley water inrush accident that killed four men in 1996. Although the inquiry reports published after the accidents pointed to a number of poor practices, in both cases the legislation governing coal mines was probably changed as much in response to public opinion and government reaction to adverse findings, as to the need for the introduction of better practices. For one of the case studies the changes introduced appeared to be extremely biased towards some of the participants in the work place. In both cases cited in this presentation, the changes to Occupational Health and Safety policy and practice followed fatalities. Changes in work practices appear to be an inevitable consequence of accidents involving fatalities and more so if high profile publication follows the accident.

Kevin Kakoschke, OAM: President: Radium Hill Historical Assn.

Radium Hill: 'From Bindii to Boom Town'

Modern mining towns don't just happen, they're planned to maximize the natural, physical and aesthetic qualities of a location divorced from the actual mine site. However the joint need for services including the provision of water, power, transportation, accommodation and communication justify their planning, costing and development as an integral part of the overall mining project.

This version of the Radium Hill story will highlight the development of these services and the men, materials and machines brought together to action the plans formulated to create a state of the art mine and town in a harsh desert environment.

Shortage of materials, manpower, and the tyranny of distance in the early 1950's were just some of the obstacles to be overcome. Although Radium Hill was a South Australian Government project, other States, the Commonwealth, British and American governments also provided resources, for example, water from New South Wales and spare Australian Army tank engines to drive electricity generators.

A very astute State Government Premier, Sir Thomas Playford, was fortunate in having a young 'workaholic' Director of Mines, Sir S. Ben Dickenson to recruit and head a team of outstanding 'young Turks' whose specialist knowledge and 'can do' approach ensured the project's success.

Dr. Ruth Kerr, OAM, Department of Natural Resources and Water, Queensland

Aldershot smelters, Queensland

In 1889 an extremely competent north American manager, Ernest A. Weinberg, was appointed to manage the internationally financed Queensland Smelting Company Limited's smelter at Aldershot, on the north coast railway, just west of Maryborough. The smelters were established to treat Queensland's base metal concentrates and gold ores. Primarily they were lead smelters equipped for calcination of lead/silver ores. The smelters pre-date the north Queensland smelter investments except for the short-lived Cloncurry copper smelter in 1884 and the privately owned tin smelter at Irvinebank. The Aldershot smelter was sustained mainly with supply from Ravenswood, but was seldom profitable. The paper explores why the Aldershot smelter was located at Maryborough far away from the mines they were meant to serve and how the works were financed from 1889 to closure in 1906.

Mrs Leonie Knapman

Transport, Mining and the Blue Mountains of NSW.

The Blue Mountains west of Sydney was a major impasse to development of the mountains and the territory to the west. The mountains provided a major obstacle to the early settlers until Blaxland, Wentworth and Lawson conquered the ridges; the mountains were a major obstacle to the development of the western pastures, they were a major obstacle to the development of the western rail system and they were a major obstacle to early shale and coal mining.

The early kerosene shale and coal operations in the Blue Mountains encountered many problems associated with transport, because they were located within deep valleys or in their steep sides and the first problem to solve was how to get the products from the mines to the top of the valleys.

Transporting the products to market then presented obstacles which included distance, cost and efficiency of transport because it was taken across the mountains by bullock and horse drawn wagons until the advent of railway in the middle 1800s. The Railway revolutionised transport, although some areas still could not be reached by rail.

Because of the mountainous area around Glen Davis it was unreachable by rail and to overcome the problem of transport they refined and produced their own petrol on site and then piped it 52 kilometres to Newnes Junction and the main railway line over the mountains to Sydney and other outlets.

This paper will case study some of the early mines and their modes of transport in the Blue Mountains.

Dr. Barry McGowan, ANU

The Legend of Lasseter's Reef – Fact or Fiction?

There is no story of gold-seeking in Australia where myth, legend and gold-seeking are so intricately interwoven as that of the ever elusive Lasseter's Reef - Australia's last El Dorado. The story lines are so blurred that it is hard even today to distinguish fact from fiction. One expedition after another has ventured into one of the most inhospitable regions of Australia - the centre of the continent – dry, dusty and unforgiving. Not a speck of gold has been found but still the mystery persists. In this paper I discuss the background to the ill-fated Lasseter's reef expedition, the making of the legend and the ongoing debate between the true believers and the doubters, including a little known link between the Lasseter story and tales of pirate's gold in Victoria.

Dr. Ken McQueen, REHS, University of Canberra

A thirsty and confusing diggings: the Albert Goldfield, Milparinka-Tibooburra, northwestern NSW

In the late nineteenth century, the Grey Ranges in far northwestern New South Wales were the scene for one of the thirstiest gold rushes in Australia. From 1880 to 1882 a succession of discoveries and rushes established the Albert Goldfield, covering an arid, 80x16km tract extending from Mount Browne to Tibooburra. These alluvial diggings were amongst the last discovered in New South Wales and the first in the arid outback. They were 'poor mans' diggings where individual prospectors or small parties could hope to win payable gold without large amounts of capital for complex plant and equipment. Hopeful miners were attracted from all parts of the colony, as well as other areas of Australia, particularly South Australia. Most of the alluvial gold was found near the surface and mined by 'raking' the shallow gullies overlying the bedrock that formed the isolated ranges. The very low and intermittent rainfall meant that water was often scarce for gold washing and drinking. Much of the gold was extracted by dry blowing. The prospectors were confused by the occurrence of gold in widely scattered patches with no clearly defined leads or deep leads. Early attempts by to find these were unsuccessful or they found deeper wash generally too poor to pay or too hard to easily mine. Some good deep leads were eventually found, but were abandoned due to flooding water and lack of capital. Gold-bearing quartz reefs were also found, but the cost of developing these in this arid and remote region proved too much for the small companies set up. The remoteness of the field created supply problems resulting in periodic famine, illness and death when the teams could not get through due to drought or rare boggy conditions. Despite the difficulties the goldfield gradually developed and by late 1882 four townships were established to service the miners. During the early rushes a floating population of up to 2000 worked the field, but it never proved fabulously rich. Apart from a few small revivals and ongoing fossicking, mining largely petered out by 1896. Total recorded gold production up to 1945 was 63,327 ounces. The Albert Goldfield provided an early model for other goldfields in arid Australia, particularly in Western Australia.

Nina Netherway and Zelda Martin

Art in Mining History Research

The role that art can play in mining history research has often not been well understood. There were many artists portraying life on the Australian goldfields of whom S. T. Gill is perhaps one of the most well known. His sketches and watercolours provide a knowledge of conditions on the early goldfields, and of the methods used in alluvial and deep lead goldmining.

However, there is much to be learnt from the paintings and lithographs of a number of other artists. These will be used to illustrate various aspects of the role that art can play in understanding aspects of mining history such as the essential elements of quartz mining, events associated with mining such as Eureka, mining town development, the degradation of the Australian bush caused by mining, and the appalling conditions under which miners, particularly coal miners, were required to work.

However the major part of the paper will concentrate on an exhibition of oil paintings by Arthur Jenkins entitled *The Art of Gold Mining*. These are on display in the Ballarat Gold Museum (a part of The Sovereign Hills Museums Association). The 47 paintings (most of which are on display) were commissioned by Rio Tinto in the 1980's and feature images of Ballarat and district quartz mines in the nineteenth or early twentieth century. Rio Tinto donated the collection to the Gold Museum late last year. The paintings were based on earlier small sketches and photographs (some of which will be used as illustrations).

Images have been shown to be extremely powerful, and this paper concludes that art has much to offer researchers in mining history.

Prof. David Branagan, School of Geosciences, The University of Sydney

Samuel Stutchbury (1798-1859) on the fringes of New England, 1852-1853

Following the upheaval of the gold discoveries at Ophir, on Summerhill Creek northerly from Orange, which pulled Stutchbury, Government Mineral Surveyor, from his general geological survey, he was able to continue this work, on the lookout for minerals deposits, of course, but more concerned to determine the broad geological structure of the country, which would serve as a more effective basis for determining the best regions for detailed mapping for such deposits. This was a course of action which Government officials did not appreciate. They wanted a tame prospector.

Between April 1852 and December 1853, Stutchbury pressed north to Dubbo, before turning north easterly to the Warrumbungles, Gunnedah, Boggabri, the Nandewars, Narrabri, Bingara, Warialda thence into what was coming to be called Queensland.

Stutchbury's reports presented a great amount of new information, much of it on maps, some on sketches, and he made a considerable collection of rocks, minerals and fossils. His work is receiving increasing recognition today and this paper sets out to highlight the importance of his findings.

Mr. Peter O'Donohue, University of New England (MA student)

Mining the Rocky River Goldfield, NSW, 1850-1900

This paper presents the early results of a study of alluvial goldmining endeavours on the periphery of the Rocky River goldfield (Uralla, NSW) between 1850 and 1900. In particular it examines the construction, use of, and reliance upon, water races for washing and sluicing purposes. The initial impetus for the study comes from a local oral history of 'a Chinese aqueduct built to take water to the goldfield'. The research strategy combines detailed field survey methods with an investigation of primary sources, which include newspapers, maps and historical surveys to question the validity of the oral history statement.

The importance of this study derives from the relatively pristine condition of sections of the material remains of the water race and its associated features. Substantial areas of the main Rocky River goldfields have been subject to intensive agricultural practices since mining ceased and are now threatened by expanding urbanisation. The recording of the alluvial mining area that has remained largely intact since it was abandoned will contribute to our understanding of small-scale, labour-intensive, capital-deficient undertakings of the 19th century.

This study will add to the small corpus of literature relating to the Rocky River goldfield, providing a basis for local heritage recommendations. It will complement Barry McGowan's work on the southern goldfields.

Dr. John S. Ryan, University of New England

Thomas Browne as the Social and Political Historian of 19th century (Australian) Goldmining

T.A. Browne (1826-1915), better known as Rolf Boldrewood, Australian frontiersman and novelist, is rightly renowned for his frontier reportage; the *Guardian* called his *Robbery Under Arms* a tale in which the writer was 'drawing upon his memory rather than his imagination'. Browne, on the pastoral frontier in Western Victoria from 1844, was closely observant of the unsettling impact of the gold discoveries of 1851 on that colony, and himself a police magistrate and mining warden at the rich Gulgong field from 1870, would make much use of his goldfields impressions and experiences in five of his novels, as well as in various essays. The prime example of his recordings was the serial, 'The Miner's Right', appearing from 3 January 1880, with 'the full cast of a mining town ... commissioner, police inspector, bank manager, ... shopkeepers, miners, trouble makers, radicals, criminals'. The plot encompassed dramatic events at Eureka, and presented as contemporary (that is, in 1855) the historical anti-Chinese riots at Lambing Flat of 1861.

In all of Browne's 'goldfield' novels, the starkness of the life, the colourful range of miners, their lifestyle and social life, and the political /demographic implications of the influx and movement of populations, are all subtly treated. Equally vivid is the treatment of the hopeful arrivals from the northern hemisphere, 'adventurers from all lands' and 'armies for Eldorado', yet all so naive and ill-prepared, for they were 'the great Club of the unsuccessful'. Browne's novels also contain numerous passages on the multiracial and egalitarian mass of the miners' society, their relatively orderly behaviour, the technical aspects of extracting gold, and about the deeper meaning of the gold discoveries for the Australian colonies and for their development towards a new nation. For gold would make a 'Freshland', noble, with a vigorous intermingling of the races to produce a 'borderer' mix of the highest physical and mental vigour. This paper will examine Browne/Boldrewood as a commentator on Australian goldmining, and will reveal that in these technical and social matters, he may be deemed an ethnographer of the highest order.

Dr. Jan Wegner, School of Arts and Social Sciences, James Cook University, Cairns

Blowing Things Up: explosives practices on North Queensland goldfields

The use of explosives in mines has attracted historians' attention mainly in the area of workplace safety. There has been less written on everyday practices and the problems associated with the adoption of new types of explosives. This paper examines the kinds of explosives in use in North Queensland gold mines before World War II, firing practices, and the types of ventilation used to clear dust and fumes after firing. It found that the miners were willing to try new explosives but that some problems occurred in the process of changing from one type of explosive to another, creating increased risks, which indicates that safety issues were not caused just by miners' carelessness or owners' callousness. It also found that "natural" ventilation was preferred over mechanical methods on the grounds of cost and ease of maintenance.

Mr. Fred Cahir, School of Business, University of Ballarat

“me no poor blackfellow now, me plenty rich blackfellow”: Aboriginal people and gold mining; what were they doing?

The discovery, but not the acknowledgement in history texts, of new goldfields by Aboriginal people has become a recurrent theme in Australian gold history. Indigenous historian Robyne Bancroft, in her study of the northern NSW goldfields argued that whilst Aboriginal miners and prospectors are included among the pioneers in the newspaper reports of the gold period they ‘did not receive fair treatment regarding their mineral finds’. This inattention by goldfields writers is remarkable considering the score of primary documents (newspapers, poetry, artwork, maps, government records, miner’s letters) which testify to the very active participatory role Indigenous people assumed in the gold mining period. Bancroft concludes that the role of Aboriginal miners has been neglected, and it would be difficult not to agree with her. This inattentiveness to indigenous detail by many historians is puzzling. The documentary record is not reticent in this regard. There is no lack of evidence pointing to the hefty involvement of Aboriginal people on the goldfields of mainland Australia. Yet rarely do Aboriginal people win accolades or even explicit acknowledgement by non-indigenous local historians.

This paper shall demonstrate the at times pivotal role Aboriginal people played in the discovery of new gold fields, with emphasis on south-eastern Australia and their considerable participation as independent gold seekers. Moreover this paper seeks to contribute to the discussion of the level and nature of relationships which were brokered with non-Indigenous miners by briefly surveying the extent of their involvement as miners in foreign lands and interestingly other immigrant Indigenous miners.

FOURTEENTH AMHA CONFERENCE, QUEENSTOWN TAS, 2008

ABSTRACTS OF PAPERS

Was Mt Lyell a better teacher than Oxford?

Richard Allsop,

My PhD on 'The Works of Geoffrey Blainey' is attempting to meet a challenge posed by Graeme Davison in the *Oxford Companion to Australian History*. Davison lamented that existing studies of Blainey's work were 'mostly polemical in approach'. He believed there needed to be 'a more mature assessment' of Blainey's work that would 'illuminate more clearly the personal and ideological dimensions of his maverick career, as well as acknowledging the sustained creativity, intellectual range, pervasive influence, and literary distinction of his writing'.

The view of the academy that Blainey was something of a 'maverick' can be traced all the way back to 1951. That was the year when, if Blainey had followed the conventional approach of first class honours graduates from the History Department of Melbourne University, he would have headed off for further study at Oxford. Instead, Blainey came to Mt Lyell and wrote about a very different topic, and in a very different way, to that which his contemporaries were doing at Oxford.

Blainey's time here, and his subsequent ten years as a freelance historian, largely earning an income from writing commissioned histories, certainly gave him a different perspective on history to other historians of his generation. Crucially, this enabled him to write a different version of Australian history, one that takes account of a range of important factors that other historians have tended to neglect.

Invisible women - Bush Nurses at Adamsfield

Marita Bardenbagen

Research Officer, Heritage Tasmania

Adamsfield is an example of a particular type of experience in mining history. It was an osmiridium mining town, one of the most isolated communities in south-west Tasmania. Memories of the place allow us to reflect on health professional interactions and the role of women as pioneers and health care providers during the first half of the twentieth century. But this history is not available in the voluminous mining reports. Archaeological investigations may be able to locate the remnants of the town now camouflaged by the bush, but oral histories provide the 'flesh on the bones'. By examining the lives of Bush Nurses that were sent to serve in this community we can also catch glimpses of another group that is absent from the records—women that shared the digs with their men. We have no artefacts that tell us of the makeshift tents in the mud and snow. There are no extant buildings that show us the living conditions for families. The Bush has wrapped all evidence into its dense growth. Unlike urban history where artefacts and records still exist, rural and bush environments disappear from the landscape more rapidly. Evanescent mining towns are even more susceptible to losing their sense of place. Some photographs exist but even these can deceive and can contribute to false impressions. The voices of Bush Nurses have been captured in letters held in the DPH and more importantly in oral histories that have recently captured what life was like for women in a harsh male dominated town. The conflict and contradictions between the public record and the recorded voices of Bush Nurses offer another dimension to the history of Adamsfield. How does the historian diffuse and interpret these opposing views? Perhaps these dilemmas in themselves offer another layer of understanding of Adamsfield - a ghost town.

Keynote Paper - Researching Mt. Lyell

Geoffrey Blainey, AC.

From a tent to a modern hospital: the role of mine and community in Queenstown health care

Anne Both

The present day West Coast Health Centre, now funded by both the Tasmanian and Commonwealth Governments, had its genesis in 1895 under the joint auspices of the Mt Lyell Co and the mining community. The Mt Lyell Co and the growing population of the district perceived the need for “the formation of a fund or society of some kind for the immediate assistance, surgically etc. of the many residents of the district ...”. The District Accident Society was formed, and the resident engineer of the Mt Lyell Co was asked to deduct subscriptions from mine employees’ pay. As the town and workforce grew so did the Society (later the Queenstown Medical Union). The community began to raise funds and the Tasmanian Government was petitioned for assistance to build a hospital to serve the district needs. With the continued growth of Queenstown, and the decline of the townships of Zeehan and Strahan, the hospital became the chief medical facility for the west coast. Although the nature of the modern Health Centre differs somewhat from that of the original hospital, it continues to serve Queenstown, Zeehan, Strahan and district. The paper explores the genesis of the hospital, the changing roles of the Mt Lyell Co and the community in its first fifty years.

Gilles v. the Glen Osmond Union Mining Company

Ross A. Both

Adelaide University

The Glen Osmond Mine was one of a group of silver-lead mines that commenced operations in the early 1840s in the foothills of the Mount Lofty Ranges near Adelaide. These were Australia’s first metalliferous mines and represented the start of South Australia’s first mining boom. The Glen Osmond Mine was located on property belonging to Osmond Gilles, the first Colonial Treasurer of South Australia. Osmond Gilles’ brother Lewis came from Tasmania to direct operations. Lewis subsequently purchased the lease of the mine from Osmond and went to London to form the Glen Osmond Union Mining Company. He was appointed General Superintendent of the mine and, following his return to Adelaide, the company commenced its operations in December 1846. Work was suspended in January 1849 when a writ was issued by the Supreme Court of South Australia on behalf of Osmond Gilles, seeking to have the company ejected from the lease on the ground of non-payment of royalties. Osmond Gilles was unsuccessful and operations were recommenced and continued until closure of the mine in 1851. This paper will review the reasons behind, and the outcome of, the court case and the role of the personalities involved in the dispute, particularly the Gilles brothers.

The Oldest Marble Quarry in Australia

David Branagan

School of Geosciences, University of Sydney

In the second volume of Thomas Mitchell’s *Three Expeditions into the interior of Australia ...* (1838) he devoted a sentence or two to a visit he made to an interesting **site**, not far from his Great Southern Road:

Near the Wollondilly, and a few miles from Towrang, a quarry of crystalline variegated marble has been recently wrought to a considerable extent, and marble chimney-pieces,

tables etc. now ornament most good houses in Sydney. This marble occurs in blocks over greenstones and has hitherto been found only on that spot.

The marble was apparently first located by an early settler, Peter Stuckey, who established the property, *Longreach*, on the bank of the Wollondilly River in the 1820s, near where the quarry occurs. Stuckey made the original development, but apparently found the operation too difficult, and passed it on to the government.

The site was visited in the 1840s by the geologist, the Rev. W.B. Clarke who saw that the altered limestone was fossiliferous, despite previous comments that it did not contain fossils. Several specimens of the 'prepared' marble were taken to England by a Captain Baker and presented to the Rotunda Museum, Scarborough.

The quarrying for marble only lasted a few years and was replaced by an operation using the material for lime. This activity also faded out when larger sources were located. However the site is still accessible and some evidence of the site's two lives as a mining centre can still be studied.

Routes to the West Coast

Peter Brown

The end of the 19th century saw a strong interest in linking the rising fortunes of the new mines of Western Tasmania with the commercial centres of Launceston and Hobart. The tumult of the various railway routes has been well documented as the 'Railway Wars' but the poor cousin of these grand schemes was the overland tracks.

Rough pioneering tracks had been cut into this country from the 1850s, which led to the spate of mineral discoveries at Zeehan, Rosebery, Queenstown and other smaller fields. In the time of the Railway Wars, a series of substantial tracks were proposed between Central and Western Tasmania. Possibly as part of the overall hysteria of the Railway Wars, the public interest in these tracks was intense, but of all the proposals only a few of these routes were cut by the Public Works Department. These were the Linda Track from Marlborough, near Lake St Clair, to Linda, near Queenstown; the Mole Creek Track from Liena near Mole Creek to Rosebery and; the South Gordon Track from Tyenna to the Gordon River. The stories of these tracks have been obscured by the more sensational railway proposals and the work of the track cutters has been almost entirely forgotten.

The main aim of this talk is to examine the success, or otherwise, of these tracks, the art of their construction and the life of track cutters, using the Mole Creek Track as the main example.

The Mt Lyell mine - Challenges of operating a large mine in a heritage environment.

Geoff Cordery

Environmental Manager, Copper Mines of Tasmania

Mt Lyell has a rich mining and cultural heritage and has been the stage for many "firsts" in the mining and metallurgical fields. This has created a diverse and abundant catalogue of heritage features and stories that now provides challenges to the historian, conservator, mine operator, environmentalist and legislator. Along with the rich mining and industrial heritage, there is a wealth of European cultural, Aboriginal, geo and natural heritage. Copper Mines of Tasmania is working to achieve a realistic and sustainable environment where heritage can be conserved and balanced with the needs of production, community growth, environmental protection and public safety, though this has its challenges.

Heritage features and historic documents are plentiful, relatively well preserved, maintained and documented. The mid 1990's saw a detailed heritage inventory compiled that was the basis for a heritage management plan for the site. Heritage on site is protected by legislation

and specific conditions on land use. Our most significant challenge is the scale of the site which is still operational. Should the mine cease production the formal closure plan allows for the conservation of heritage together with potential future mineral, tourism and other land uses.

Awareness and competing perceptions are challenges and effort has to be made to protect documents, retain the integrity of the cultural landscape, but also ensure that a balance exists between conservation and problems associated with health and safety issues. One recent problem has been associated with storage of information, with some digital records from the 1970's to 1990's no longer useable due to changes in computer technology. With a commitment to responsible conservation, Copper Mines of Tasmania has a heritage management plan in preparation to ensure a sustainable environment where heritage can be conserved and balanced with the needs of production, community growth, environmental protection and public safety.

Mining on the frontier: some comparisons in the working of precious metals at the extremities of English / British rule

Peter Cloughton

Exeter University, UK.

Carlisle in the 12th century or Ophir in the 19th; there were certain similarities in the way that the working of precious metals, silver or gold, was regulated. Significant differences are also apparent, particularly in the way the English Crown chose to react to the discovery of rich metal deposits which could be worked by the small operator. Well-established English practice was apparently ignored in Australia although it had given good service in a similar situation, albeit seven centuries earlier, and continued to be used in modified form up to the present day.

From Blow to go - a geological take on the early days of Mt Lyell

Keith Corbett

Consultant Geologist, Hobart

The early development at Mt Lyell in the 1880's and early 1890's centred around a large outcrop of gossan-like hematite ironstone known as the Iron Blow. Sluicing of nearby creeks produced fine gold which appeared to come from the Blow, but the costly attempts to crush the hard, heavy barite-laced hematite and extract payable gold were a failure, and forced the sale of the works to a Melbourne group, from which followed its development as a highly successful copper mine. Geological studies indicate that the Iron Blow was actually a fossil gossan formed about 500 million years ago, when the original sulfide body was exposed and oxidised at surface, but not completely eroded away. This happened when the mass of softened clay-rich rock, or schist, surrounding the orebodies, collapsed off the scarp of the great fault which cuts the field, and rolled out onto the younger conglomerates accumulating on the downthrown side. The huge slug of schist at North Lyell, surrounded by conglomerate and containing the rich bornite orebodies from the top of the system – the basis for the rival North Lyell Company's short-lived wealth - was also formed at this time.

A younger 'normal' gossan which had formed on the eroded upturned end of the sulfide body now lying beside the Iron Blow – but originally underneath it – also yielded good gold for a short period. The 250m-deep sulfide body, consisting of massive pyrite and chalcopyrite, became the mainstay of the new Mt Lyell Mining and Railway Company, but it was the discovery of an amazing bonanza of silver-rich ore just beneath the Iron Blow hematite which got the company to its feet in the first critical years. This bonanza probably resulted from weathering and supergene enrichment processes acting on the upper part of the original sulfide body, which might well have been mostly lead-zinc sulfide, during this early interval of surface exposure and oxidation of the orebody.

Mining in Western Tasmania - A Brief History of Exploration and Development

Greg Dickens

Mineral Resources Tasmania

Exploration to this mineral-rich region of Tasmania began in 1856, with the discovery of a quartz vein near Mount Arrowsmith, by government surveyor James Calder. 150 years later, mineral discoveries are still being made, leading to the establishment of new mines such as the Avebury Nickel Mine near Zeehan.

Exploration carried out over the past 50 years has not only supported existing mining operations but has contributed to the successful reopening of some abandoned mines. The continued development of Western Tasmania's mining fields presently generates around 80 per cent of the state's mineral wealth.

This paper, not only briefly traces the history of the major mining fields and its supporting communities, but provides a background story for the Conference.

Pugholes and Brickworks of Adelaide's Western Suburbs

Greg Drew

PIRSA

Due to the absence of timber suitable for building purposes, brick making commenced in SA soon after the establishment of the colony in 1836. Hand-moulded primitive bricks were first made using red alluvial clay from the banks of the River Torrens through the parklands. After the banning of this activity in 1840, brickmaking moved to the low-lying area west of Adelaide including Brompton, Torrensville and Beverley, which became the major brickmaking region of South Australia. For more than 100 years the history of the Brompton, Torrensville and Beverley areas was the story of pugholes – digging them out and filling them in.

This area is underlain by red alluvial clay which is up to 100 metres thick and ideal for brickmaking. The clay was worked by hand from pits or pugholes to natural water level that averaged about eight metres in depth. Clay was shovelled into trucks and hauled up incline railways to the adjacent brickmaking plants. Brickmaking in the area began as a backyard industry and it was not until the early 1900s that the larger clay workings were developed. The industry was at its peak in the 1920s when about 30 individual brickworks contained four large Hoffmann kilns and up to 100 smaller kilns, and employed 100s of workers.

By the 1960s, the traditional clay sources in the western suburbs were nearing exhaustion. This combined with the pressure from urban development and the preference for lighter coloured bricks, forced producers to develop new plants on clay deposits at Golden Grove. The last pughole closed in the late 1970s and most were subsequently filled with building and industrial waste and used for sporting activities or light industry. More recently, urban renewal projects have seen some contaminated sites excavated and refilled for housing. All that remains of a once significant brick manufacturing industry is the Hoffmann kiln in the Brickworks complex and four small kilns at Beverly. It is hoped that these kilns can be used to tell the story of the district's first manufacturing industry.

Jim Enever

'Not for Want of trying': The history of the Coopers Creek Copper Mine, Victoria

The first significant discovery of copper ore in Victoria was made during 1864 at the junction of Coopers Creek with the Thomson River near Walhalla in North Central Gippsland. During the years from 1866 to 1880, two main companies and a number of tributaries attempted to make a go of what turned out to be a small but rich copper deposit located in rugged terrain on the southern flank of the Australian Alps. The driving force was provided by a number of local

mining promoters, versed in the art of quartz mining for gold, but not base metal mining and smelting, for which there was no real precedent in Victoria at that time.

A feature of these years was the stream of imported managers engaged to provide the technical know how needed. Many of these came with a background honed by their involvement with copper mining in South Australia. Their attempts to translate experiences gained in more established mining centers to the isolated and testing environment of Coopers Creek generally proved disappointing.

The story of Coopers Creek in the 1860s and 1870s is dominated by the struggle to introduce smelting based on the use of local timber as fuel, timber that was invariably wet, and the high cost of transport for materials coming in and product going out. Although modest operating profits were made over limited periods, none of the operators was able to claim a viable enterprise when repayment of capital was taken into account.

Getting lost in the Myths: Blue Tier mining history at risk

Jo Field

Tasmanian Department of Environment

The significance of the Blue Tier in Tasmania's northeast is its rich tin mining history, dating from 1873. By 1878 the township of Blue Tier junction had three hotels, shops, stores and a small cluster of cottages. While the main period of tin production in the Blue Tier was between 1875 and 1913 prospecting has continued until recently. The Blue Tier is littered with the physical remains of the mining era, from large open cut faces to mining machinery, and even remains of prospectors' picks. Although mining and prospecting has had a very large effect on the landscape of the Blue Tier plateau, certain mining exploration marks have become the centre of a controversy.

Over the last 90 years reported observations of surface markings on tin granite boulders, at numerous locations on the plateau, have raised speculation to their origin. Some researchers have attributed the markings to Tasmanian Aborigines. An early investigation to determine these markings' identity by a multidisciplinary team in 1957 concluded they were a combination of natural weathering processes and mining exploration sampling. Another investigation in 2007 claimed the markings were examples of Tasmanian Aboriginal rock art, dating back 1,000 years. We have re-examined the evidence from earlier investigations and undertaken additional research in order to clarify the origin of these intriguing markings and to clarify for what purpose (if any) they were made. The results of these investigations are presented. The resolution of this issue is of great relevance to the correct historical interpretation of this iconic area.

Convicts and Salt Water River Coalmine Research Project

Wendy Fowler

Initially the Coal Mines Research Project began with the hypothesis that there must have been a high level of skills amongst the original convicts and their military supervision at the Salt Water River site, Tasmania. A careful examination of convict records and technical reports indicated that this was not the case. Further it is clear that the decision makers within the colonial government had several agendas. The author's research compares the skill level of the convict miner workers with the general convict population and explores dependence upon a small number of key operatives in Tasmania's first mining operation. The research focuses on the period 1833 to 1847, at which time the mine was leased to a private operator. In particular focus will be on the men who worked the coal seam rather than the technical details of the mine engineering.

'A carter, a businessman, and a prospector with several things in common'

Philip Hart

University of Waikato

In the 1880s, Alexander Jackson was a carter and William La Grenade Mitchell was a businessman with a variety of ways of making money. In the twentieth century, Edward Ralph Martin was a 'professor' of music and an enthusiastic prospector for gold and oil in several areas of New Zealand. All three men had a slight involvement in gold mining in the Te Aroha district, but as well had three other, surprising, features in common, as this paper will explain.

Richard G. Hartley

Sons of Gwalia gold mine: reasons for operational longevity

The Sons of Gwalia gold mine near Leonora was the biggest gold producer in the state outside Kalgoorlie and was also the longest operational mine (1898-1963). It was British owned and managed but its management by Bewick Moreing, a company which in the early 1900s was one of the most powerful organisations on the Western Australian goldfields in its later years was somewhat of an anachronism. The paper argues that the mine's long term operation from as early as 1912 was largely dependant on local innovations and Government assistance rather than British capital and international technology. The company at the peak of its influence in 1904 managed nearly twenty mines. This was in contrast to the majority of British companies in the state, which were almost all single mine companies, a factor which adversely affected management mobility. Bewick Moreing's three main northern mines – the Sons of Gwalia, Great Fingall Consolidated and Yuanmi GM - had a common scarcity of fresh water and fuel, which encouraged the search for alternative power sources. Shortages of processing chemicals during the First World War also stimulated innovations in gold precipitation techniques. Consequently these isolated mines became world leaders in producer gas power generation and gold processing and during the downturn in mining during the 1920s as the industry steadily shrank the Sons of Gwalia, the last of the three mines was able to attract government finance for much needed development work.

Chasing a shadow? T.B. Moore, Robert Sticht and the Balfour copper boom

Nic Haygarth

Research Associate, University of Tasmania

TB Moore, the prospector who was outpegged at the Mount Lyell Iron Blow, wins the prize for Tasmanian mining lore's greatest 'one-that-got-away' story. He gained nothing from Australia's last colonial mining bonanza, the Mount Lyell copper boom. Moore's post-Iron Blow career was not spent in the boardroom or the boudoir, but 'on the wallaby' in bush camps. For the last 15 years of his life he was a waged employee, effectively of the Mount Lyell Mining Company, whose birthright apparently once lay at his feet. The focus of this work from 1907 to 1911 was prospecting and mining in the 1,000 square kilometres of coastal plains and ranges which came to be known as the Mount Balfour mining field. The interest of Mount Lyell general manager Robert Sticht and a Melbourne land grab sparked a Balfour copper speculation boom of more than 300 mining leases, most of them still virginal today. Sticht's fortunes were perhaps just as ironic as Moore's. One of the architects of Tasmania's greatest mining boom also directed its greatest fizzer, squandering much of his own wealth in the process.

Bulli and Appin Mine Disasters – Who Was To Blame?

Adrian Hutton

The Bulli seam was one of the first seams mined in New South Wales and continues to be mined today. The seam has a long history of gas outbursts and explosions with two notable accidents being on 25 March 1887 in Bulli mine when 85 men were killed by an explosion and the other, a massive fire 31 July 1902 which killed 96 miners, some of them boys, in the Mt Kembla mine, only 20 kilometres south of the Bulli mine fire. Although less catastrophic with respect to fatalities, two other significant mine accidents occurred at Bulli Colliery in 1965 and Appin Colliery in 1979. Both these so-called accidents were followed by judicial inquiries.

The fire at Bulli Colliery on 9 November 1965 resulted in the death of four of the 11-man crew near where the fire occurred. Two subsequent inquiries disagreed as to the cause of the accidents. On 24 July 1979 fourteen men were killed when a large explosion hit the underground workings in the Appin Colliery. The inquiry following the disaster was critical of Appin mine operations, the performance of some mine employers and officers of the Department of Mines at the inquiry

This paper will look at the published information following the Bulli and Appin accidents, especially the causes and the consequences that followed.

"That some rich lode amongst these hills is waiting for us yet"

Tim Jetson

Education Faculty University of Tasmania, Hobart

This paper outlines the development of mining at the Barn Bluff and Pelion mining fields, located in what is now the Cradle Mt-Lake St Clair National Park. Phases of mining, from the early 1890s until the end of World War II, are delineated and analysed. Reasons for the demise of the fields, including the area becoming a Scenic Reserve, are suggested. Key figures, such as prospectors, mine managers, speculators and politicians, associated with the mines are identified and details of mining operations are provided. Finally tentative conclusions are drawn about mining's environmental impact and its significance in the history of the National Park.

New Zealanders and the Zeehan Silverfield 1891-1895

Roger Kellaway

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In 1891, 1,222 persons arrived in Tasmania direct from New Zealand. This was more than three times the annual average of the preceding decade. In 1892, departures to New Zealand were equally abnormal. The most obvious explanation for this unusual pattern involved the activities of T.A. Reynolds and Company. Loosely associated with the Union Steam Ship Company, Reynolds and Co. had the contact to build the Strahan to Zeehan Railway. Unable to secure sufficient workers locally, they recruited large numbers of labourers in Dunedin. The completion of the railway, the difficult natural environment and the temporary collapse of the silver boom following the failure of the Bank of Van Diemen's Land saw many of the navvies return to New Zealand on the expiry of their contract.

The railway project by itself cannot explain the large number of New Zealanders coming to Tasmania in the early 1890s. The Zeehan silverfield offered other attractions, especially for residents of declining mining regions in New Zealand. Miners, mine managers, share brokers, storekeepers and others left stagnant townships throughout Central Otago and the Thames to seek their fortune on Tasmania's West Coast. This study examines the importance of Zeehan as a magnet for New Zealanders by measuring its impact on the scale of inter-colonial migration. The paper also considers the information flows in the New Zealand press that provided the

stimulus for emigration despite the majority of reports being negative. Some attention will be placed on the wider significance of the influx of a skilled mining population into a largely non-mining colony.

Recap Mines and Tramway on the Chillagoe Field - its connection to southern Australia and Queensland politicians 1890 to 1920s

Ruth Kerr, OAM.

Department of Natural Resources and Water, Queensland

Redcap mines and tramway are significant for their critical role in the development of the Chillagoe field and as a precursor to the formation of the Chillagoe Company Pty Ltd and construction of the Chillagoe smelters. The mines were opened in 1890 and a battle with influential southern mining directors was fought in the local court over ownership, and the tramway was built in 1901 with steel rails, which were rare in Queensland. The resources and the tramway also figured in the Mungana Scandal in the 1920s and tramway rails were used as uprights in the Palace Hotel in Cairns.

Weather versus Glen Davis

Leonie Knapman

When settlers arrived in Sydney over 200 years ago they did what man had done down through the ages and that was to build along river flats, and so it was when Glen Davis was built along the Capertee River in 1938. *'Floods, what floods'* was the question as residents arrived to build a new industry and township along the river that had had no water in it for years. Glen Davis had a temperate climate, but the Australian weather can often be unkind but also bounteous. This paper will cover the 14 years of problems that beset Davis from droughts and lack of water to the 29 floods that destroyed homes and damaged the work site many times.

Booms, busts and the environment: the life and times of the base metal mining community of Captains Flat

Barry McGowan

Australian National University

Captains Flat is located in the southern tablelands NSW about 40 minutes south of Canberra. Its environment and circumstances have many similarities with Queenstown. Gold was found along the Molonglo River and worked for many years on a small scale. In the early 1880s reef gold was found in the hilly country upstream, now the site of Captains Flat. By 1885 the gold bearing ore was found to have a very high silver content. For the next 6 years the Flat was a silver producer, until low silver prices and inappropriate treatment methods led to the closure of the mines, and a focus on copper extraction. Higher copper prices in the mid-1890s encouraged large-scale capital investment based on the pyritic smelting process as at Queenstown. Falling copper prices led to the closure of the works in the late 1890s.

Captains Flat lay dormant until the mid-1930s, when rising metal prices and the availability of the flotation process encouraged large scale investment. Lead was one of the main products. Throughout the 40s and 50s the town again enjoyed boom conditions, until falling reserves caused the closure of the mines in 1962. Captains Flat survives today as a feeder town for Queanbeyan and Canberra. Locally it is most remembered for its environmental legacy. Defoliation and deforestation in the 1880s and 1890s were bad enough but in the 1940s the slime dams collapsed into the Molonglo River, leading to wholesale destruction of arable farm land. Reclamation and rehabilitation work is ongoing.

Quidong Mineral Field, NSW: An intriguing discovery of W.B. Clarke

Ken McQueen

University of Canberra

In 1851-1852 the Reverend W.B. Clarke, Australia's first geologist, discovered copper at Quidong in the Bombala area of southern New South Wales. Clarke focussed on gold and at panned colours of the metal from detritus trapped in cavities in a limestone outcrop on the edge of the Delegate River at Quidong. Observing nearby veins of copper carbonates he predicted a major mineral field would develop in the vicinity and in 1864 the Quidong Copper Mining Company commenced operations. It produced several hundred tons of copper ore but expended all its capital before a profitable mine could be established. In 1868 the Belmore Freehold Silver and Lead Mining Company took over the Quidong deposits and purchase an additional 100 acres it considered prospective for lead and silver. Crushing equipment and a smelter were erected but there is no record of production and the site was abandoned by the early 1870s.

The area continued to attract interest and in 1955-56 Lake George Mines Pty Ltd. investigated the Quidong Basin for base metal deposits but major problems were encountered in drilling the cavernous and fractured ground. During 1969-1970 Cyprus Mines Corporation in joint venture with Hastings Exploration N.L. and Esso Australia Ltd explored the basin using improved techniques but despite encouraging signs no economic mineralisation was discovered. From 1978 to 1983 Western Mining discovered ore-grade intersections at Clarke's Reef but without sufficient continuity. Further exploration by Plagolmin Pty Ltd and Delta Gold NL from 1987 to 1995 revealed zones of gold mineralisation but with no resulting mine. A new company, Stirling Minerals Ltd, has recently taken over the tenements and completed a detailed airborne magnetic and radiometric survey to identify possible drilling targets. After 156 years the jury is still out on Clarke's prediction.

History of the Discovery of Gold and Iron Ore and the Development of the Magnetite deposits at Savage River, NW Tasmania, from 1877 through to the 21st Century.

Donald J. Perkin

In 1877 Government surveyor and geologist Charles Sprent became the first European to discover the huge magnetite deposits that were cut by the Savage River in this remote part of Western Tasmania. In this expedition Sprent also discovered alluvial and lode gold and other minerals.

In the following 30 years further exploration was undertaken by other hardy government geological surveyors across the highly mineralised area known as the Pieman River Goldfield. This opened up the country for prospectors and developers and led to the publication of the Iron Ore Deposits of Tasmania in 1919.

During the Depression of the 1930s only some desultory gold prospecting was noted in the Pieman River goldfield and Savage River area although a Government report (Finucane, 1933) detailed new insights into the geology of the area. However it also suggested that most of the alluvial gold at Savage River had already been worked out and that there was little to be gained in enduring the rigours of further prospecting in this remote locality.

In the late 1930s it was estimated that the iron ore resources of the Savage River area totalled over 20 million tonnes of potentially high-grade ore (Rio Tinto), but that this would still be uneconomic because of its remoteness and other reasons.

The post-war period from 1948 to 1960, saw demand and prices for commodities rise strongly in concert with technological advances for discovering and exploiting minerals. Federal and State Government aid including subsidised exploration drilling, and the development of a robust tenure system for mining title propelled the economy into five or six successive economic booms. The Savage River iron ore project is a reasonably good paradigm, which exemplifies the

first of these booms. This development saw a coming-together of Australian entrepreneurs and overseas management, which with government cooperation led to the successful exploitation of low-grade ores.

The above aspects of the burgeoning Savage River Project that was begun in 1964/1965 are just some of the subjects that will be touched upon and illustrated in this paper.

Tragedy at the Mt Lyell Mine, 1912

Peter Schulze

J.P., Fellow: Institution of Engineers Australia and of the Institute of Mining and Metallurgy.

The Mount Lyell Copper Mine at Queenstown in Tasmania has been operating since the 1880's. The most tragic event in its history occurred on Sat 12th Oct 1912. At 8.00am, 170 men went down into the North Lyell Mine. At 11am a fire started at the 700m pump station. About 78 men were able to get out that day before the smoke intensified. Early Sunday morning 92 men were not accounted for. Attempts were made to rescue them on Sunday, Monday and Tuesday. On the Wednesday, after 109 hours underground, and most of that time without food, 54 were rescued. The total number of lives lost was 42 - more than at Port Arthur in 1996. Twenty widows and 35 orphans were left as a result of the disaster. There are many stories of great sadness, many tales of great courage and many great acts of bravery associated with the tragedy. There were also many lessons learnt about mine safety.

A Royal Commission was established and the Company brought five 'expert witnesses from 'away'. Much of their evidence was faulty, yet given high regard by the Commission. On the other hand, evidence given by experienced Company employees was generally discredited.

My assessment of the Royal Commission transcripts (recently typed up and published) conclude that the Commission's findings were faulty and that the most likely cause of the fire was from an electrical fault.

Millie's Story: Women, Domesticity and Commerce in Gwalia and Leonora

Pam Sharp

History & Classics, University of Tasmania

This paper draws on evidence (mainly oral history) collected for our ARC Linkage Project (Bertola, Fitzgerald, Layman, Sharpe) about the history of the mining communities of Leonora and Gwalia. By focusing on one woman, (Milka Rodonovich born in Dalmatia in 1891), we can take a detailed look at women's employment and social and economic position in a remote mining town in Western Australia. Millie's story includes her emigration; her work running boarding houses and sly grog operations; the laundry trade and provision of food as well as economic aspects of family and household management. We also learn about religion, educational, social life and race relations through the story of this and similar families who lived in these remote communities.

Mining Lower Grade Ore Through Changes in Mining Technology at The Mount Lyell Mining and Railway Company, Queenstown, Tasmania from 1931 to 1938

Tony Weston

The Mount Lyell mining and smelting operation at Queenstown in Tasmania was established in the early twentieth century. It was based on a high grade copper resource, following earlier separate mining developments, and mainly used underground mining. The development of a larger low grade resource in the period 1931 to 1938 was primarily driven by changes to the underground mining technologies employed, followed by large scale open pit mining. The topography at Mount Lyell had allowed the prior development of a 100,000 tons per year low

level rail haulage tunnel capable of expansion to much higher capacity. This was at the time when a low-grade pyrite hosted copper resource was being recognised as an alternative ore resource through the application of new, lower cost underground mining technologies. The new underground mining technologies were however unable to produce copper from the low-grade resource at an acceptable cost, and open cut mining was initially developed with a variety of small scale excavation, loading and transport methods. Larger scale drilling and blasting, shovel loading and truck haulage to an ore pass were subsequently used, accompanied by rapidly decreasing mining unit costs. By 1938 Mount Lyell had the highest annual ore production of any mine in Australia, producing more than a million tons of ore each year.

FINE or FORGED: Precious Metal Assay Through the Ages

Nicola Williams

Monash University

The purity, or fineness, of a specimen of precious metal has been important ever since coinage was invented near the end of the seventh century BCE, when forgers saw a golden opportunity for quick profits. Miners, jewellers, mints and banks have been concerned with fineness ever since, and various assay methods have been developed. While some modern spectroscopic techniques are becoming important, the ancient method of fire assay remains the most accurate, and is still the standard for comparison.

This paper describes and compares assay methods, particularly in relation to gold and silver, and the role of accurate weighing in fire assay.

FIFTEENTH AMHA CONFERENCE, LITHGOW NSW, 2009

ABSTRACTS OF PAPERS

Double Disaster: Lithgow Valley Colliery, Lithgow, NSW, 1886

Adjunct Assoc. Prof. Clive Beauchamp
Charles Sturt University, Bathurst

In 1886, there were two separate accidents at the Lithgow Valley Colliery resulting in the death of eight miners in total. The disasters were the most serious mining accidents ever experienced in the Western Coalfield of New South Wales. The first accident on 13-14 February 1886 (stemming from an underground fire) left three men dead whereas the second on 19 April (attributed to a 'wind blast') resulted in five fatalities. The paper traces the background to the disasters including a brief history of the Lithgow Valley Colliery Company; its management and early operations. It also considers the critical events that led directly to the disasters. Evidence submitted at the Coroner's Inquests is outlined and its findings detailed. There is special focus on the proceedings, conclusions and recommendations of the Royal Commission of Inquiry. This includes examination of the conflicting evidence and theories presented, together with the Commission's censure of the management on account of 'unsafe working practices'.

Britain's Coal Export Trade, 1902-1915: Evidence from Edward Bates & Sons

Prof. Gordon Boyce
University of Newcastle

This paper considers new evidence relevant to the debate regarding the importance of British coal export to the nation's shipping industry in the pre-World War era. Contemporary observers thought that outbound coal shipments were vital in establishing and maintaining the nation's leading position in shipping. Craig suggested that 'Britain's unique endowment of high quality steam coal was to become the most potent agent of Britain's supremacy in tramp steamships'. According to Buxton and Palmer coal exports (22 million tons in 1886 and 73 million tons in 1913) helped establish Britain's lead in the tramping sector. Palmer also found that Britain retained a tight grip on non-European trades characterised by high value imports and low value coal exports.

In contrast, C. Knick Harley used quantitative data to show that coal exports did not enhance the profitability of British shipping because these outward shipments caused homebound freight rates to fall. By comparing changes in market share, he inferred that coal exports did not contribute to the competitiveness and efficiency of the British fleet. However, Harley's interpretation is based on aggregate data complemented by 'snap-shot' analyses of isolated two-way, outbound and inbound voyages conducted after 1890. The present study uses uninterrupted time series evidence drawn from voyage accounts to develop a dynamic view of one company's operations, which also included cross-trading and multilateral voyages, within the context of later changes in the structure of the coal export business.

The Open Cut Era (late 1940s – mid 1960s) in the Western Coalfield of New South Wales

Prof. David Branagan
School of Geosciences, University of Sydney

Production of coal from the western side of the Blue Mountains began in the 1850s from a series of small underground mines in the vicinity of Lithgow. Coal production was quickly overtaken by interest in oil shale production at a number of sites from Hartley to Genowlan some km to the north, production beginning in 1866. Understanding of the geology of the region came through the detailed mapping by J.E. Carne and his assistants, presented in his two classic works: *Geology and Mineralogy of the Western Coalfield* (1908) & *Kerosene Shale Deposits of New South Wales* (1903).

Production limped along during the interwar years, but in the immediate post-war years increased call for energy supplies suggested the possible open-cut mining of coal in the Western Coalfield, following its successful introduction in the Northern Coalfield. Geological plane-table mapping by staff of the NSW

Geological Survey and a large drilling program, under the control of the newly-established Joint Coal Board, indicated a number of localities suitable for open-cutting. However the logistics of getting suitable mining equipment (large shovels and draglines) took some solving as they could only be brought by road from the coast, and the Great Western Highway was not built for such traffic. Open cut mining began in the Blackman's Flat area and extended in time to localities near Lidsdale, a few isolated small workings west of Cullen Bullen and at Ben Bullen. A railway spur line was surveyed in to the Ben Bullen open cut, but the line was not constructed and coal was transported by road. During the initial period of open cut mining little thought was given to conservation matters and it took some time before rehabilitation of the mined areas was undertaken properly.

A major endpoint for the coal was the Wallerawang Power Station constructed in the early 1950s. Much later (1980s) a second power station was constructed near Piper's Flat, but by that time all Western coalfield production (except at Ulan to the far north) was from underground mines. The establishment of vibrant offices of the NSW Mines Dept, Joint Coal Board and a number of private companies saw a re-invigoration of Lithgow and surrounding villages which has largely continued to the present.

“Can do” is still part of the vernacular at Centennial Coal

Alex Brown

Regional Technical Services Manager – West

Centennial coal has substantial historic precedents: among their assets, the Airly and Ivanhoe mine sites were operative in the late 1800s. Mining at Ivanhoe was originally associated with iron ore smelting and then the supply of high quality coal to the nearby Portland Cement Works, relics of which are now heritage listed and historically significant. In the mid 1980s Coal and Allied and R.W Miller, both coal mine operators in the Hunter Valley and Newcastle, merged their operations. In the subsequent re-organisation, one of the mines affected was Preston Extended, located at Curlewis near Gunnedah in northern NSW. In 1989 Bob Cameron, a former employee of Coal and Allied, raised finance to purchase the mine. A private company was formed (Preston Coal Pty Ltd) and the mine purchased. The mine operated successfully until 1999 when it finally closed due to depletion of economically recoverable reserves.

In 1994, Blue Circle Southern Cement Ltd (BCSC), a subsidiary of Boral, placed its Charbon, Ivanhoe and Berrima (Medway) mines on the market. Established to fuel cement kilns and generate power at cement works located at Charbon, Portland and Berrima respectively, the closure of the Charbon and Portland cement works meant the base market was no longer available to two of the mines. Bob Cameron and Preston Coal seized the opportunity and formed Centennial Coal Company Limited (named after the original Centennial, or possibly Centenary Mine established in 1888 at a location within the Preston leasehold), to acquire the BCSC mines. With a market capitalisation of A\$20m in mid 1994, Centennial subsequently acquired interests in many other mining properties. Through recent acquisitions and organic growth Centennial's market capitalisation is now (at the time of writing) in excess of \$1.2bn, or 60 times greater than at public listing in 1994. These early mining operations were established by mining entrepreneurs with a “can do” philosophy, which is still present within the modern day Centennial Coal.

Keynote address The New South Wales Central Tablelands

Ray Christison

President of the City of Greater Lithgow Mining Museum Inc.

The New South Wales Central Tablelands has an important place in Australia's history. In the 19th and 20th centuries the region's natural mineral wealth supported the creation and development of mining and industrial enterprises that have become Australian legends. The great Australian Gold Rush commenced in this region when Edward Hammond Hargreaves discovered alluvial gold in February 1851. Gold is not the region's only mineral resource. From the 1870s Lithgow's coal deposits provided the energy to supply industries processing copper ore, iron ore and fine clays. From the 1860s oil shale was mined and processed at various places in the region. By 1907 William Sandford had created Australia's first integrated iron and steel works in Lithgow. The region continues to support an active mining industry based on coal and gold. The region has an impressive mining heritage. Various aspects of this heritage have been conserved and interpreted at Scenic World Katoomba, Blast Furnace Park Lithgow, Lithgow State Mine Heritage Park, Newnes Oil Shale Works, Glen Davis Oil Shale Works, Bathurst Goldfields, Sofala, Hill End

Historic Site and the Wentworth Gold Mine Lucknow. This address will look at the key developments of the area that have left an indelible mark upon the landscape of Australian mining history.

Lithgow State Coal Mine becomes Tourism attraction for \$1

Ray Christison

President of the City of Greater Lithgow Mining Museum Inc.

Established in 1916, the Lithgow State Coal Mine was New South Wales Government's first venture into coal mining. It produced coal from 1921 until 1964 and was one of the biggest mines on the Western Coalfield. This paper attempts to outline the history of the mine during its 43 year operating life. After its closure the site lay idle for many years until it was sold and then handed over as a museum site for the costly sum of \$1. The site and its railway branch line have been conserved as a mining and industrial museum. With many of the large buildings still intact tourism is bringing the site back to life as visitors and not miners walk around this once important worksite.

The Historic Significance of the Whyalla Blast Furnaces

Greg Drew

2007 marked the centenary of the modern blast furnace in Australia. This paper will briefly outline the history of iron smelting in Australia and consider the historic significance of the blast furnace at Whyalla. The smelting of iron in Australia began in the mid 19th century but none of those early ironworks survived the decade of their birth. In 1907, the first modern blast furnace was blown in near Lithgow. These operations eventually proved to be uneconomic and, in 1928, the industry moved to Port Kembla. BHP established a steelworks at Newcastle in 1915, based on Middleback Ranges iron deposits. That plant closed in 2000 wiping out 2500 jobs and the remaining blast furnaces have been demolished. During the 1930s, BHP assisted by the BHP Indenture Act of 1937, decided to establish steelworks at Whyalla since the site was less vulnerable than Newcastle from a defence point of view. Whyalla No.1 Blast Furnace, the sixth in Australia, began smelting ore in May 1941. No.2 Blast Furnace, commissioned in 1965, is the oldest remaining furnace in Australia.

The paper will explore the management of 20th century historic iron smelting sites in Australia, USA and Europe including:

- Lithgow Blast Furnace Park
- Pittsburgh, Pennsylvania – the *Steelmaking Capital of the World*
- Sloss Furnaces, Birmingham Alabama
- Landscape Park Duisburg Nord, Germany.

This may provide an insight for the Whyalla site when iron smelting eventually ceases.

South Australia's Cornish Mining Heritage in Images

Greg Drew

Photography was introduced to South Australia in the mid 1840s at the time of Australia's first mining era. A few daguerreotypes were taken including one of the Burra Mine but there were few images of people as the process required a lengthy exposure. Fortunately the artist S.T. Gill, who arrived in SA in 1839, captured images of the newly discovered mines at Glen Osmond, Kapunda and Burra. These images were commissioned by the mining companies presumably to promote their activities and along with several other drawings and paintings provide visual evidence of the country's first mining boom.

By the late 1850s, the development of cheaper and easier to manage photographic processes saw the establishment of photographic studios and the first significant photography of South Australian mine sites commenced in the 1860s. The most prominent photographer of mines of this period was Robert Stacy who established a studio in Adelaide but spent most of his time in country SA. He took the first photos of the Moonta and Wallaroo mines in 1865 and was commissioned by Henry Ayres to photograph the Burra Mine in 1866 prior to the commencement of open cut operations. He also photographed gold mining activities in the newly discovered Teetulpa and Wadnaminga Goldfields in the mid 1880s. The most prominent South Australian mining photographer was Matt Mitchell who emigrated from Cornwall as a boy in 1867. He worked as a miner at Wallaroo Mines but his interest was in photography and, in 1890, he was

employed as official photographer by the Wallaroo and Moonta M&S Co. where he remained until closure of the mines in 1923. This paper will use examples of these artists' work to illustrate aspects of Cornish mining heritage.

The Politics of Oil Shale: Government Involvement with the Tasmanian Oil Shale Industry, 1915-1935

Jim Enever

By the 1920s, the oil shale industry in NSW was in decline and focus was shifting to the Tasmanite deposits of the Mersey Valley. These deposits had been known since the mid nineteenth century, but it was not until the early twentieth century that a serious attempt was made to develop them. In the period from around 1915 to 1935, a number of activities were initiated in an attempt to perfect commercial extraction of the valuable products.

A notable feature of this period was the role played by governments, both state and federal. At a state level, government involvement ranged from an attempt to set up a state run enterprise, to the granting of a monopoly to private industry aimed at engineering a critical mass of activity, to sponsoring of an amalgamation of small scale operators to the same end, to the direct funding and co-ordination of research into processing technologies. At the federal level, the period in question coincided with a marked change in policy from active support for the oil shale industry through the agency of a bounty on oil production, to the introduction of a bill to expedite the establishment of a domestic crude oil refining capability in Australia, based on imported crude, and encouragement of exploration for conventional oil within Australia.

By the 1930s, it had become obvious that the Tasmanian oil shale deposits were not going to meet Australia's need for a strategic oil supply, and, in the absence of significant domestic conventional oil discoveries, attention was re-focused on NSW with the establishment of Glen Davis.

Shale and Coal mining in the Blue Mountains of NSW and its development to the tourist infrastructure at Scenic World, Katoomba

Philip Hammon

Owner of Scenic World

Philip Hammon has been associated with the Scenic Railway since birth, probably conceived after a celebratory drink by his father when the lease for the old coal mine was purchased in 1945, and so Philip was born into the business. As a child he played on the 'monkey vines' in the rainforest at the foot of the Scenic Railway, and the mysteries of the many relics upon which he stubbed his toes prompted his curiosity. Today with time to spare, and as his children become more active in the business, he has had time to devote to unearthing, sometimes quite literally, the relics of the 19th century mining infrastructure of the area. This resulted in his 258 page hard covered book *The Burning Mists of Time* released earlier this year. Philip and his publishing partner Phillip Pells have created a successful history that is accurate and informative. The book has several authors who contributed chapters relating to their particular area of expertise.

Utilising information and photographs from the book Philip will detail the development of the coal and shale mining in the Katoomba area, the highs and lows, both mechanically and economically. He will also look at the mechanical details of operating the aerial ropeways, overrope tramways and dual inclines, powered by steam engines. Philip will then leap into the 20th Century and briefly go through the development of the abandoned coal mine and its journey through time to its present day configuration as a world renowned Tourist Attraction.

Joseph Harris Smallman: a Prospector who became a Pakeha Maori

Dr. Philip Hart

University of Waikato

English-born Joseph Harris Smallman spent some time on the alluvial goldfields of Australia before moving to New Zealand. In 1867, with another miner he was employed by a Maori chief to prospect for gold on his land, part of the future Thames goldfield. This chief saw the economic advantages of opening his land to mining; other chiefs did not, and the prospecting caused much controversy amongst Maori. When their prospecting found evidence of gold, which they wrongly hoped would be alluvial, the field was declared

open by the government. Smallman mined on this and other goldfields on the Hauraki Peninsula for several years before settling down with his family on a farm on Maori land near Te Aroha, where he became what was known as a Pakeha Maori.

**Observation and the amateur geologist: the success of ‘self-culture’ in
Thomas Hainsworth’s exploration of the Mersey-Don Coalfield, Tasmania**

Dr. Nic Haygarth
University of Tasmania

The senior student of Tasmania’s Mersey-Don coalfield was a self-educated ex-Yorkshire pit boy, Thomas Hainsworth (1832-96). This amateur geologist’s part in establishing Tasmania’s second coal horizon and an understanding of the Mersey-Don geology vindicated his lifelong habits of careful observation and voracious study, which were tenets of the popular Victorian-era pursuit of self-culture or self-improvement. Hainsworth’s mentors were Scottish journalist Hugh Miller and the amateur geologist William Branwhite Clarke. While work, family responsibilities and poverty restrained his geological exploration of Tasmania generally, his local expertise was constantly in demand. Such was Hainsworth’s mastery of the Mersey-Don field that in 1884 he staked his wife’s drawers on his belief that no coal would be found beneath its Silurian limestone. Happily, diamond drilling failed to disrobe Mary-Jane Hainsworth’s nether regions.

**An Old Shopping Bag and a Couple of Tipples – Enough to
Change the History of the Discovery of Gold in Australia?**

Dr. Adrian Hutton
University of Wollongong

Edward Hammond Hargraves is generally given credit for the discovery of payable gold in Australia in 1851. Hargraves’ place in history came only after a reward given to him by the then Government, but only after Hargraves had embarked on a program of lectures and correspondence to publicise his case. In 1890, Hargraves claim was dismissed by a Government Select Committee which acknowledged that ‘Messrs Tom and Lister were undoubtedly the first discoverers of gold in Australia in payable quantities’.

Documents, some predating Hargraves 1851 claim, held in both London and Sydney make the case that William Tipple Smith discovered commercial gold in 1848, three years before the accolades showered upon Hargraves. Smith, also involved in the early iron industry in the Southern Highlands of NSW, made some valiant efforts to support his claim as the discoverer of commercial gold but he died in 1852 and hence his battle for recognition lapsed. Thomas Tipple Smith took on his father’s case in the 1890s, but to no avail.

Another descendent, William Tipple Smith also made a case for the recognition of William Tipple Smith in the 1920s, again without success. A well-researched case was mounted by Lynette Ramsay Silver in her 1986 book, *A Fool’s Gold?* Her case relies heavily on ‘copies of letters made in 1924’ and ‘held by various people for over fifty years until only tattered sections remain’. ‘Untattered’ copies of the originals sent and received by the first William Tipple Smith have been found in a shopping bag. Are the contents of a shopping bag the answer to this mystery?

**‘I ... have done more for tourists and Mining in Tasmania than any other man or Men’:
The Tasmanian mining activities of EC James.**

Dr. Tim Jetson

This paper examines the life of entrepreneur Edward Charles James whose mining ventures at Catamaran in Southern Tasmania, at Zeehan, and in the Cradle Mountain – Lake St Clair National Park spanned half a century. During his life, James participated in the heroic pioneering days of late 19th West Coast mining and witnessed its subsequent transformation into more orderly activity. By illuminating James’ activities it is hoped to shed light on the role of entrepreneurs in Tasmanian mining. It is also a case study of financiers who straddle the worlds of the miner/pro prospector and the big company.

'No Gold Medals'

Kevin Kakoschke, OAM

Women did it tough on the North-Eastern gold fields of South Australian during the depressions. Many who followed their man in his quest for gold only experienced disillusionment, deprivation and loneliness in that harsh desert land. Children were most at risk and the decaying, forgotten cemeteries and lonely graves bear witness to their passing. Some deaths were caused by diphtheria, pneumonia, typhoid, and 'visitation of God'. Women folk became the 'unsung heroines' as they battled the elements caring for their men and children. They grappled with the loneliness, of having no doctors, shops, nor female company to share their day to day worries. This paper will explore some of the trials and tribulations that Dorothy Kakoschke (from age 21years) experienced on the Wadnaminga goldfields near Mannahill during the 1930s depression when rearing up to six boys under the age of seven years in a dugout. In the four years that 'Dorrie' lived in this environment she left her dugout home twice for 'holidays': by going down to Peterborough to give birth to two more boys.

E.G. Stone and the Co-production of Shale Oil and Cement: Railton, Tasmania 1922-1926

Dr. Roger Kellaway

University of Tasmania

E.G. Stone, a civil engineer with an Australia-wide reputation in reinforced concrete, was involved in the formation of the Tasmanian Cement Company. The initial plan was to build a cement plant in the northern suburbs of Hobart. By mid 1923, the company reassessed the original scheme and decided to locate at Railton, the site of superior limestone. It was also only a few miles from the oil shale mines at Latrobe. Stone was entranced by the shale and devised a plan to co-produce oil and cement. His theory was that oil from shale could never be profitable by itself, but could be made competitive by linking it with the production of cement. Waste heat from the cement kiln would be used to retort the shale. Uncondensed volatile gases and some of the oil could then be used as fuel in the cement-making process. Extra cost savings were also possible by using the spent shale in place of clay in the cement kiln.

By late 1924, the Railton works had been virtually completed to Stone's design. However, the additional capital required to build a dual facility forced the company to seek backing from Dorman and Long, a British engineering firm that held the contract to build the Sydney Harbour Bridge. Production was delayed while Stone worked on the complexities of upsizing a trial plant into a full-scale operation capable of retorting 180 tons daily. Further injection of capital by Dorman and Long in June 1925 led to Stone's dismissal and the abandonment of the co-production scheme. The Railton plant opened using conventional cement technology but the company retained an interest in oil shale. Retorts were erected at their mine at the Great Bend and shale briefly integrated into the cement-making process.

The aim of this paper is to place the Railton scheme into the general history of the Tasmanian oil shale industry through an appraisal of the role of Stone in oil shale technology, oil shale politics, and the management/mismanagement of an oil shale company.

Western Mines Rescue Station

Brian Kelly

Regional Manager Mines Rescue Pty Ltd

Coal Services Pty Ltd has developed the most advanced real world simulator of its kind, exposing staff to dangerous situations that may be encountered in a hazardous environment. Their Virtual Reality Training System is accurate and realistic, allowing staff to experience and respond to real hazards in a safe and controlled environment before actually encountering them in the work place. It is the most advanced real world simulator of its kind, providing a panoramic environment using 12 hi-resolutions video projectors, six computers and a massive 120 sq.mt circular screen that completely surrounds and immerses the audience. Training modules have initially been developed for the coal industry, with the technology available also for use in other industries. Training Modules also cover Rib and Roof Stability, Truck Pre-Shift Inspection, Isolation, Outburst of a violent release of seam gas, Hazard Awareness, Unaided Self Escape and Industry Related Modules that can be tailor made for any industries that need training.

Irvinebank State Treatment Works - the recent history

Dr. Ruth S. Kerr, OAM

The Irvinebank State Treatment Works remains substantially intact but is surrounded by a 3.6m fence and its administration is again under review. The mill was established in 1884 and operated by the Irvinebank Mining Company until taken over by the Queensland government as a state enterprise in 1919. It operated as a State Treatment Works until 1983 except for 1929 to 1934. The collapse of the world tin price in 1985 cast a death spell over the future of the operation. The Hilla family struggled on and stopped the mill finally in 1996. The Irvinebank State Treatment Works were placed on the Queensland Heritage Register in 1991 - the only operating business on the list. That proved a perceived disadvantage to the operation of the mill. This paper examines the recent history of management of the Irvinebank complex and its plight as a significant heritage in Australia.

Researching the Past, the Present and the Future Joadja Creek Southern Highlands of NSW

Leonie Knapman

In 1878, the Australian Kerosene Oil and Mineral Company heralded the beginning of one of Australia's richest pioneering industries of the time. The company introduced large-scale production methods and solved their own transport problems by building a 30km narrow gauge railway to Mittagong. The company produced kerosene, candles, wax, oils and other products such as soap that had earlier been imported. After two books and a DVD on this interesting 1800s township and industry, more material has come to life revealing evidence of the trademarks of the AKO products, with one label found in an American candle label collection.

Ideology and union conflict at Captains Flat in the late 1940s and early 1950s

Dr. Barry McGowan

School of Archaeology & Anthropology, ANU

The great coal strike of 1949 and its aftermath are well known to most labour and social historians in Australia. Less well known was the Captains Flat lead bonus dispute which ran from late 1948 to early 1949, a period of almost seven months, and the shaft sinking dispute, which ran from mid 1954 to early 1955, also over a period of seven months. The Captains Flat mines were tucked away in the foothills of the Dividing Ranges near Canberra and a long way from any other mining field of importance. It is tempting, therefore, to dismiss the disputes as of merely local interest. I argue that both events, but in particular the lead bonus dispute, had a much greater significance, and should be viewed in the context of the great inter-union conflicts that racked Australia during that period, in particular those between the AWU and the Communist dominated Miners' Federation.

Diggers on the Klondike

Dr Robin McLachlan

Charles Sturt University and Times Past Productions

The Klondike Gold Rush (1897–1899) attracted several hundred Australians, including many experienced miners. Drawing on letters and memoirs, as well as archival sources from the Yukon, this paper will explore their experiences in travelling to the Yukon and, for those who made it, living and working on the Klondike. Although historians have largely overlooked the contribution of Australians to Klondike history, it was of some significance, especially given their small numerical presence. Drawing on fifty years of antipodeans' goldfields experience, Australians made important contributions to political, social and business developments in the Yukon, as well as to gold mining on the Creeks. Reflecting their own history of goldfields militancy, for example, Australians were at the forefront in the Miners' Association and the battle against Canadian government corruption and incompetence. They contributed as well to a definitive, if disappointing, professional assessment of the nature of the goldfield.

Although few achieved any wealth, the Klondike experience provided returning Australians with a heightened sense of national identity on the eve of Federation. Some of those who remained in the Yukon went on to become significant characters in the development of the territory – often with their Australian connection in time largely forgotten. The ongoing research for this paper is being undertaken for a documentary film, *Diggers on the Klondike*, with Ronin Films (Canberra), now in pre-production, and a book, with Peter Bridge, to be published by Hesperian Press. The presenter would be pleased to hear from anyone with news of an Australian or New Zealander Klondiker.

Gold in the 'Mundic': The Story of Dargue's Reef, Majors Creek, NSW

Dr. Ken McQueen

University of Canberra

Dargue's Reef is the largest known bedrock gold deposit in the Majors Creek goldfield of southern NSW. It was discovered in 1869 by Joseph Dargue while he was mining alluvial gold. Dargue sampled an 'ant bed' and was surprised to find colours of gold. He powdered and washed the complete bed, recovering about 6 ozs of gold, and concluded that there must be a rich lode nearby. With a syndicate of mates he located the source and mined the weathered and oxidised upper part of the deposit in shallow workings. Ore was carted by horse to a crushing plant on Majors Creek. At this stage the mine was known as the Homeward Bound.

In 1871, fresh rock was reached and it was realised that much of the gold was held in the disseminated 'mundic' or pyrite making up the deposit. Unsuccessful attempts were made to find equipment to extract the gold locked in the 'mundic'. In 1882, the Dargue's Reef Gold Mining Company was set up by the Warren brothers to redevelop the mine but the 'mundic' was intractable. In 1889, Thomas Merton took an interest in the deposit and the pyritic ore was treated by chlorination at Parramatta and Cunnigar. A chlorination plant was built at Dargue's in the latter part of 1889 but the operation was not a financial success. Most recently, exploration has defined a much larger resource at Dargue's Reef and it is hoped to develop a new mine with both gravity separation of gold and shipment of pyrite concentrate for processing by modern CIP technology.

SIXTEENTH AMHA CONFERENCE, GREYMOUTH NZ, JULY 2010

ABSTRACTS OF PAPERS

Two Shillings a Minute: Operations of the Rimu Gold Dredging Company 1921-1923

John Barry & Margaret Mort

By innovation and change the gold dredge in New Zealand evolved into an efficient gold-saving appliance. Introduced into California by Robert Postlethwaite, the technology was beefed up by American mining engineers. North American successes prompted British and American mining houses to search worldwide for dredgeable deposits.

In 1918, Robert Cranston visited New Zealand on behalf of a New York mining company and purchased dredging properties held by Rimu Options Ltd south of Hokitika. Funded by American capital, the Rimu Gold Dredging Company was registered on 12 July 1920, and dredging commenced on 12 September 1921. By 1930 the wooden pontoon required replacement, and as much low-grade ground remained the dredge machinery was upgraded and transferred to a new steel pontoon. The western edge of the license was reached on 8 April 1953, and as no further ground had been found the dredge was advertised for sale.

From 47,851,000 cubic metres dredged, 319,345.3oz of gold bullion was recovered. The company also supplied Hokitika with electricity from its Kanieri Forks power station. Total dividends were £759,802, most of which went to the American owners. The company was a just employer and its American management was highly regarded.

150 Years at the Wallaroo Smelters

Peter Bell

The Wallaroo smelters, in the heart of South Australia's Copper Triangle, operated for 65 years from 1861 to 1926, producing 333,000 tons of copper and significant quantities of other metals. This paper describes those decades of production as the smelters' technology evolved from Welsh reverberatory furnaces through waterjacket blast furnaces to electrolytic refining and converters. It also traces the smelters' next 84 years through a long process of closure, demolition, and abandonment. For about 50 years the site was a derelict and rather noxious wasteland.

More recently, its immediate surroundings have been transformed by a marina, a ferry terminal, and a housing development, and plans are afoot to develop the smelters site itself. Since 2007 the author has been involved in a project to define the extent of the heritage site and open it up to visitors by a pedestrian access path combined with an historical interpretation trail.

From Plants to Miners' Hats and Magnetic Exploders

Anne Both

In the seventeenth century, John Tradescant the Younger obtained samples of a tropical tree which yielded a rubber-like substance which he named "Maser wood. Its commercial potential was not developed until its reintroduction in 1843 by William Montgomerie, who recommended that it could be used in surgery. *Palauquium gutta* provided the Industrial Revolution with Gutta-Percha, subsequently developed into many new products. Its insulating properties were used by cable and telegraph companies, and many domestic items were produced. In mining, it was promoted as increasing safety and reducing costs, and products made from it such as suction pumps, clack seals and lathe bands could be found on most nineteenth century mine sites world-wide. It is still used in the manufacture of some mining products.

Mining Heritage of the Linares-La Carolina District, Spain: From Bronze Age to the Twentieth Century

Ross Both and Antonio Angel Perez

Mining in the Linares-La Carolina district in Jaen Province, southern Spain can be traced back 4,000 years, when the Bronze Age Argaric people mined outcropping veins of copper. Iberians, Carthaginians, and Romans later mined copper and lead. There are no references to mining during the Moorish occupation or the Middle Ages, but mining revived after 1563 and increased after the Crown became involved in the Arrayanes mine in 1749. Installation of a Cornish pumping engine on El Pozo Ancho mine in 1849 led to a mining boom that transformed the local economy. Most mines were equipped with Cornish steam engines, which dominated the landscape. Many new mines were financed by British, French, German, and Belgian capital, the Spanish government retaining the Arrayanes mines, the largest in the Linares district. After the last mine closed in 1991, the Colectivo Proyecto Arrayanes was formed to record, conserve, and interpret the mining heritage.

The 'Chinese Invasion' of the West Coast Goldfields

Julia Bradshaw

The Chinese were one of the many different nationalities to come to the West Coast in search of a fortune. Although during the gold rush and for many years afterwards the Chinese were the largest minority group on the Coast, until recently very little has been known of their story. This paper explores the arrival and distribution of the Chinese, details of their mining experiences, and their successes and failures. Included are stories of some interesting individuals such as Young Hee, who organized an important anti-opium petition, and Lily Chow Fong, the wife of a Chinese merchant, who ran her own business in Greymouth.

Six Personalities Searching for the Pot of Gold: Australasian connections: practical and academic

David Branagan

In view of the relative proximity of Australia and New Zealand, it is natural that there was frequent interchange between many individuals and companies interested in mining and geological activities. This paper discusses the work of six personalities, Georg Heinrich Ulrich (1830-1900), Frederick Wollaston Hutton (1836-1905), Joseph Campbell (1856-1933), James Malcolm McLaren (1873-1935), Robert Alexander Farquharson (1883-1959), and George Herbert Watson (1894-1963), covering a wide range in time and interests, with links in time and space. All had major interests in gold, and worked in both New Zealand and Australia.

Overview of Tasmania's offshore oil and gas exploration and development

Chris Boron

Tasmania, historically, usually had about 3-4 offshore petroleum exploration licences at any one time. The number of licences peaked in 2007 when a total of 19 exploration licences were in force. Tasmania is strategically positioned to the growing South East Australian gas market, which is currently growing 2-4% annually. Industry now maintains a strong exploration and development presence in Tasmanian offshore waters. Tasmania has the fourth largest offshore petroleum exploration and development industries in Australia's offshore waters. Tasmania ranks a head of South Australia, New South Wales and Queensland. The Thylacine/Otway and Yolla/Bass Gas developments are located in Tasmanian Administered Waters. Victoria enjoys security of gas supply, employment opportunities and economic benefits from exploration and development undertaken in Tasmanian Waters. Natural Gas from these developments is piped to Port Campbell and Lang Lang in Victoria respectively, guaranteeing supply to Victoria from a number of sources.

The 1998 Longford Gas Plant Disaster in Victoria was an unfortunate but invaluable lesson learned, in not having all your eggs (energy) in the one basket and contributed to the development of the Thylacine/Otway and Yolla/Bass Gas projects.

Pat Hickey's Apprenticeship: An education in mining and militancy in New Zealand and the USA, 1900-1908

Peter Clayworth

Patrick Hodgens Hickey, union organizer and socialist activist, was one of the most colourful and militant leaders of the 'Red Feds', the Federation of Labour. Hickey first came to national prominence leading the Blackball strike of 1908, and went on to try to create One Big Union to overthrow capitalism. He had a leading role in the Red Fed challenge to the arbitration system, which sparked the most intense period of class confrontation in New Zealand, culminating the Waihi strike of 1912 and the Great Strike of 1913. Although born in New Zealand, Hickey acquired both his activism and many of his mining skills as an itinerant worker in the USA in 1900 and 1903-1906. This paper, based on Hickey's letters from both America and Denniston, on the West Coast, outlines how he acquired the skills that made him an experienced miner in both hard rock and coal mines and examines his education in politics and union organization by the militant Western Federation of Miners. Hickey's mining skills combined with a good reputation amongst fellow miners as a good worker was essential for his being taken seriously as a union activist. His story illustrates the role of mines around the English-speaking world as bases for militant activism.

The Mines of Western Tasmania

Greg Dickens

Mining in Tasmania has a long and varied history. Aborigines mined flints, salt, and ochre, and after 1803 the early settlers mined sandstone, limestone, and clay for building materials and coal for fuel. The first major mineral find was in 1871, when tin was discovered at Mount Bischoff. This led to further exploration and the discovery of other major mineral fields.

Western Tasmania contains several highly mineralized zones, and Mount Bischoff, Renison, Mount Lyell, Rosebery, and Hellyer are world-class mines in both size and grade. For the past 140 years the region has been the lifeblood of Tasmania's mining industry, currently about 50% of the state's total export income. This paper provides a chronology of the exploration and development of the principal mines.

A History of Emperor Gold Mining Company Ltd, Vatukoula, Fiji

Aert Driessen

Sporadic reports of alluvial gold in the Tavua area, on the northern side of Viti Levu, circulated in Fiji from around 1872. Patrick Costello, owner of the Shamrock Hotel in Lautoka and a passionate prospector, funded prospecting parties in 1915, 1924, and 1928, without success. The Tavua basin, a collapsed caldera some 50 kilometres east of Lautoka, was probably not covered in any of these explorations. In the latter part of 1932, Costello grub-staked his 72 year-old Scottish-born foreman, Bill Borthwick, to prospect it. On 5 November, Borthwick traced alluvial gold to an outcrop, and within a week Costello pegged out a prospecting license of 200 hectares. On 23 November, Costello informed the Colonial Secretary of his discovery, which he named Vatukoula, meaning Golden Hill. Costello offered the prospect to Waihi Gold Mining Company of New Zealand for development, but by dallying they allowed events to overtake them.

In Sydney, recently-ousted Federal Treasurer Edward Granville Theodore (Red Ted) read of the find, contacted Costello, obtained samples, formed a syndicate with John Wren, Patrick Cody, and Frank Packer, and arrived in Fiji on 30 May 1933. By 1934 there were three mines, Emperor, Loloma, and Koroere, all effectively controlled by the syndicate, and by the end of 1935 Theodore had accumulated more wealth than he could have imagined as a boy.

In December 2006, after some 70 years of operations and 7 million Troy ounces of gold, the Emperor mine, the last to operate, was placed in care and maintenance, with the loss of 1,700 jobs. But the 5.6 million ounces still remaining at a time of rising gold prices was bound to attract attention. In 2009, Vatukoula Gold Mines was floated on the Alternative Investment Market in London, and by 2011 it expects to be producing at the historical levels of 100,000 ounces a year.

Mining for Oil in Victoria: The Lakes Entrance Oil Shaft

Jim Enever

From 1940 to 1950, a novel attempt was made to recover oil from a sand horizon at about 360 metres depth near the town in Lakes Entrance in East Gippsland, Victoria. At that time, the Lakes Entrance Oil Field was the only source of liquid 'well' oil known in Australia. Encouraged by the need for an indigenous supply of petroleum during wartime, the Commonwealth Government tried to induce private enterprise to undertake a trial of an innovative development method involving the drilling of horizontal holes into the producing zone from the bottom of a vertical shaft. When private enterprise struggled to raise the necessary finance, the Government, in conjunction with the Victorian Government, stepped in and ran the project itself. A shaft was sunk through the soft, water-bearing strata, and a number of short horizontal holes drilled into the sand to test the oil flow. Disappointing results from these tests, combined with a reappraisal of the potential of the field and the end of the war, led to the governments terminating their direct involvement. Handed back to private enterprise, the project was seen through to completion, but by 1951 it was clear that commercial production would never be achieved. The project was abandoned at the end of that year.

The Banbury Tourist Mine Development

John Green

The Department of Conservation has undertaken to give initial protection to all historic heritage sites over 30 years old on land it administers until an assessment of significance is completed to determine whether to include them in its inventory. Avoidance of adverse effects of human activities is the appropriate management regime for 90 per cent of the heritage assets managed by the department. Areas such as Denniston have a distinct physical nature, and the deterioration of historic sites is a consequence of climatic extremes rather than human threats.

The vision for Denniston is a well-orientated, well-informed, and enjoyable visitor experience which will encourage people to stay longer in the area and leave with a greater understanding of the historic values unique to this special place. Development will consist of three main components:

- Coaltown/iSite at Westport, interpreting the mining industry and acting as a gate way to the Denniston experience.
- Banbury mine underground experience, to be developed adjacent to the brake head/incline, conveying the story of workings and workers and transporting visitors deep into the heart of an historic mine by tram and following the journey of coal from the face to the port.
- Friends of the Hill Museum will focus on the life of a miner and the mining community with emphasis on the stories of past residents.

The Runanga Miners' Hall Project

Joe Hart and Paul Kearns

The Runanga Miners' Hall is central to the mining heritage of the region, and is a significant building in terms of the history of industrial unionism on the West Coast and in Australasia. The presentation will cover the history of the coal mining town of Runanga, the hall, and plans for its restoration and the development of a museum of mining heritage.

Golden Fleece? Tasmania's disastrous trans-Tasmanian dalliance with gold

Nick Haygarth

A piano-tuning, potato-growing ex-Prussian engineer named Rudolph Wachsmuth sparked a hydraulic gold sluicing craze in Tasmania during the 1890s, encouraged by Government Geological Surveyor Alexander Montgomery. Both men had experienced the success of hydraulic sluicing in Otago, and predicted good results in Tasmania. Several New Zealand 'hydraulicers' were recruited. Lavish expenditure and ludicrous ambitions, however, could not disguise that the Tasmanian goldfields chosen were too small to be worked economically. Shareholders found out the hard way.

King Coal on the West Coast (The rise and fall and revival of the West Coast coal mining industry)

Stuart Henley

Since 1880 coal mining has been the life blood of the West Coast economy. While it was gold that lured thousands of people to the region in the 1860s, the gold rush was short-lived and it was the coal mining industry that contributed most to the development of the West Coast. Coal was first discovered by Brunner near Greymouth in 1848 and in 1860 thick, high quality coal seams were found in the Buller Coalfield. Exploitation was initially hampered because of a lack of infrastructure but by the 1880s the ports of Westport and Greymouth, supported by railways, were in operation and the coal industry rapidly expanded.

West Coast coal was renowned for its superior steaming qualities and was used to fuel the emerging New Zealand economy. In 1914 coal production (all from underground mining) reached 1.34 million tonnes with 2550 people employed. After WW 2 a major decline set in with hydro-electricity and diesel fuel becoming readily available. A number of larger underground mines closed in the 1960's and by 1989 there were only 72 coal miners left in the Greymouth Coalfield.

Interest by Japanese coking coal buyers led to a major revival with most of the production increase being exported. In 2006 coal production was a record 2.86 million tonnes (80% from opencast mining) and there are now over 1000 people directly employed. With a number of new mines coming into production, the future for the West Coast coal mining industry looks bright.

Mining Joadja Creek Kerosene Shale, New South Wales: A salute to perseverance

Adrian Hutton

School of Earth and Environmental Sciences, University of Wollongong

Joadja Creek kerosene shale produced one of Australia's first, if not the first, successful petrochemical industries. This shale, up to one metre thick, occurs in a coal seam, cropping out around the sides of the valley. Exploiting the shale required hand-mining techniques strongly influenced by the geology of the deposit. Immediately above the seam the thick coarse sandstone provided an excellent roof unless there were rock falls. The seam lensed out quickly, and mining heights were somewhat restricted near its extremities. Initially all mining was based on the pick and shovel method, with two men working the seam from adits driven from the valley sides or from drives from these adits. Efforts to mechanize the work were limited by the nature, thickness, and shape of the shale lens. This paper examines the geology and mining techniques used.

Thames School of Mines

John Isdale

Initiated by the government to improve mining and increase revenue, and opening at Thames in the late nineteenth century, the Thames School of Mines was one of over 30 such educational institutions in New Zealand. My paper explores:

- The growth of this institution since 1886, the addition of specialized buildings to meet various needs, and success in developing better extraction processes and training people to work these technologies.
- The additions to the curriculum that were so successful that the school continued for another 40 years rather than close when mining ceased, effectively, in Thames in 1914.
- The survival of this unique complex, achieved with the help of Australian and Canadian mining companies, and the work of my late parents, A.M. and J.A. Isdale.
- Some of the people who worked in, for, against, or benefited from the school, including James Black, the founding father, and Hugh Crawford, the last director.

Today the buildings, including the unique 110 year-old mineral museum, are one of 15 Manned Heritage Destination sites owned and operated by the New Zealand Historic Places Trust.

Reacting to Otago: The search for gold in Tasmania 1861-1865

Roger Kellaway

In early 1862, the *City of Hobart* stopped in that city on a trip from Dunedin to Melbourne. On board were 125 passengers, mainly diggers returning to Victoria from the Otago goldfields. Some took the opportunity to join an expedition to check reports that a valuable outcrop of gold had been found near the lighthouse at the entrance to the Derwent River. This Iron Pot gold rush on 13 February 1862 was the shortest in Tasmanian history: it was all over by 10 pm that day.

This event illustrates a growing problem. Otago was playing the same role as Victoria in the 1850s by causing many, mainly males, to leave Tasmania. In September and October 1861, 1,204 had left for Otago on ships sailing directly to Dunedin, and an unknown number went via Melbourne. Although many returned, increasing numbers of women and children went to join their husbands. Other opportunities, mainly town-based, attracted other emigrants, and empty houses were increasingly common in both Hobart and Melbourne.

This paper examines three strategies designed to counter emigration by developing a Tasmanian goldfield. One was to encourage men with Otago experience to mine in the Fingal Valley or prospect for gold elsewhere. Another was to promote prospecting by the public funding of a reward. The third was to redirect the efforts of the Colonial Geologist towards searching for gold on the West Coast. The effect of these policies ranged from negligible to limited in the short term, but may have had some longer term impact.

Emuford Tin Battery – its Heritage Values

Ruth Kerr

Emuford tin battery in the Cairns hinterland of north Queensland is one of the most intact tin batteries in Australia and illustrates late nineteenth and twentieth century tin treatment technology. The heritage significance has been recognized for many years and recommended for heritage listing on the Queensland Heritage Register. The battery operated from 1911 (with short breaks) up until the world tin market closed on 24 October 1985. It contains stamps, suction gas engine, shaking tables, Krupp tables, Luhrig Vanners, Wheeler Grinding Pans and pumps. The battery sits on mining tenure and the holder desires to freehold the land over which there is a native title claim. The paper briefly outlines the history of the site and describes the heritage significance of the industrial technology there and recommends that the battery be listed on the heritage register under the *Queensland Heritage Act 1992*.

A Coal Miner's Daughter

Leonie Knapman

In 1940, and only a few weeks old, a baby in her mother's arms entered a coal mine at the base of Macquarie Pass, west of Wollongong, for the first time. After this, many a weekend passed with mother and baby accompanying the miner as he prepared the mine for the men to work it on Monday. When only a few months old, the family moved to Glen Davis, where her father worked at the shale mine in the new township. As an experienced operator, he later opened up the coal mine downstream to supply the power station. Most weekends were spent at the coal mine, with the now young girl taking messages or lunches into the mine for her father.

In 1954, Glen Davis closed, the family moved to Mittagong, and the miner started working the anthracite mines which had been abandoned in the 1880s because the heat from the anthracite was too intense for the Mittagong iron work, built in 1848. Weekends were often spent at the mine or in the yards where the anthracite was being prepared for export. At the same site petrol was being made from Joadja Creek shale and sold to Ampol and Peters Ice Cream for their fleet of trucks. Now somewhat older, the miner's daughter wonders whether any child would be allowed inside or even near a coal or shale mine today.

The New Zealand Gold Dredge: A macro-innovation?

Nic MacArthur

From 1890 to 1930, British and Australasian mining writers recognized the New Zealand gold dredge, developed in Otago, as a world-first. More recently, English mining historian Roger Burt's review of international mining technology in the nineteenth century has confirmed this dredge as the first of its kind. He classifies it as one of only seven „macro-innovations that transformed mining throughout the world in the latter half of that century.

Burt appears to base much of his case on something known as a Ball dredge. This was not a bucket ladder dredge, the essential characteristic of the New Zealand one, but a cutter suction one, described by the New Zealand Mines Department's Inspecting Engineer as a 'mere toy'. This paper investigates whether 'the New Zealand dredge' was a macro-innovation or not, using detailed local information and reviewing its evolution, extensive capabilities and efficiencies, and the rapid diffusion of its technology around the world. It appears that Burt may have been right for the wrong reasons.

Burt also questions why the dredge was developed in New Zealand when better deposits existed in California. Unusually, world-class technology had been created in a small, isolated region with limited resources. This indicates that the huge physical and technical resources of the United States were not necessarily an advantage in technological innovation if operations, engineers, and engineering workshops were in reasonable proximity. The New Zealand gold dredge is of greater significance in technological history than has generally been recognized.

'We've always Preferred Lucky Geologists to Good Ones'

Peter Maciulatis

In 1982, Franco Nevada Mining Corporation Ltd (FNMC) was created by Seymour Schulich to test the entrepreneurial skills of young metals analyst Pierre Lassonde. FNMC went public in 1983, and over the next 20 years grew into the world's fifth largest gold mining company as measured by market capitalization.

FNMC operated with a very small staff of employees and consultants. Initially, it attempted to achieve cash flow by finding and then mining a deposit. Attempts to develop reserves at an inactive gold mine and later by drilling a low-grade gold resource both failed. In 1986, two consulting geologists alerted Lassonde that the underlying royalty on the Goldstrike property in Nevada was for sale. It was producing only 42,000 ounces of gold per year. By acquiring the royalty FNMC gained instant cash

flow without a discovery or mining. A few months later, American Barrick Resources Corporation purchased the operations, and Goldstrike was on the road to becoming the largest gold mine in US history.

In 1985, FNMC commenced grassroots exploration. As royalty income quickly increased, FNMC feared becoming a passive foreign investment company, and accordingly with a sister company provided its consulting geologists with a budget of \$600,000-\$1,000,00 (Canadian) per year. In 1993-4, a high-grade deposit was found, helping to double the value of the companies.

Fracas, Fizzle and Fortune: South Island Miners on the Klondike, 1898-1899

Robin McLachlan

South Island miners, particularly from the West Coast, figure prominently among the more than 200 New Zealanders known to have gone to Canada's Yukon to take part in the Klondike gold rush of 1898-1899. This presentation recounts the experiences of some of these men and gives their assessments of 'the last great gold rush'. Amongst them are Dr Edwin Dunn, Westport doctor and founding president of the Yukon Medical Association, and John Donnellan, whose arrival in Greymouth was unlike that of any other returning Klondiker. The research for this paper draws on 'Diggers on the Klondike', a project exploring the experiences of Australians and New Zealanders.

'The Letter': Film researched and written by Robin McLachlan

Robin McLachlan

Hundreds of Australians and New Zealanders were among the thousands who responded in 1898 to the call of the Klondike. Drawing on letters sent home, *The Letter* offers in storytelling form a true record of experiences common to many. *The Letter* is a tale of adventure, of climbing the icy Chilkoot Pass and riding the wild Yukon River, of anger aroused by corruption on the goldfields and of awe at the magic of a Yukon winter. But, as with all adventures, there is sometimes a price to be paid.

Newmont Waihi Gold's Oral History Project: Telling it the way they saw it

Doreen McLeod

Since 2005, Newmont Waihi Gold has carried out an oral history project, interviewing people from all sectors of the Waihi community aged from 8 to 80 and beyond. To date, 65 interviews have been recorded and transcribed which, along with the photographs collected, provides a comprehensive documentation of Waihi's social, cultural and economic heritage. The project provides research material on the people, social history, early and current mining practices, and the role of mining in shaping today's district. The project seeks the anecdote, the yarn, and the description of the everyday event, the lived experience. First-hand accounts capture the ordinary – sometimes extraordinary – lives of people, giving a voice to those who are often left out of historical records.

Maitland Bar Nugget: A key link to the gold rush heritage of New South Wales

Ken McQueen & Robert Barnes

On 17 June 1887, three alluvial miners, Jonathon Thorpe, Isaac Holmes and Frederick Leader, discovered a large gold nugget near Maitland Bar on Meroo Creek, 22 kilometres southwest of Mudgee in central NSW. It was unearthed at a depth of 3.4 metres from a terrace mined during the 1851 gold rush. After being displayed at Mudgee, it was sent to Sydney for display there and at exhibitions in Adelaide and Melbourne.

The nugget, containing 313.093 ounces of gold, was purchased by the government for £1,236 and until 1996 was kept at the Department of Mines' Geological and Mining Museum. When this closed, responsibility for it was transferred to the Department of Mineral Resources, and it is now kept in a vault at the National Australia Bank in Sydney. Over the years it has been displayed at important exhibitions, including the World's Columbian Exhibition in Chicago in 1893 and the 'Gold and

Civilisation' exhibition in Canberra and Melbourne during 2001. It is the last remaining large nugget known from the New South Wales gold rushes, and is a key physical link to that state's gold rush heritage. Its present value exceeds \$A1 million, but its heritage and scientific value far exceeds this amount. It is important that the nugget be preserved and treasured.

The Photography of Joseph Divis: Blackwater Mine and the Snowy River battery in the early 1930s

Simon Nathan & Les Wright

The Blackwater mine at Waiuta worked a narrow but persistent gold-bearing quartz reef, producing over 22 tonnes of gold from 1908-1951. The ore was processed at the Snowy River battery, 900 metres from the mine, until 1938. After being crushed, a slurry was passed over copper amalgamating plates coated with mercury, after which the courser residue was crushed again, passed over Wilfley tables, roasted, and finally treated with cyanide.

A huge investment was needed to develop the mine and build the battery. A modern plant when opened, and progressively modified over the years, by the early 1930s it was out of date and a significant percentage of the gold was not recovered. In 1938 a modern plant close to the Prohibition shaft replaced it. Expatriate Czech miner Joseph Divis took a series of photographs of the mine and battery for the *Auckland Weekly News* in 1931. These are a unique record of the machinery and processes used in the early part of the twentieth century.

Waiuta Gold: Environmental legacy

Jim Staton

Waiuta produced gold from the Blackwater and Prohibition mines between 1908 and 1951. Ore was processed by stamper battery in Snowy River until 1938 and then by ball mill at the Prohibition site until 1951. Both sites used similar chemical gold recovery processes, of which various relics remain, mainly in the form of cyanide solution tanks and concrete foundations at the Snowy and the ball mill foundations at the Prohibition; an Edwards Roaster was used at each site. Not until 50 years after the mines closed was the toxicity of the sites determined, and another five years of sampling and analysis followed before any remedial work was begun by the Department of Conservation.

Scientific papers and a major thesis have helped to define the contaminated areas of most concern, and measures have been put in place to contain the most toxic sites. Currently the department is working with CRL to complete an analysis of downstream water quality with a six-month treatment trial of water coming from the most contaminated site. This will be followed up with the removal and containment of the primary source from the Prohibition site.

Oceania Mines

Paul Thomas, Gareth Thomas & Les Wright

Paul Thomas will explain Oceana Gold's mining operations at Reefton and how the commercial tour opportunities came about and their success. A DVD covers the history of gold mining on the West Coast, historic footage of the Blackwater mine, the development of the Oceana mine, mineral exploration, and environmental restoration after mining ceases. Les Wright will explain the uncovering, investigation, and recovery of historical artifacts, including the B shaft winder house, the aerial tramway terminal, and the double brick detonator store and explosives magazine. Gareth Thomas will participate in question time at the end.

The New Zealand Tunnelling Company

Sue Baker Wilson

In September 1915 the Imperial Government requested that the Australian and New Zealand Governments raise an Engineer Tunnelling Company to counter the German underground war. New Zealand miners served underground in a secret war, driving tunnels towards enemy lines as the Germans were driving tunnels towards them. The first to complete their tunnel and detonated the charge would live; anyone underground when the charge went off would die from either the blast or carbon monoxide poisoning. Later the Tunnelling Company extended caves under Arras to house a hospital, billets, kitchens, and up to 20,000 men. Towards the end of the war, after three weeks at a bridge building school, they constructed the longest bridge ever built during the war, at Havrincourt.

The last of the Company arrived back home in April 1919. They returned to the mines, where their skills were urgently needed, and their story was forgotten. This paper will briefly detail the history of the company and its activities, and provide present day links.

West Coast Coalmining Communities: Using genealogical sources for historical analysis

Brian Wood

The two communities are Brunnerton and Blackball and the events, the litigation that followed the Brunner mine disaster 26 March 1896 and the Blackball strike 27 February – 13 May 1908. The analysis argues that country of origin, time of arrival, place of residence, ethnicity and colonial experience were significant elements in the composition of the litigants and the initiation and outcome of the strike.

SEVENTEENTH AMHA CONFERENCE, HAHNDORF SA, SEPTEMBER 2011

ABSTRACTS

The Castlemaine Diggings National Heritage Park: why are we blind to the things we do not feel?

David Bannear

Archaeologist, Heritage Victoria

Central Victoria experienced over 150 gold rushes from 1851 to 1903. Some were immense, some were small. Melbourne became the way-station at the start of the colonial journey of thousands of expectant journeys. During 1852-53, when gold fever was at its height, nearly 200,000 men, women and children disembarked at Melbourne.

Ballarat, Castlemaine and Bendigo were the goldfields whose names echoed (reverberated) across the globe, triggering the surge. From these goldfields the rushes spidered outwards like veins, carrying the gold-lured population throughout the fledgling colony.

My illustrated talk will introduce you to some of the mining relics that can be found in the forest surrounding Castlemaine and which are associated with the defining moment of Victorian Rush – the rush to the Mount Alexander Diggings. I will also talk about how despite this goldfield receiving various levels of heritage recognition since 2001, an important part of the archaeological legacy was threatened by a strategy to ecologically strengthen the forest – the forest's feebleness in the eyes of ecologists was in fact one of the land's greatest mining relics.

Australian Copper Mines: the growth of a giant

Geoffrey Blainey, AC

Patron, Australian Mining History Association

Australian copper mining, beginning near Adelaide in the 1840s, preceded gold as an important industry. It also hastened the rise of gold because it attracted to Australia experienced mining men and their technology, mainly from Cornwall.

South Australia usually was the dominant copper producer for the next half century. By 1940, copper ranked fourth in aggregate value of output amongst the main Australian minerals, coming far behind gold and coal and not far behind silver-lead. Copper was the only major mineral where, so far, four different states had contributed strongly to the output – usually one or two states dominated the output of each major mineral. Curiously, the two great gold regions, Victoria and Western Australia, were the weakest in copper.

From the 1950s, one copperfield – Mt Isa – utterly dwarfed all others, an unusual event. Its sheer dominance ended in the 1990s when the astonishing Olympic Dam (South Australia) challenged Mt Isa.

Themes discussed will include new patterns in discovering copper; decline of Australian ownership; industrial relations and safety; and what makes copper mining distinctive.

Early mines of the Adelaide Hills

Ross A. Both

The 1840s mining boom in South Australia followed the discovery of silver-lead ore at Glen Osmond, in the foothills of the Mount Lofty Ranges on the outskirts of Adelaide. This was quickly followed by the discovery and exploitation of a large number of mines during *Australia's Earliest Mining Era*. These developments came at a crucial time in the history of South Australia; in the early 1840s the newly created colony was close to bankruptcy and was saved from collapse by the mining boom.

Copper is widespread as vein deposits in metamorphic rocks of the Cambrian Kanmantoo Group. The most significant early operations were the Kanmantoo, Paringa and Bremer mines in the Kanmantoo district and the Kitticoola Mine in granite host rock in the northern Adelaide Hills. Several veins in sedimentary rocks of the Proterozoic Adelaidean System were also worked for copper, including the Balhannah, Grunthal and Montacute mines.

The Aclare Mine and Wheal Ellen were the main silver and lead producers in the Kanmantoo Group but were unprofitable because of metallurgical problems due to high contents of zinc and other metals in the ore. Silver and lead were also produced from veins in Adelaidean rocks, with Glen Osmond, Almanda and Mount Malvern the main producers. Gold has been mined from both alluvial and reef deposits in the Adelaide Hills. The Echunga Goldfield was the major producer, mainly from alluvial deposits in Tertiary gravels and modern drainage channels. The Bird-in-Hand Mine in the Woodside Goldfield was the largest of the reef mines.

Alfred Selwyn in South Australia, 1859

David Branagan

School of Geosciences, University of Sydney

In 1859 Alfred Selwyn (1824 – 1902) was one of the most respected geologists in Australia, having established an efficient Geological Survey organisation in Victoria and gained the confidence of mining and government officials. Selwyn was invited by the SA Government to visit South Australia to assess the potential of the Colony for gold and coal occurrences and the potential for good supplies of underground water.

He spent two months (May-June) on his survey, beginning in the Hahndorf-Echunga district. He then examined southern parts of the Colony from Cape Jervis and Encounter Bay returning to Adelaide via Nairne and Strathalbyn. He then travelled north in company with the SA Surveyor-General, G.W. Goyder, travelling from the Cape Jervis as far north as Wilpena, examining known mineral occurrences, although he was denied entry to Burra! He was particularly impressed by the splendour of Wilpena, ‘a synclinal undulation of the upper sandstones’, and made other significant observations on the regional geology.

Having seen plenty of the Flinders Ranges, he and his companion set off for the Barrier Ranges, but an infection, from an injury caused when he was skinning a kangaroo, forced him to return hastily to Burra for medical assistance. What might have resulted had Selwyn made it to Broken Hill in 1859? Would he have seen and understood the significance of the ‘Gossan’, more than twenty years early?

While his report indicated little evidence of significant gold or coal occurrences he was the first to recognise evidence of former glaciation in the Inman Valley.

The Geraldine Mine – the end of civilisation

Mary Callaghan

Western Australian Museum, Geraldton, W.A.

This paper traces the history, and relates the stories, behind Western Australia’s first commercially viable mine - the Geraldine, which began operations in 1849 after a rich lode of galena was discovered in the bed of the Murchison River, 500km north of Perth. News of the discovery caused great excitement in the struggling Swan River Colony. The recently appointed Governor FitzGerald insisted on inspecting the site himself and despite an eventful expedition to the location, he enthusiastically embraced the idea of developing a mine to generate much needed wealth in the colony. On his return to Perth, he wasted no time in canvassing the idea with prominent businessmen who went on to form the Geraldine Mining Company. Over the following decades, English gentlemen, Cornish mining captains, convicts and free men faced enormous challenges working the Geraldine Mine, the earliest mine on the rich Northampton Mineral Field, in a place that was aptly referred to as ‘the end of civilisation’.

The hard men of Bendigo: confronting the mythology of the Central Otago gold rush

Lloyd Carpenter

School of Humanities, University of Canterbury, NZ

The Otago gold rush left New Zealand with a legacy of a mining heritage landscape, a mythology around the life of the miners and a local identity "The Southern Man" constructed around these. I will look at some of this legacy and heritage as it particularly relates to Bendigo in Central Otago. The common belief is that these were hard men for hard times and while this was the case for Bendigo, the real picture of daily life in this starkly beautiful place is far more complicated than that commonly discussed and used to sell New Zealand consumer goods today.

Bendigo became a community: a place for families, gardens, social occasions, cultural events and meetings, and a place where some families remained for over 40 years. Nevertheless, Bendigo was also a place of heartache: where miners’ houses were destroyed at the whim of capricious shareholders, where miners were hurt or killed

deep underground, where livelihoods turned on the weather-influenced flow of a water in a sluice race, and the chance discovery and exploitation of quartz lodes which promised wealth on one hand and penury on the other, and where business owners and hotel keepers sought to establish a permanent place at a time when settlements, mining wealth and populations rose and fell in mere days.

I will also briefly discuss the results of my recent research into the peculiarly affectionate way New Zealand miners viewed the Australian Bendigo in their writing and memories.

Snowball Creek Copper Mine, Gundagai, New South Wales

Christopher Carter

School of Archaeology and Anthropology, Australian National University, Canberra

The Snowball Creek Copper Mine is located in the South-West Slopes Region of NSW, in the vicinity of the Adelong goldfield. It operated intermittently from the 1870s to the early 1900s. While gold was the lure for the majority to come to the area, this mine attracted a group of miners who had the expertise to exploit the copper ore which had been found in the area. Expertise was required not only to extract but also to process the ore as it was too costly to transport in its raw state.

The Snowball Creek Mine was a small operation, one of several in the region; it required an experienced labour force to both extract and process ore. The operator was able to engage a Cornish mining team to operate the mine during this period and they established a small settlement adjacent to the mine and smelting works. While its success was rather limited, mines of this type collectively contributed to the regional economy and provided a social and economic base for the miners and their families. This paper will examine the archaeological evidence of the mining settlement and its place within the broader history of Cornish miners in this region.

Silver in Queensland: a preliminary study of ore processing techniques

Peter Cloughton

University of Exeter, UK

In the late 1880s there was a rush of silver mining companies formed to work deposits in Queensland and northern New South Wales. Few if any of those companies would have made a long term profit; in fact probably only a few of them made any profit at all. This 'silver boom', as it regularly referred to, was stimulated by discoveries of high grade silver-rich ores and the perceived high price of silver on the international market.

Although the price of silver in the latter part of the 19th century maintained a high price longer than other non-ferrous metals it had been falling steadily since 1883 and was to collapse dramatically after 1890. In addition to falling prices the mining companies had to cope with the economic realities of working in remote areas with limited resources; where bringing the silver-rich ores to surface was only the first in a long series of difficult processes.

This paper examines the choices made in processing the ores prior to shipping to markets outside Australia. It considers potential sources of further information on how and why particular methods of processing were chosen or rejected; what benefits, if any, were or might have been derived from those processes. In addition to conventional historical and archaeological sources, consideration is given to the use of archaeometallurgical analysis as a possible line of research to expand our understanding of the processes, particularly the smelting techniques, used in Queensland and northern New South Wales.

The significance of South Australia's Cornish Mining Heritage

Greg Drew

Australian Mining History Association

In 2006, the Cornwall and West Devon Mining Landscape was inscribed on the World Heritage List. World Heritage status recognises Cornish mining's fundamental influence on World hard rock mining, ore dressing and in particular steam engine technology during the 19th century. During this time Cornwall developed a distinctive regional identity which took on global significance with mass migration of Cornish culture after 1840.

The Australian Cornish Mining Heritage Site (ACMHS) consists of two areas – the Burra and Moonta Mines State Heritage Areas – which contain the most authentic and historically significant components of the Cornish

Mining Landscape in Australia for the period 1845 to 1923. The ACMHS has been shortlisted for assessment for National Heritage listing by mid-2013. The ultimate aim is have the ACMHS joined as a Transnational World Heritage Listing, involving Cornwall, South Australia, Mexico, Spain and South Africa, to the existing Cornish World Heritage Site. This would recognise that the distinctive mining landscapes in those locations were derived directly from the Cornish mining landscape.

To enable the ACMHS to be linked to the Cornish Mining World Heritage Site it will need to reflect the impact of the revolution caused by Cornish mining and ore processing technology which took place in Cornwall in the late 18th and early 19th centuries and was transferred to South Australia after the early 1840s. The evidence can be clearly seen in the transfer of Cornish mining and mineral processing methods, steam technology and associated cultural traditions such as mine management and employment systems to South Australia from the 1840s until the early 20th century.

Overland Gold - researching the journey to the goldfields in the early 1850s

Moira Drew

Cornish Association of Victoria

This paper will describe research into overland travel between South Australia and the early Victorian goldfields and introduce the website where the collected information is being made available.

Research into the overland experience of a group of Cornish miners who left Burra in early 1852 has indicated that little comprehensive information is available, and that a number of other family historians sought to fill similar gaps in their family stories. Of particular interest is detail relating to the routes taken, modes of travel, conditions experienced and the numbers of people involved.

While travel between Burra and Bendigo was the initial focus, and the Cornish involvement is significant, the project covers overland travel generally between South Australia and Victoria in the first years of the gold 'rush', primarily 1851 and 1852. Information sources being sought include diaries and family accounts, newspaper reports, records held by collecting institutions and regional historical societies, published sources and references providing context for the period. Once existing sources are identified, attempts will be made to locate records not so readily available.

A summary of results so far will be given along with an overview of the contents of the website. Case studies of several groups who travelled will be presented. Through the establishment of this resource it is hoped to encourage the sharing of information and raise the level of awareness of this period of extensive migration in Australian history.

The first wave – South Australians and the Victorian Gold Rushes

Charles Fahey

School of Historical and European Studies, La Trobe University, Melbourne

This paper will examine the migration of South Australians to the Victorian goldfields. When gold was discovered in Victoria in 1851, the news quickly spread to South Australia, and South Australians were among the first to dig for gold. Among the early diggers on the gold fields were Isaac Edward Dyason and Edward Snell, both of whom left vivid accounts of the early rushes. Both did remarkably well from digging. The paper will use their accounts to look at life on the early diggings. However, Snell and Dyason were only two of the hundreds who came from South Australia, and the paper will examine this broader migration through analysis of vital records. The paper will argue that the South Australians were important in the move from shallow alluvial mining to more complex deep lead and quartz reef mining. The paper will also explore the continuing link between Victorian mining communities and South Australian mining areas in the years after the great alluvial rushes.

Gold production at Gympie, 1867-2009

John Ferguson

Australian Mining History Association

Gold was discovered at Gympie in 1867 and provided Queensland with its first significant rush and goldfield. Production was continuous until 1924, then restricted to sporadic retreatment of tailings. Modern hard rock mining was resumed in 1994 but ceased again in 2009. Such timeframes, and now the absence of any mining

or exploration, dilute an under-appreciated historical legacy. This paper defines the production and grades attained during the different eras and periods of historical and modern mining.

The Gympie Goldfield was characterized by a high frequency of visible gold and relatively high grades. The gold from narrow veins was free milling and suitable for mercury amalgamation. During the Historical period, many single-shaft mines were located on multiple reefs within the Phoenix and Monkland structural blocks. During the Modern Revival, only one mine operated within the Monkland structural block, using several old shafts plus a new decline shaft. While narrow Gympie veins were the major type of orebody during the Historic period, the Inglewood dyke structure yielded more gold during the Modern Revival.

The Historical period, 1867-1979, involved production of approx 4.5 million oz of bullion. Combined with the 470,000 oz from the Modern Revival period, 1980-2009, the Life of Goldfield total is approx 5 million bullion oz. The relative contributions from the sequential Alluvial, Shallow Reefing, Deep Reefing, Interlude and Modern Revival eras are estimated as 3%, 7%, 80%, 1% and 9%, respectively.

The New Zealand Exploration Company and Aroha Gold Mines Ltd

Philip Hart

University of Waikato, NZ

During the mining boom of the 1890s, 'the Rothschilds' were reported to be investing in Waiorongomai mines. Although no Rothschild had shares in their names, close associates did, through being shareholders in the New Zealand Exploration Company, an offshoot of the Rothschild's Exploration Company. A subsidiary company, Aroha Gold Mines Ltd, was in turn floated to work mines at Waiorongomai. Two friends, a German and a Frenchman involved in the early days of the Thames goldfield, Baron James de Hirsch and Jules George Wilson, were the catalysts for tempting overseas investors, notably those with links to the Paris Rothschilds, to the district. They were encouraged by reports provided by a leading Victorian geologist, Edward John Dunn. Because of his over-enthusiasm, capital was wasted testing reefs that lacked the values he claimed, and over 20 months a low level tunnel intended to be two and a half miles long was driven without success. Directors and investors included prominent financiers, and, like other exploration companies of the time, the New Zealand Exploration Company was profitable for its shareholders, even if the mines were a failure. This was the last significant investment of capital into the Waiorongomai field, which was doomed not because of lack of capital but because, despite Dunn, it lacked payable ore.

The 1962 Kanmantoo copper discovery and its aftermath: a triple whammy

Chris Haslam

In 1960, with only 10 years of mine life remaining, Broken Hill South Limited commenced planning an exploration program in Eastern Australia. The campaign would be innovative, and apply a leading-edge geophysical method (IP) to appraise brownfields areas near large known deposits. Being an entirely new venture for the company, it was decided to "bed down" the operating procedures in an area with good infrastructure, and with easy access from Broken Hill. The Kanmantoo district was chosen, despite its modest production, and field work commenced in 1962. A regional IP survey defined strong anomalism extending several kilometres north from the old workings, and the first drillhole intersected an encouraging 1% copper over a core length of 90m.

Further drilling established the geometry of the deposit, and in 1968 a 58m shaft was sunk to provide a bulk sample for metallurgical testwork. Open pit mining and ore treatment began in 1971 at an annual rate of 830,000t. However, low copper prices prevailed during the 1970s, rendering the operation marginal, and mining was suspended in 1976.

In the early 1980s CRA acquired a group of copper assets, including the 'mothballed' Kanmantoo mine. Copper prices have always been cyclical, but CRA took the surprising step of auctioning the mine plant and equipment, though copper prices were already 30% higher than the average for the 1970s: five years later they had trebled! Kanmantoo, without a treatment plant, became a 'stranded asset' - but that provided the opportunity for Hillgrove.

From Flea Flat to the Shotgun Carnival: J.H. Robinson, mining fields photographer

Nic Haygarth

Freelance Historian and Honorary Associate, University of Tasmania

From 1913 to 1953 John Henry ('JH' or 'Jackie') Robinson framed Tasmania's Waratah district from a tripod. While working for the Mount Bischoff Tin Mining Company granted Robinson all-areas access to a great mining operation, his shutter also celebrated the social life of the region's tight-knit community. The amateur's only studio set - of sun streaming across a rickety garden fence - backdropped many portraits. Waratah was Tasmania's original 'window' on the West Coast wilderness, inspiring Marie Bjelke Petersen's romance novel *Jewelled Nights*. Robinson doubled as stills photographer for the movie shoot of that book as he chronicled life on the Savage River osmiridium fields.

'The 'Merican Expert' L.R. Menzies and his role in a South Australian mining fiasco

Brian Hill

Australian Mining History Association

American 'mining expert' L.R. Menzies, the discoverer of the Menzies gold field in W.A., was the promoter of a gold mining venture in South Australia which in 1898 resulted in the biggest mining fiasco in the colony's history. Menzies floated the Menzies Barossa Gold Mining Company NL which installed the biggest stamp battery in the colony on the renamed Menzies Barossa gold mine in the Barossa Goldfield: the 40-head stamp mill dwarfed all other gold treatment plants in S.A. Designed to treat 600t a week, the mill ran for only a couple of weeks and crushed only 1,500t when it was shut down and the mine closed after a calamitous crushing result when only 30 oz of gold rather than the anticipated 750 oz were recovered. Instead of the expected half an ounce to the ton, the grade of ore in the mine turned out to be only 10 grains of gold per ton which was 1/25th of the predicted grade that had been used to justify the decision to install the large mill. Menzies later wrote a curious autobiography noted for its wild claims and tall yarns.

Retorting and Refining: the heart of the Joadja Creek Oil Shale Industry

Adrian Hutton

School of Earth and Environmental Sciences, University of Wollongong

Much of the Joadja Creek story has been published in book form or articles. However, one area that has been relatively neglected is the retorting and refining sections of the operation. Oil shale (examples are kerosene shale from Joadja Creek and Glen Davis, and tasmanite from Tasmania) is the feedstock of the oil shale industries, past, present and future.

Oil shale is a rock composed of mineral matter and solid organic matter derived mostly from algae. In rock form, oil shale has little use. However, when heated in the absence of air, the solid organic matter decomposes to vapours which can be cooled to liquids with a similar composition to the crude oil which is the mainstay of modern petroleum plants. At Joadja Creek, the retorts were 'D' shaped retorts which were heated from below by either wood or coal. The organic matter in the oil shale decomposed to gases which were condensed in water-cooled equipment and the synthetic crude oil carried by pipes to the refinery section some 150m away from the retorts. In processes not unlike those in modern oil refineries, the synthetic crude oil was separated into useable products such as kerosene, paraffin wax, oils and greases. Some of the refinery products were used in the manufacture of products such as soap and candles.

This paper presents the retorting and refining story of Joadja Creek.

The Rosny Copper Smelter 1846-1850

Roger Kellaway

University of Tasmania

A plan was developed in 1846 to link Tasmanian coal with South Australian copper. Ships travelling south would carry copper ore to Schouten Island and return to Adelaide with a cargo of coal. Smelters at each site would refine copper at half the cost of smelters located in Britain. This concept led to the formation of the Australasian Smelting Company in 1848. The Hobart shares were quickly taken up and a local board formed comprising prominent members of the business community. In Adelaide, investors were slower in getting behind the scheme though eventually sufficient shares were sold to allow a provisional committee to be formed.

At some stage, a division occurred within the company. The Australasian Smelting Company continued to develop the Schouten Island coal mine while a separate company – the Exmouth Smelting Company – began erecting a smelter at Rosny on the Derwent directly opposite Hobart. The major force behind the Rosny smelter was Charles Swanston, Managing Director of the Derwent Bank. Technical expertise was provided by Richard Rodda, a mining expert recruited from South Australia.

The Rosny works may never have been fully operational though small quantities of copper ore were imported from South Australia and New Zealand and the company occasionally advertised for charcoal. Swanston had trouble in separating the interests of the bank from his personal speculations. When Swanston's financial irregularities were discovered, the smelter scheme quickly unravelled as the works were found to be on land not owned by Swanston but by the bank. Rodda tried to keep the scheme alive but in the end returned to South Australia. The Rosny Estate, including the works, was sold to Askin and Morrison. Though both were connected with the Schouten Island group, nothing appears to have been done to finish the smelter. The works gradually fell into ruins; the chimney remaining as a prominent waterfront feature for the next 60+ years.

Treadwell Gold Mines open up the Alaska Frontier 1881-1917

Sheila Kelly

Mining History Association (US)

A century ago, for a moment in time, Treadwell, Alaska was the largest hard rock gold mining operation in the world. The mammoth lode of low grade ore discovered in 1880 on Douglas Island opened up southeast Alaska to trade and tourism and put Juneau on the map. The company town with four mines and five mills housing 960 pounding stamps boasted gracious living complete with club house and heated swimming pool for families that included Sheila Kelly's father and aunts. Her grandfather was a machinist for Treadwell.

Constant refinements of technology and processes resulted in steadily increasing profits. At the same time, underground caving in the mined-out stopes accelerated. A high spring tide triggered a cataclysmic drama on April 22, 1917, when the waters of Gastineau Channel gouged a hole in the weakened surface and poured into a sinkhole, flooding three of the mines. The fabled town was promptly abandoned but it had already established a place in history as the first large scale industrial mining operation that shaped the future of Alaska. Kelly's presentation features stories and rare historic images from her book, *Treadwell Gold, An Alaska Saga of Riches and Ruin*, (University of Alaska Press, 2010).

Mittagong – Marriage of the Iron Age and modern shopping

Leonie Knapman

Australian Mining History Association

Australia's earliest iron works were supposedly officially opened in Mittagong in August 1848. However, in 2011 the remains of an earlier site, now preserved as a display in a parking lot under 'Mittagong Market Place' - a Woolworths store - were discovered. It seems an unlikely place to discover Australia's beginnings as an industrialised nation and it would have been lost except for the role played by Woolworths in conserving the archaeological remains of Australia's first iron smelter.

Excavations for the building foundations of the store uncovered extensive relics of the original iron works, including foundations of the rolling mills and an associated fly/drive wheel pit, timber dampeners for a tilt hammer used in forging, puddling furnaces used to produce wrought iron, and a number of chimney bases and boiler houses.

Woolworths agreed to integrate the discoveries into the development of the site. In doing so they had to forgo sixty car spaces in their underground car park to allow a display space of 40m x 45m to showcase the ruins. Heritage display boards have been erected to help visitors understand the significance of the relics. Until these discoveries, the earliest known surviving foundations of the Fitzroy Iron Works were to the east, near a public reserve, appropriately called Iron Mines Oval.

The Angas Zinc Mine: history and operation to date

Katherine Laughton

Senior Mining Engineer, Angas Zinc Mine, Terramin Australia Limited

Located on the Fleurieu Peninsula in Australia's oldest base metals mining belt, Terramin's Angas Zinc mine continues to show that the viability of these older mining areas is still alive and strong. Positioned in close proximity to the town of Strathalbyn, mining at the Angas Zinc Mine is not, however, without its challenges. The Angas Zinc Mine orebody was discovered in 1991 and the first product shipped in 2008; the mine is now producing approximately 400,000t of zinc/lead ore per year. This presentation will outline the recent history of the Angas Zinc Mine at Strathalbyn, looking at the challenges so far, and the future ahead.

Diggers, dredges and dancing girls: the Araluen goldfield of New South Wales

Barry McGowan

Visiting Fellow, Australian National University

The Araluen goldfield was the largest alluvial goldfield in New South Wales and one of the most productive and enduring in Australia. Mining commenced in 1851, with a long boom beginning in 1858. By the mid-1860s, the population was about 10,000, if not more, and the small syndicates of working miners had given way to large companies with subscribed capital. Notwithstanding a succession of debilitating floods, the main boom lasted until 1871, when floods wiped out many claims. Araluen then entered a slow but steady period of decline, which ended in 1900 with the advent of bucket dredging aided by New Zealand expertise and capital. The last dredge clanked to a halt in 1926.

As the title to the paper suggests, Araluen was famous for more than its gold; its alleged saturnalias and orgies in the 1860s, along with the depredations of bushrangers such as Ben Hall and the Clarke gang, gave much concern to the authorities. Hotel owners hired teams of dancing girls, the new arrivals taking to the floor after an obligatory foot bathing in tubs of champagne. In my paper I address the unusual and intriguing mining history of this field, and discuss the dichotomy between the alleged excesses of the miners and other reports, which portray Araluen as firmly in the grip of middle class values such as respectability and domesticity.

Blame Paddy! Assessing the Klondike goldrush from afar

Robin McLachlan

School of Humanities and Social Sciences, Charles Sturt University, Bathurst

*Billinger is going to lecture on the Klondike. Fudge!
He has never been there.
Well, neither have the people who will hear him lecture.*

This joke appeared in Australian and New Zealand newspapers in early 1898, a time when many were making the decision whether to join the rush to the Klondike goldfield. While newspapers carried up-to-date telegraphic reports, thanks to the undersea cable, and filled their columns with the latest copy from American and Canadian newspapers arriving on steamers, trustworthy eyewitness reports from expert Australian or New Zealand miners were notably absent. There was virtually no-one in the colonies in early 1898 with first-hand knowledge of conditions in the Yukon, let alone the true nature of the Klondike goldfield. Nonetheless, hundreds of Australians and New Zealanders bought all available berths on scheduled and chartered steamers heading for west coast North America. And, hundreds returned home by year's end, pockets empty and chorusing a common line that they had been duped into going. Sour grapes or legitimate gripe? What was the quality of the information available to prospective Antipodean Stampeders?

This paper will assess the nature and reliability of Klondike information available in early 1898. It will be shown that it was a complex slurry of fact and fiction, knowingly shaped by shipping companies, outfitting merchants and other potential beneficiaries, including the Canadian government. Enterprising "experts" added to the mix with lectures and individual consultations – at a price. The final push to "Ho for Klondike", however, may have come from the reported opinion of Australia's sporting celebrity on the spot, Paddy Slavin.

A town built on slate: Willunga and its quarries

Deb Morgan

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As the first wave of immigrants flooded into the new colony of South Australia and spread out across the Adelaide Plain and surrounding districts, one of their first priorities was to get a roof over their heads. For most early settlers this was initially a canvas tent, but more durable shelters soon appeared. Imported building materials were in limited supply, and were expensive, so all but the wealthiest settlers had to make do with primitive huts constructed using whatever materials were at hand – bark and split slabs from the abundant native timber, reeds, mud and thatch.

Some settlers spent months or years in temporary shelters, enduring the extremes of the South Australian climate whilst they waited for government surveys to be completed so they could take possession of their land and set about building permanent homes for themselves and their families. Local sources of suitable, affordable building materials, including timber, stone and bricks, were desperately needed to meet demand.

The time was ripe for an observant young Devonshire man, recently arrived in newly-settled District C, to make an important discovery: one which would give the infant settlement of Willunga a substantial economic boost and leave a lasting impression on its character which is still observable today.

This paper will present an overview of the development of the township and its slate quarries over the nineteenth and early twentieth centuries.

Johannes Menge (1788–1852)

The South Australian Company's Mine and Quarry Agent and Geologist

Bernard O'Neil¹ and Barry Cooper²

¹ O'Neil Historical & Editorial Services

² School of Natural and Built Environments, University of South Australia

Johannes Menge's pioneering work on the mineralogy and geology of South Australia in the period from his appointment as the South Australian Company's Mine and Quarry Agent and Geologist in 1836 continues to be reappraised. In particular, his approach to mineral exploration is little understood. This co-presentation will provide an update of recent findings on Menge's life, his career and exploits, with a focus on his assessments of the geology of Kangaroo Island in 1838. Both his official Company post and his limited mineral exploration on the island were pacesetters for Australia. Indeed, Menge was one of the earliest Australian mineral exploration geologists. A short film depicting Menge's explorations in the Barossa Valley will be shown after the presentation.

The Cornish Crucible: the Mount Lofty Ranges and South Australia's early mining history

Philip Payton

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In discussions of 'Australia's Earliest Mining Era', to use the phrase coined by the late Ian Auhl, the focus is overwhelmingly (and understandably) on the rapid development of the Kapunda and Burra Burra copper mines. The narrative, after a deferential nod in the direction of the Glen Osmond silver-lead workings, usually moves swiftly on to the altogether more significant (or so it is inferred) Kapunda and Burra Burra mines, which soon after their discoveries in the mid-1840s won international acclaim and gained for South Australia its apt sobriquet, 'the Copper Kingdom'. However, with one or two notable exceptions, the early and enduring significance of the Adelaide Hills – the Mount Lofty Ranges – has been overlooked, or at least underestimated. This paper sets out to redress the balance, by looking again at the Hills mining activity, especially in this early period, and by arguing that much that came to characterise the South Australian mining industry – in particular its enduring Cornish flavour – was first evident in the Hills. Place names such as Callington, St Ives, Tavistock and the enigmatic 'Kelynaek' more than hint at a Cornish (and West Devon) influence, while tell-tale mine names like Wheal Prosper, Wheal Fortune and Wheal Harmony likewise speak volumes. Moreover, within this 'Cornwall of the colony', as the local press dubbed it, were Cornish settlers – miners and their families and others – who brought their social and cultural influence to bear within in the locality. In this way, the Hills were indeed South Australia's 'Cornish crucible'.

The Kanmantoo Copper Mine development

Cam Schubert

General Manager, Kanmantoo Copper Mines

The Kanmantoo Copper Mines project is located in the Adelaide Hills region of South Australia, an area which has recorded production of over 39,000t of copper metal, but remains one of the most under explored and prospective base metal provinces in Australia, showing outstanding potential for copper-gold and silver-lead-zinc mineralisation.

The project contains the old Kanmantoo Copper Mine pit, which was in operation from 1970 until 1976, but work by Hillgrove since 2004 has proved up an additional Indicated and Inferred Mineral Resource of 32.2Mt grading 0.9% copper (292,200t metal) and 0.2g/t gold (191,100 oz).

The Kanmantoo Project has outstanding potential as one of the few remaining 'brownfield' copper-gold opportunities in Australia. With licensing and planning now completed and finance in place, Hillgrove is now undertaking construction of the second hand Pilbara ore processing plant and surrounding buildings, as well as the tailings storage facility and administrative offices, with the aim of bringing the mine into production by the last quarter of 2011. Ample water is available to operate the mine, with the majority of its process water coming from treated waste water from the District Council of Mt Barker Laratinga Water Treatment Plant.

The potential for further discoveries and growth of the global copper/gold resource at Kanmantoo is high. The deposit appears to remain open along strike and down dip where additional drilling could materially increase the resource inventory. The Kanmantoo Mine development is poised to go into production in late 2011 for what will be Australia's latest mid-sized copper mine.

When is a store not a store? When it's a smelting house

Jason Shute

Burra could have more of its history on its hands than it presently believes. Its claim that the substantial stone building at the mine entrance is the mine store, of 1847 vintage, is impressive enough, but what if it is something more and somewhat older? What if it is none other than the colony's earliest mine smelting house? Any one hundred-by-thirty foot building of masonry construction, being erected in the Burra Mine's vicinity as early as New Year 1846, had to be one of the more impressive structures in 'rural' South Australia of the time. Records show that the Mining Association's forlorn hopes for local smelting soon saw the smelter declared redundant, certainly by June 1848, even before the Patent Copper Company's smelting initiative of that September. However, one does not throw away such a valuable investment; one utilises it for some other purpose.

This paper suggests that ST Gill's watercolours of the building bear testimony to the fact that we are perceiving the very same structure, occupying precisely the same spot at the mine entrance, through the three-year period of its transformation from Smelting House to Store. Gill throws only one spanner in the works of our straight-forward acceptance of the evidence for the transformation as indicated in the SAMA records: his depiction of an upper storey of some dimension. Today's building is clearly of single storey. Can this circle be squared, rendering Burra more a significant heritage than it currently knows?

The Law of Unintended Consequences: mining at Brukunga and its environmental aftermath

Ross Stevens

Mine Completion Group, Primary Industries & Resources South Australia

*The best laid schemes of Mice and Men oft go awry,
And leave us nothing but grief and pain,
For promised joy!- Robert Burns 1785*

It all started after World War II: returning servicemen and assisted immigrants were encouraged by the South Australian Government to clear and develop the land and increase agricultural production in the state. Australia realised it was isolated from the UK and promoted self-sufficiency, population growth and agricultural development. The problem was that the poor quality South Australian soils required superphosphate fertiliser to sustain cultivated crops. In the 1950s there was a critical shortage of sulphuric acid for superphosphate production. The Brukunga Mine was encouraged and sponsored by both the State and Commonwealth Governments to ensure that Australia was self-sufficient in supplies of sulphur for

superphosphate production. Pyritic minerals were quarried at Brukunga as a source of sulphur for the production of sulphuric acid, which was then used to manufacture fertiliser in Adelaide. The mine commenced production in June 1955 and continued for 17 years, closing on 31st May 1972.

The first of the unintended consequence was from the very beginning of the mining - the natural oxidation of pyrite minerals as they were exposed to air and water, resulting in the formation of sulphuric acid drainage seeping from the waste rock dumps, tailings dam and mine voids. The acid drainage dissolved heavy metals from the rock causing heavy metal pollution. Aided by Dawesley Creek that flowed through the mine site, the acid drainage and heavy metal pollution were carried downstream into Mt Barker Creek, Bremer River and Lake Alexandrina, impacting the freshwater ecosystem and rendering the water unfit for drinking, stock watering or irrigation.

This presentation will focus on the evolution of post-mining remediation strategies, starting with work done by the mining company, the transfer of the site to government control, the building of the treatment plant, the diversion of Dawesley Creek and finally the current strategy. Despite the best laid schemes, each stage of remediation has triggered the Law of Unintended Consequences. The presentation will discuss the ramifications of each of the Unintended Consequences and end with how the current strategy plans to beat this Law.

The first geophysical surveys for minerals in Australia

Rob Vernon

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

In the last decade of the 19th century the Englishmen Leo Daft and Alfred Williams developed an earth resistance surveying method for prospecting for mineral lodes. After field trials in the USA, they brought the method to England in 1900 and established the first geophysical prospecting company in the world, the *Electrical Ore-Finding Company Limited*.

Ernest Lidger, was originally a State mining geologist working in the goldfields of Victoria. However, he gave up this position, and came to England to promote Australian gold mining. Whilst in London he heard about the Electrical Ore-Finder, and decided to gain a licence from the inventors to bring a set of equipment and operators to Australia in 1903.

Initially, geophysical surveys were conducted on the Hampton Plains Estate to the south of Kalgoorlie, Western Australia, and later at Kalgoorlie. Nothing conclusive came from the surveys and others took up the venture to use the equipment in the Cobar district of New South Wales, and on gold prospects in Victoria, for example.

In South Australia surveys were conducted at Port Lincoln, Kapunda and Kadina. The last known ore-finding surveys were conducted in October 1907 at the Hamley Copper Mine, Moonta. Development work was conducted from Treuer's Crosscut to intersect a lode identified by the Ore-Finder survey. Despite the exploratory work continuing until the end of that year, no lode was found.

This is apparently the first recorded use of geophysical prospection for minerals in Australia. The paper describes the equipment and the surveys conducted.

EIGHTEENTH AMHA CONFERENCE, WAIHI NZ, 2012

ABSTRACTS

Prelude to the Strike? The 1911 New Zealand Royal Commission on Mines

Hazel Armstrong

Wellington lawyer specializing in employment law and occupational health and safety,
and

Tom Ryan

University of Waikato

In the first decade of the twentieth century, royal commissions in both Australia and New Zealand sought to deal with growing public and political concerns about their mining industries, especially occupational health and safety issues. The report of the 1911 New Zealand Royal Commission on Mines was the outcome of one of these inquiries, and is an under-utilized source for understanding mining at Waihi immediately prior to the 1912 strike. This presentation is based on its narratives from Waihi miners and their union representatives, and its data on fatalities, injuries, and industrial illnesses. It also focuses on the system of workers' compensation at Waihi around that time and its significance for industrial relations.

So Much Potential, But So Little Copper: The Mount Cannindah Mine and Smelters

Peter Bell

Historical Research Pty Ltd

Mount Cannindah in south-eastern Queensland hosts a porphyry copper deposit large enough to be of great interest to prospectors, although complex in structure and low in grade. It has been the scene of perpetual promise and repeated disappointment during four successive periods of operation spanning 70 years from the 1890s to the 1960s. Only one of these episodes was really productive, and then only briefly.

Many times Mount Cannindah has seemed on the brink of a bright future but has actually produced very little copper. It has not been for want of effort and skill: the mine has been operated by experienced investors who have engaged the best talent in the industry and installed state-of-the-art technology, but somehow miscalculation or sheer bad luck has always defeated their efforts. The road leading to the mine site today is called Misfortune Road.

The story of Mount Cannindah tells us much more about the optimism of mining investors than about metal production. The total output was only about 1,000 tons, an amount that Mount Isa and Olympic Dam today produce every few hours. Since 1965 there has been no copper production, but the ore is once again in the advanced stages of exploration and planning for production.

'The Inimitable Mr Thatcher' and Joe Small: Trans-Tasman Songsters on the Goldfields

Ross Both

Formerly of the Economic Geology Department, University of Adelaide, and current member of the South Australian Mining Heritage Group.

Entertainers were an integral part of nineteenth century life on the goldfields, with Charles Thatcher and Joe Small two of the most popular in both Victoria and New Zealand. Both men had followed the gold rush to Victoria in the early 1850s but after early attempts at mining turned to entertaining, writing and performing their own songs set to popular tunes of the day.

Thatcher soon became renowned for his wit and satire, with songs that reflected life on the goldfields, recounted local scandals, and mocked authority. One early report commented that 'if circulated in England [his songs] would give a much better idea of life at the goldfields than most of the elaborately written works upon them do'. He became known as 'The Inimitable Mr Thatcher' and was also dubbed 'The

Colonial Minstrel'. Thatcher's output of songs was prodigious, with many published in songbooks or as broadsides. He has been described as the vocal equivalent of the artist S.T. Gill. His popularity was largely due to the topical nature of his songs. Few remain well known today, although a small number have entered the folk music genre. Small's songs were less topical and witty. He played the part of a pseudo-Irish comic, identifying with the misfortunes of the underdog. His most popular song, 'The Unfortunate Man', was a favourite with audiences throughout his career, particularly in New Zealand.

Two New South Wales Mineral Provinces, Two Faults, and Two Geologists

David Branagan

School of Geosciences, University of Sydney

Two quite dissimilar mineral provinces, the Sydney-Gunnedah coal basin and the adjacent metal-bearing New England Orogen, are separated by an important fault system, the Hunter–Mooki Thrust. Within the New England Orogen two distinctly different regions are separated by another distinctive fault, the Peel Fault, marked by the occurrence of serpentinite, and a variety of mineralisation. Study of these fault systems owes much to the work of two geologists, W.N. Benson (1885-1957) and G.D. Osborne (1899-1955), who wrestled with the tectonic complexities of the region, Benson between 1909 and 1920, and Osborne between 1920 and 1950.

Early Geologists at Waihi (1897-1924)

R L (Bob) Brathwaite

Minerals Geologist, Contractor. GNS Science

The first geological reports on the gold-silver lodes at Waihi were not published until after 1896 (Park, 1897; Morgan, 1905; 1924; Lindgren, 1905; Finlayson, 1909; 1910; Bell and Fraser, 1912; Jarman, 1915).

James Park (1857-1946) was born in Scotland, studied at the Royal School of Mines (RSM), London, joined the New Zealand Geological Survey (NZGS) in 1887, was a director of the Thames School from 1889-1896, and was Professor of Mining at the Otago School of Mines from 1901 until 1931.

Percy Morgan (1867-1927) was born in Tasmania just before his family settled in Otago, and graduated from Otago University with an MA (1891) and Associate of the Otago School of Mines (AOSM) (1893). From 1897 until 1905 he was the first director of the Waihi School of Mines, then joining the NZGS, of which he was director from 1911 to 1927. In the early 1920s he resurveyed the Waihi district (NZGS bulletin 26) to determine the potential for discovering new ore bodies either in depth or lateral to the lodes already worked (Morgan, 1924).

Waldemar Lindgren (1860-1939), one of the giants of economic geology, was a Swedish-American geologist who in 1904 noted that the Waihi lodes were hosted by a porphyritic dacite and showed similar features to the Tertiary gold-silver veins of the western USA (Lindgren, 1905).

Alexander Finlayson (1884-1917), born in Otago, gained an MSc and AOSM from Otago. He published papers on the geology of Hauraki (1909) and the ore deposits of Waihi (1910) during the time he gained a DSc at the Royal School of Mines.

Bell and Fraser (1912) described the geology and mine development at Waihi in NZGS bulletin 15. James Bell (1877-1934) was born in Canada, gained a PhD at Harvard (1904), was director of the NZGS from 1905 to 1911 and an international mining consultant based in Canada from 1912. Colin Fraser (1875-1944) was born in Coromandel, gained an MSc at Auckland University College, and joined the NZGS in 1906. He was a consultant geologist based in London from 1911 to 1914 before moving to Melbourne and becoming a director of many prominent Australian mining and metal refining companies.

Arthur Jarman (1887-?) was born in England and was an Associate of the RSM. Whilst professor of Mining Engineering at Auckland University College from 1906-1908 he studied the geology of the Waihi Grand Junction (Jarman, 1915).

Some of these early geologists engaged in controversies over the presence or absence of secondary enrichment with depth in the Waihi lodes and whether the host rocks of the Waihi lodes are a sequence of lava flows or an intrusive body.

Quartz Adventures in a Remote Central Otago Valley

Lloyd Carpenter

University of Canterbury

In the headwaters of Bendigo Creek is the Rise and Shine Basin, a beautiful valley with a confusing pattern of sluice scarps, mine shafts and adits, mullock mounds, dry water races, and the detritus of 85 years of mining. A comprehensive study of the area's archaeology and its mining history yields a fascinating farrago of mining successes and failures, wild dreams and harsh reality, revealing the Rise and Shine area to be a place where a golden fortune remained elusive, but where assorted small groups of miners wrestled with an unusual geology, a harsh environment, capriciously patchy gold deposition and, as they did, made this remote valley their home for nearly nine decades. This paper surveys the mining industry of the Rise and Shine Basin, especially in terms of its remaining archaeology.

Johnny Aspinall

Wendy Carter

Interested in bush history

Alf Thompson, a prospector in the Eastern Goldfields of Western Australia came across Johnny Aspinall's grave back in 1980, when he was out looking for gold at Hawk's Nest, west of Laverton. He could read on the piece of tin on the grave that Johnny came from Otago and that he had been killed at Hawk's Nest but he could not make out how this had happened as the writing had faded on the piece of tin on this mound of red earth surrounded by bush. After five years caring for the grave on subsequent prospecting trips in the area and not knowing any newspapers by name, Alf wrote a letter about the grave with the inscription and the location to "A Newspaper", Dunedin, New Zealand. As a result he received a number of letters in a very short time and ended up both travelling to meet family members in New Zealand as well as taking them out to visit the grave in Western Australia. This presentation looks briefly at the life of the diarist from New Zealand to his early death in Western Australia.

The Waihi Strike: Some New Evidence

Mark Derby

Chair, Labour History Project

In recent years the Waihi museum has acquired a large and unusual cache of primary documents – letters, telegrams, reports, and publications – dealing with the Waihi strike. They formed part of the personal collection of an Auckland unionist closely involved with the strike from the outset, and include many documents not previously cited in any published work. This paper examines the historical significance of this collection.

An Incident at Mount Morgan: Company and Class Loyalties in a Central Queensland Gold Mining Town, 1883 to 1902

Erik Eklund

Monash University

This paper uses the marriage of Mount Morgan general manager, Wesley Hall, as a point of departure to explore the forms of company dominance at Mount Morgan. On return from his honeymoon in 1889 both the company and the town offered an almost ritualistic public expression of his fine qualities and the loyalty of the workers to his wise leadership. The town band played outside his home, and a crowd of thousands cheered and applauded the appearance of Wesley Hall on his balcony to thank them for their

welcome and the band for their music. ‘Loyalty’ is probably the best word to describe the social relationship between the company officers and their employees. In this period the company was the focus of allegiance and identity. The interests of the masters and those of the men were seen to be in sweet harmony. Capital and labour were reconciled, or at least labour had reconciled with capital.

For the next 12 years, however, this company control was gradually eroded so that company-sponsored local parliamentary candidates were challenged in 1899, and ultimately defeated by labor candidates in 1902. Using original research and Betty Cosgrove’s excellent thesis on Mount Morgan history, the paper follows this shift from company control to class expression.

The Buchan Proprietary Company: A Victorian Mining Swindle

Jim Enever

Retired mining engineer

The Buchan Proprietary Company was formed in the 1890s, ostensibly to mine the supposed extensive deposits of lead carbonate ore that were imagined to exist in the limestone surrounding the town of Buchan in East Gippsland, Victoria. Small pockets of argentiferous galena had been extracted from the limestone from the 1860s by a succession of companies, without a sustainable operation being established. The 1894 prospectus of the Carbonate Gold and Silver Mining Company (the forerunner of the Buchan Company) promised to change all this by establishing a major operation based on the mining of the supposedly previously ignored lead carbonate ore.

The face of the new company was Colonel Cecil C. Morgan, an English mining adventurer who had gained some notoriety in the USA managing mines in the carbonate belt of Leadville, Colorado, and elsewhere. Morgan had come to Australia in 1892 to manage the British Broken Hill mine, but after a relatively short and colourful stay there he appeared at Buchan. The next two years were a sorry tale of misappropriation of shareholder funds to support his extravagant and erratic lifestyle, with little or no evidence of any substantive mining activity. Events finally caught up with Morgan in 1896, resulting in his sudden departure from the country and the winding up of the company. Never brought to account, Morgan returned to the USA to continue similar activities.

W.H. Rands: Pioneer Geologist of Early Queensland

John Ferguson

Retired agricultural researcher

William Henry Rands (1855 or 1862-1914) arrived in Queensland in 1884 to work within the Department of Mines and later as a private consultant. His publications provide a wealth of historical and geological information, but his tenure as Government Geologist from 1899 to 1902 was terminated by budget cuts and intrigue. Passing away in 1914, still single, he had drifted into obscurity.

Rands’ career and life were influenced by a youthful Queensland Geological Survey Department and science of geology; R.L. Jack and family, his superior, mentor, and friends; the Gympie goldfield, which he ‘put on the map’; and the North Chillagoe – James Duffy Affair, which did him unjustified harm. His legacy includes numerous reports, maps and other publications; accurate descriptions of many early mineral fields; a fossil collection; an underground dyke at Gympie; and a lonely grave at Toowong.

Rands was a productive, descriptive field geologist of his era. As Government Geologist, sandwiched between two icons (R.L. Jack and B. Dunstan) he appears unspectacular and is barely acknowledged. Although he is almost unknown and little is recorded of the private man, this enigmatic character left a significant footprint and warrens greater recognition.

Three Centuries of Mining in Waihi

Glen Grindlay

General Manager, Newmont Waihi Gold

The early goldfields weren't just about digging underground and raw muscle power. The region became known as a centre for innovation, invention and scientific investigation. Waihi fostered the development of the cyanide process and refined its technology used to extract gold from low grade ores. This opened up new areas for mining that previously had been uneconomic.

Gold mining in Waihi now spans three centuries. The original Martha underground mine operated until 1952 but the increasing price of gold created renewed interest and in 1987 the Martha was reopened as an open pit operation. Mining returned underground in 2006 with the opening of Favona mine followed by Trio in 2011.

This paper will briefly summarise the major events leading up to the discovery of gold, the emergence of the industry in the nineteenth century and its demise in the middle of the twentieth century, The resurgence of the industry in the 1980s will also be covered, as will current plans for the future in Waihi.

Billy Nicholl and the Discovery of the Martha Lode

Philip Hart

University of Waikato

William Sharman Crawford Nicholl, known to all as Billy, commenced mining at Thames when aged 16. He spent the rest of his life almost until his death in 1937 prospecting in several districts in New Zealand as well as Fiji and the Klondike, but he only made one major discovery: the Martha lode at Waihi in December 1880. But others challenged his claim to have discovered this, especially John McCombie. As both men wrote about their prospecting at Waihi, it is possible to compare their accounts and determine who was right. The paper also uncovers the identity of Martha, over which there has been much disagreement, and reveals the financial reward for a lifetime of prospecting.

The Alluvial Gold Rush, Rocky River, New South Wales

Adrian Hutton

School of Earth and Environmental Sciences, University of Wollongong

The discovery of payable gold in 1848 and 1851 was a watershed in Australia's history. The gold rushes that followed saw a rapid growth in population and the beginnings of unrest and a push for equality of rights. Gold was discovered at Rocky River, a village near the small town of Uralla in the New England area or Northern Tablelands of NSW in 1851. The first workings were alluvial ones, soon followed by deep leads under the basalt-covered caps of the nearby hills. Later attempts made to discover the veins that produced the gold met with little success. Once again, exploration licenses have been issued to look for gold in the same areas.

The alluvial workings were small operations, although some companies were formed and dredging done: the Chief Inspector of mines recommended dredging equipment similar to that used in New Zealand. As elsewhere, water was a problem, and several lagoons or dams and water races were constructed. This presentation will document the workings of the 1850s and 1860s, the move to deep lead mining and dredging, and also touch upon social aspects.

Education and Career Paths of Professional Engineers and their Support Staff in Japanese Coal Mining Companies

Horishi Ichihara
Surugadai University

This paper gives an overview of the processes of development and decline of the coalmining industry in Japan, with a focus on technological innovation and examining the effects on the duties of engineers and other engineering staff who have advanced technological innovation in sections responsible for coal mine development, mining, ore dressing, and machinery, and of the differences of their educational backgrounds and careers. In Japanese firms, educational background has had a decisive effect on decisions on employee job assignments and compensation. Its influence has been stronger in coal mining firms than in other industries. This paper will consider the distinctive characteristics of human resource management in Japanese coal mining forms, which differ completely from those of Australian mines.

The growth of Japan's coal mining industry began when the new Meiji Government, established in 1868, began developing mines using technologies imported from the West. Coal was an important Japanese export throughout the 1920s, with major business groups such as Mitsui and Mitsubishi generating their greatest earnings from their coal mining businesses. Beginning in that decade, companies introduced new technologies such as the long wall mining method, the coal pick, and the coal cutter to reduce costs during the economic slowdown. Thus advanced the modernization of Japanese coal mining. The industry began to wane in the latter half of the 1950s as demand in the market was taken over by petroleum, and it disappeared at the start of the 21st Century, despite efficiency improvements resulting from technological innovation.

The Thames School of Mines and Mineralogical Museum Collection

John Isdale
New Zealand Historic Places Trust and Thames School of Mines Mineralogical Museum

In 1870, three years after the proclamation of the Thames goldfield and the year before the great Caledonian bonanza, the formal collection of minerals began by the Thames Mechanics Institute as an aid to gold mining. Economic utility as well as elements of self-improvement, education, and increasing the store of knowledge were aspects of the collection's creation and retention. Donations of samples from successful mines proved a valuable resource for others, showing which ores in the words of the School of Mines' 1901 syllabus 'had been shown to give returns'. As a teaching tool the collection has a focus on mining and supporting the teaching of geology.

The opening of Ohinemuri, with its complex ores, in 1875 made the need for more effective processing even more pressing. The 1885 establishment of the Thames School of Mines was part of the effort to address this, and the mineral collection moved to the school from the former Mechanics Institute. In the late nineteenth century it was the largest school of mines in New Zealand, and the collection grew to such an extent that in 1900 a dedicated museum was built to house it.

As mining declined in the twentieth century, the collection continued to support gold mining, including at Waihi. When the school closed in 1954 the mineral museum continued under the control of the borough council. By 1958 a modest revival of interest in gold mining saw a Canadian mining company based in the school buildings. Eventually this revival saw base metal mining at Te Aroha, silver on Great Barrier Island and at Maratoro, and gold at Waihi; the collection reflects this work and the 'rock hound' era of the later twentieth century. After the Historic Places Trust took over the school and its mineral collection in 1979 the focus has been on maintaining the buildings, not adding to the collection, which today is an authentic nineteenth century mineralogical collection housed in New Zealand's best-preserved museum.

James Gow Black: The ‘Dunedin Professor’ and the Tasmanian Mining Industry

Roger Kellaway
University of Tasmania

In 1871, James Gow Black (DSc Edinburgh) was appointed Professor of Natural Philosophy at the University of Otago. This post was partly funded by the Provincial Government to apply science to issues important to the province’s economy. By the mid 1880s, Black had established a trans-Tasman reputation by taking the training of miners beyond the formal Schools of Mines into the gold mining townships scattered throughout New Zealand. This introduction to mining life took him into deeper involvement with the industry. While his principal academic interests were in mineralogy and the chemistry of ore deposits, he became increasingly involved in preparing material for company prospectuses and was an active investor.

This paper assesses Black’s interaction with the Tasmanian mining industry during four visits to Tasmania. The first, in the summer of 1889, was to investigate mining and smelting processes that could be applied to the recently discovered tin deposits on Stewart Island. The interaction in this case was actually a twoway process, as Tasmanian prospectors had been there before the finds were made public. The second and longest trip was to Zeehan in the summer of 1891-2, his main legacy being his involvement in the establishment of the School of Mines. His third and fourth trips, in the summers of 1902 and 1903, involved experimental work on the Mersey oil shale. The presence of numerous New Zealand expatriates, often former students from the Otago School of Mines, was revealed during his work in Tasmania.

History of South Portland Cement Ltd, New Berrima, New South Wales

Leonie Knapman
Author and historian

The growth of a country, especially its infrastructure, can be measured by the amount of concrete it uses. New Berrima, in the Southern Highlands, has been an important cement manufacturing centre since 1927. When Southern Portland Cement’s first kiln was fired in May 1929, it was expected, correctly, to bring a blaze of prosperity to New Berrima. This company, now Boral Cement Berrima, continues to bring wealth to the district.

Geographically, New Berrima was ideal, and it had large quantities of shale, coal leases nearby, and the foundations of an old railway line through the worksite. A permanent supply of water was only 1.5km away, and a plentiful supply of limestone was available at Marulan. Canberra, to the south, had no other supplier, and its plant could meet demands in other parts of the state. As Canberra grew, so did the demand for cement, and such massive projects as Warragamba dam, the Snowy Mountains Scheme, the Sydney Opera House, and interstate freeways all required SPC cement.

This paper traces the history of the plant from the first five kilns to the building of kiln no. 6, which introduced dry process technology.

Chasing the Scarlet Runners: Women in Waihi

Cybele Locke
Victoria University (and once played for a social netball team called the Scarlet Runners)

The women of Waihi played an active and innovative part in the 1912 strike, often stepping well beyond the accepted bounds of female behaviour for that period. Some, known by the admiring name of the ‘scarlet runners’, acted as covert couriers for the strikers, often at considerable personal risk. This paper examines the place of women in Waihi during the most tumultuous events in the town’s history.

The 1912 Strike: Casting a Long Shadow over Waihi

Peter McAra

Writer and part-time lecturer at the University of Wollongong

This paper is based on my childhood memories of Waihi in the 1940s. My grandfather worked at the battery during the 1912 strike and my father often mentioned the strike, which had huge and long-lasting implications for the local community. During my early years at school we learnt not to associate with kids whose families still wore the scab label. By contrast, we were required to be ‘good mates’ with the children on the men who were on ‘our side’. I suspect some kids grew up feeling outcasts – everyone knew they were tainted by their parents’ past.

“New Zealand Australia” – Similar, but not the same: Australians and New Zealanders on the Klondike, 1897-1899

Robin McLachlan

Charles Sturt University and Times Past Productions ‘New Zealand Australia’ was the home address recorded by a Mountie for two New Zealanders, for to him, ‘New Zealand? Australia? What’s the difference?’ The Australians and New Zealanders who went to the Klondike did have much in common, sharing a British imperial heritage and coming from societies shaped by gold mining. Their letters home are at times so similar as to be indistinguishable.

Yet the Klondike Rush reveals some telling differences between Australians and New Zealanders. Some are perhaps not surprising, such as the comparative indifference with which the larger nation regarded the opinion of the smaller. Other differences are more curious, such as the disparity in the numbers of women and professional boxers, while the relative numbers of indigenous prospectors perhaps reveals another order of difference. There are as well differences in collective behaviour that eye witnesses ascribed to national character, one party being considered especially troublesome.

Did the practicalities of the Klondike, however, override the peculiarities of national differences? An overarching question to be explored is whether they were drawn together when their combined numbers were overwhelmed by the American presence. The answer reveals an occasional trans-Tasman ‘pulling together’ – but nothing to write home about.

Striking a Balance: An Oral History of the Waihi Strike

Doreen McLeod

Waihi’s Gold Story Manager, Newmont Waihi Gold

One of the most significant events in the history of Waihi was the bitter May-December 1912 miners’ strike. In 2005 Newmont Waihi Gold initiated and funded the Waihi Heritage Vision Oral History Project to record the memories of elderly former miners and their families. Over the years descendants of families have been reluctant to talk about the strike and the conflict and political upheaval that resulted. Recently, however, we have been recording ‘subject specific’ anecdotal evidence that focuses on recollections of the strike and responses to it. These stories have given us an insight into how society memorializes an event. During the strike there were many accusations from both sides. Some saw police actions as heavy handed, some said the strikers were taking the law into their own hands, while others said the mining company had inflamed the situation.

Much has been written and analysed over the last 100 years. This presentation does not attempt an in depth analysis. This is the story of the strike as related by the descendants of families who were involved in the event in some way. It’s the story they were told, and which they now retell. The interviews have uncovered divergent stories of the same event, but it has become obvious that no one involved, whether strikers, ‘scabs’, or police, were lily white.

Mercury Mining: A Quick History of Quicksilver in Australia and Even Quicker in New Zealand

Ken McQueen

University of Canberra

In the nineteenth and early twentieth centuries there were optimistic attempts to mine mercury in Australia and New Zealand, but despite the strong demand production was minor, largely due to the characteristics of the mercury deposits and the niche nature of the mercury market. Labour costs, metallurgical difficulties, and the eventual phasing out of mercury use were also detrimental factors.

Mercury was first discovered in Australia in 1841 near the Cudgegong River in central New South Wales, and the first attempts at mining took place there in 1869. In 1872 cinnabar was discovered at Kilkivan in Queensland, and Samuel and William Hester, experienced miners who had worked in the mercury mines of California, together with W.H. Eldred conducted successful mining and retorting there in 1874-6 and 1891-2, producing 13,664lb of mercury. More discoveries were later made in northern New South Wales, but the elaborate furnace-retort constructed at Pulganbar in 1912 was a complete failure.

In New Zealand, mercury was first detected near Lake Omapere, in Northland, in 1870, mining taking place briefly in 1895. After 1929 a plant at Ngawha obtained about 42,000lb from mercury bearing hut mud. From 1910 to 1934 intermittent cinnabar mining at Puhipuhu produced about 36,300lb. The only other operational mine was at White Rocks, in the Karangahake gorge.

During World War II mining revived in both Australia and New Zealand, prompted by the need for mercury for detonators and primers. The reopened Puhipuhi mine was considered so important that it was to be destroyed in the event of a Japanese invasion.

Ohinemuri: New Zealand's Most Accessible Historic Mining Area

Neville Ritchie

Department of Conservation

The Ohinemuri goldfield is one of the three sub-fields (Coromandel, Thames, and Ohinemuri) which make up the Hauraki goldfield. It was the last of these fields to be opened in the 1870s, but proved to be by far the most productive, both historically and in modern times as evidenced by the on-going Newmont Gold operation at Waihi.

Despite its limited geographical extent – basically the catchment of the Ohinemuri River and in particular the hills on either side of the Karangahake Gorge between Paeroa and Waihi – the area has some great advantages for mining heritage tourism. It is close to three major population centres (Auckland, Hamilton, and the Bay of Plenty); State Highway 2 between the Waikato and the Bay of Plenty cuts through its centre via the Karangahake Gorge; and it has some spectacular historic mining remains, especially in the vicinity of Karangahake. Consequently the historic hard rock mines of Ohinemuri are New Zealand's most accessible and most visited.

This presentation highlights some of the main attractions and recent developments which have further increased their accessibility, appeal, and educative value to mining enthusiasts and visitors.

Women's Voices and Mine Safety

Louise Roche

Daughter of Stanley Roche, author of *The Red and the Gold, an Informal Account of the Waihi Strike*,
and
Alfred Hill

Stanley Roche published *The Red and the Gold, an Informal Account of the Waihi Strike* in 1984. This book breathed new life into the popular understanding of the strike by portraying the strike as a personal as well as a political event. From listening to and recording the voices of the people who experienced the strike as children, Roche developed the view that history is unreal unless it includes details of day-to-day domestic life, including women's roles. This paper will trace the research that led Roche to challenge the commonly held view of the women of Waihi as strikebreakers. It will also critically examine the role played by modern day mining companies and unions in ensuring the safety of miners and by association that of their 'wives, mothers, and sweethearts'.

Blood on the Iron: Demythologising Industrial Conflict in the Pilbara, 1970s-80s

Tom Ryan

University of Waikato

A generation ago the Pilbara iron ore industry registered in the Australian consciousness for just two reasons: first, its dramatic shift from zero to major player in the West Australian economy; and second, its unprecedented levels of industrial conflict, said to be 25 times greater than the wider Australian mining sector. In the late 1980s, the corporations hit back hard; in several areas they created union-free zones, and everywhere they seriously undermined union power. By the 1990s, in both scholarly literature and the minds of many Pilbara residents, the iron ore workers were represented as authors of their own misfortune. The popular myth was, and probably still is, that their strikes were too often over such irrational issues as ice cream, duck d'orange, and toothpicks!

Based on my own 1970s experiences as a worker and union secretary in a large Pilbara mine, I suggest an alternative scenario. I do not recall any union launching industrial action on such silly pretexts; usually disputes were about wages or conditions, or in direct response to stand-downs by the company during its dispute with another union. A persistent memory, moreover, is of workers' outbursts of anger at the growing list of accidental deaths and injuries – and at the employer's perceived failure to deal with these tragedies. There was a strong correlation between high levels of, on the one hand, workplace deaths and injuries, and on the other, worker and union activism. A distaste for spilled blood, rather than a taste for fine food, is the spectre haunting my counter-scenario.

The Australian and Other Influences on the Development of Gold-Saving on the Thames Goldfield

Russell Skeet

Part time researcher, writer, tour guide, and over time an
office holder in every heritage group in Thames.

The development of the Thames goldfield was a remarkable achievement, not least for its engineering and technological development. Victorian assistance facilitated the spectacular construction over a relatively short time of a dynamic and relatively complex industrial capacity.

Enchanted with hopes of easy and quick riches, miners flocked to Thames after it opened on 1 August 1867. And with them, unrecognized by history, but equally important, came the legions of supporters, foremost amongst them the engineers. Some had worked in the far-flung reaches of empire, often with a finely honed and pragmatic approaches to finding engineering solutions imparted from recent experience on the Victorian goldfields. And sales reps and company owners from Victorian engineering firms studied conditions at Thames and readied themselves for a business opportunity that would, in a very short time, be ripe for exploiting.

This presentation explores the coming together of hard-working pick and hovel miners, speculative and entrepreneurial capitalists, and nuts and bolts engineers to create one of the most exciting bonanza goldfields seen in New Zealand, with gold to rival anything found elsewhere in the world. It will also reveal something of the personalities involved and the constructions they facilitated.

The Impact of the Thames Gold Rush on the Culture and Livelihoods of Local Maori

Nicole Thorburn
University of Waikato

The middle of the nineteenth century was a time of immense change for Maori of the Hauraki and Coromandel area. As the discovery of gold brought thousands of prospective European diggers to the region, local iwi showed leadership and agency in adapting to the challenges of the gold fields. Unlike previous histories of Thames, which have sometime sought to push Maori involvement on the gold fields to the background, this paper sets out to bring the social and economic ingenuity of Hauraki Maori into the spotlight.

New Discoveries Leveraging Off a Rich Waihi Mining History

Lorraine Torckler
Geology Manager, Newmont Waihi Gold

The discovery of gold at Waihi saw the development of an epithermal gold silver vein deposit that still stands as New Zealand's largest gold mine. The Waihi mine produced 4.9Moz of gold and 20Moz of silver over a 70-year period to 1952. As a world class deposit it attracted significant scientific interest that was well documented during its life, and these early reports, combined with the carefully drafted mine plans, many of which we still have due to the foresight of some enterprising individuals when the mine closed, have enabled us to reconstruct the geology, structure and distribution of gold and silver bearing ore with state of the art 3D modelling software. These models have provided keys to help unlock the geology and resource potential of the greater Waihi vein field, and have contributed to the reopening of the Martha mine as an open pit and the subsequent discoveries of Favona, Trio, and more recently Correnso.

On the Move: Re-siting Waihi's Cornish Pumphouse

Kit Wilson
External Affairs Co-ordinator, Newmont

Waihi's Cornish pumphouse was built in 1904 to house steam engines and pumping equipment to dewater the Martha mine. Within a decade electricity arrived and the pumphouse was decommissioned, but kept in good working order until 1929. In the early 1930s the building was stripped of its machinery, and remained derelict until the closure of the mine in 1952. When the Martha reopened as an open pit operation in 1987 the mining licence contained a condition that required its owners to take all necessary precautions to protect the pumphouse. By 2005 it was clear that this 1840-tonne reinforced concrete structure was tilting dangerously. Experts advised that the only practicable way to save the building was to move it. This paper details the relocation project as the building was cut from its foundations and slid over 300 metres towards its new home.