



**AUSTRALASIAN  
MINING  
HISTORY  
ASSOCIATION**

**PROCEEDINGS of the  
27th ANNUAL CONFERENCE**



***Geoconservation & Mining Heritage - the  
Way Forward***

**Reefton, New Zealand  
15 – 19 October 2023**

**Editors: John Taylor & John Barry**

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ISBN:

**Bibliographic reference:**

Taylor J.B., Barry J.M. and Williams N.H., 2023, Proceedings of the 27<sup>th</sup> Annual Conference, AMHA, Reefton 15-22 October 2023, Australasian Mining History Association, Perth.

Printed at James Print, Mackay Street, Greymouth, New Zealand.

Front Cover Image:

View of the Wealth of Nations Mine, Crushington, New Zealand in 1923.  
Source : Alexander Turnbull Library, Wellington, New Zealand.

## Sponsors 27<sup>th</sup> Annual AMHA Conference



As the AMHA Conference Convenor I would like to welcome you all to Reefton, less commonly referred to as Quartzopolis, Reef Town, or more recently as the "Town of Light". All these names reflect Reefton's claim to fame and fortune, based on its gold mining history and wealth generated from mining. The town was established in late 1870/early 1871 to support the mining industry that was rapidly growing in the hills around the town. There appears to have been no prior Maori settlements in the area, although they undoubtedly travelled through on their way north or to the east.

It was the prosperity from the gold mining which enabled an entrepreneur to sell the idea of 'bottled lightning', leading to Reefton's other claim to fame: having the first public electric street lighting in the Southern Hemisphere. A gold mining site in Otago had its battery driven by hydro-generated electricity before Reefton did; Reefton power was generated from a small hydro plant on the Inangahua River, which runs through the town.

The 1880 water race has been restored, and modern operational hydro is being installed on the original plant site. Participants will have the opportunity to visit this project during the conference.

Currently the population of Reefton is just under 1000 inhabitants, far fewer than lived here in the earlier days, when families of up to 10 were common. Parents often increased the size of their families, to allow for the known high rate of infant mortality.

Most of the early miners in the area were of Cornish or Irish extraction, and this is very much in evidence both in the Reefton Pioneer Cemetery, and in many of the exhibits in the Blacks Point Museum.

In the early days of Reefton, even getting supplies into the town was a major undertaking. Supplies had to be packed in by horse from Greymouth to the south and via the Buller River cargo barges, from Westport, transported goods to an offload spot on the Inangahua River, called 'The Landing', from which they were then transferred to pack horses for the rest of the journey to Reefton. At that time a direct link east over the Lewis Pass to Canterbury didn't exist.

Reefton is the hub for the former Reefton Goldfield, and as such is linked to former mine sites by a network of Government funded 'benched tracks' which were required to maintain a relatively standard gradient to allow packhorse trains to deliver supplies to remote sites. Many of these tracks have now been recycled for mountain bikes. Reefton is now a mecca for recreational visitors from Christchurch and beyond who make use of the surrounding areas for tramping, mountain biking, trail running, all terrain vehicle excursions and nature based and heritage tourism.

Hence the conference has a significant focus on "geotrails", which are rapidly catching on in Australia but are almost unknown in New Zealand. The idea is to improve the availability of relevant information on the landscapes, geology, fauna and flora and heritage sites which one would encounter during a recreational trip along such trails. Many tourists travelling through Reefton are unaware of the huge range of interesting places to visit within 10-20 km of the town - enough to take up a full week of daily activities!

Although gold mining had commenced around Reefton in the early 1870s, it was Consolidated Goldfields of New Zealand Limited, an English based mining company, which introduced sufficient capital and technical expertise to re-vitalise the flagging local mines. This company, formed in 1896, bought out the local major mines, consolidated them under the new ownership, and continued operations in the area until the mid-1950s. Around Reefton there were also extensive smaller scale alluvial gold mining ventures and dredges working the local creeks and river terraces.

If you wish to try your hand at gold panning, there are still plenty of opportunities to pan gold 'colours' from the local creeks and rivers, but no large nuggets as can be found here, in contrast with the Australian Goldfields.

I hope you have an enjoyable week in Reefton, both at the Conference itself, the local sites you will visit on the arranged tours, and the large number of heritage places we still have around town. Apart from the formal proceedings every day, there will also be a number of more informal 'walkabouts' around town before and after the day's sessions.

John Taylor



October, 2023

**AUSTRALASIAN MINING HISTORY  
ASSOCIATION, REEFTON CONFERENCE  
PRESIDENT'S FOREWARD**

The AMHA has enjoyed three New Zealand conferences in the past few years – Greymouth in 2010, Waihi in 2012, Cromwell in 2018 – and we're very pleased to be here in historic Reefton in 2023.

While the local economy of this area is now based on tourism, forestry, coal mining and farming, gold was the main attraction from the late C19<sup>th</sup> till the 1950s; the first discovery of alluvial gold was in the Inangahua Valley in 1866, the first quartz reefs in 1870 (hence Reef Town), and the Reefton School of Mines opened in 1886. In his vast survey of worldwide gold occurrence and distribution, geologist Malcolm Maclaren<sup>1</sup> stated that, 'In the Reefton district from the 31<sup>st</sup> March, 1880, to the 31<sup>st</sup> December, 1906, a total quantity of 1,285,771 tons of ore were crushed for a yield of 687,555 ounces gold worth £2,715,838'. The value of this gold today is slightly over £400 Million! With gold prices relatively high, it's not surprising that a new mine opened in in 2007, employing 260 in 2013, although the site is now being rehabilitated after the mine closed in 2016. However, local mining is concentrated now on coal, rather than gold. Coal from the small Inangahua mine, close to Reefton, is important for local markets, while coal from the Terrace Coal Mine, which has operated on and off for over 100 years, and has a current expected life of 15 years, is mostly sent out by rail to Christchurch, largely for export.

One very special piece of Reefton history is that in 1888 it became the first town in New Zealand, in fact in the Southern hemisphere, to have its own electricity supply, generated by the Reefton power station.

Reefton also has a rich railway heritage, running a passenger rail service from 1892 to 1967, though the line is now used only for coal. The historic railway precinct is just one of the many places of interest conference delegates will visit during their explorations of Reefton.

Some of us will also explore further afield in our two day post-conference tour based on Westport.

I'd like to thank Mayor Jaime Kline, local helpers, and in particular John Taylor, all of whom have contributed their time and efforts to ensure this conference happened.

Nicola Williams,  
President.

<sup>1</sup>M J Maclaren, 'Gold', *The Mining Journal*, London (1908), p. 319.

## The Reefton Goldfield

John Taylor

The greater Reefton Goldfield consists of a 35km elongate belt of Ordovician metasediments stretching from the Lyell Goldfield in the north, through the central Reefton area to the Blackwater Goldfield in the south, beyond which the productive rocks are overlain by more recent cover. The 15km wide north to north-east trending belt is bordered by the younger granitic rocks of the Victoria Range to the east and the deep fault bound Inangahua Depression to the west.

The quartz reefs of the Goldfield have produced over 3,000,000 ozs of gold: 2281451 ozs from the historic underground quartz mines, approx 610000 ozs from a modern open pit and the rest has been obtained as alluvial gold by small scale surface mining and the larger gold dredges.

The quartz reefs are restricted to the Ordovician Greenland Group metasediments (greywackes and argillites) and are located within steeply dipping shear zones along the axes and flanks of regional fold structures.

The quartz reefs are typically narrow (0.1 to 3.0m in width), generally of short strike length (100-150m) and commonly have a fairly steep northerly plunge. The down plunge dimensions of these reefs can exceed 1000 m but are frequently dislocated by high angle cross faults or shallower thrust faulting.

The gold occurs either as free gold grains in the quartz, or as refractory gold contained in specks or blebs in associated pyrite and arsenopyrite grains, and is of a hydrothermal - metamorphic origin. However the original source of the gold is still subject to debate.

The major mines of the Goldfield consist of the Alpine United Mine at the Lyell, the Wealth of Nations, Fiery Cross - Welcome, Golden Fleece - Ajax, Keep-it-Dark and Globe-Progress Mines in the Reefton region, and the major Blackwater Mine to the south.

The Greenland Group metasediments are overlain in places by a thin, frequently gold-bearing, conglomerate, which is in turn overlain by coal measures. There are instances where shallow dipping coal seams abut directly on top of steeply dipping quartz reefs.

The narrow lenticular nature, short strike length and generally low sulphide content (5% sulphides) of the quartz reefs make them almost impossible to detect even by modern geophysical techniques. The steep terrain, extensive surface cover of alluvial and glacial gravels and organic forest debris makes standard surface mapping difficult, and restricts structural mapping to creek beds, open ridges and diamond drill core. For the same reason conventional surface geochemistry has proved difficult to interpret but bedrock geochemistry, using Wacker drilling technology developed in Western Tasmania, has proved to be extremely effective in delineating the long, sinuous shear zones, which contain the quartz reefs or veins. These shear zones are readily outlined by the associated significant arsenic anomalies.

However, a means of locating the small, lenticular, but potentially gold-bearing quartz reefs within these extensive shear zones remain elusive. As yet no successful vectoring technique has been developed to target non-outcrop quartz reefs. One has to admire the tenacity of the early prospectors who succeeded in locating almost all the known quartz reef within the Goldfield, despite the difficult terrain and ground cover. Even the largest mined quartz reef, the 800m long

Birthday Reef of the Blackwater Mine, has no surface outcrop but was located by a small piece of gold-bearing quartz float in a creek bed.

Modern structural mapping of the major fold axes, and magnetic mapping of dolerite dykes intruded within deep seated crustal structures, are being widely used to narrow the search space for these ore bodies. In addition, the well established technique of drilling along strike of known quartz shoots to locate repetitions or faulted extensions, is still being utilised by modern explorers.

Most of the smaller mines were accessed by surface adits which have collapsed at the T- junctions where the adits join the ore drives, so almost none of the original underground quartz mine workings are accessible today. This lack of underground access is unfortunate as the old time miners were skilled at following prospective "reef tracks" from one ore shoot to locate additional shoot repetitions.

The host rocks to the quartz reefs are metamorphosed to lower greenschist facies and in the immediate vicinity, (5-10 m), of the reefs may show considerable carbonate (ankerite) "spotting". This feature is more readily apparent in drill core than in the field.

The main sulphide minerals in the reefs are pyrite, arsenopyrite and stibnite but the total sulphide content is rarely outside of the range of 5-10%, although the stibnite can occur locally as massive blocks.

The largest mines in the Goldfield have been mined to a depth of 800 m below surface (11 – 17 levels below a shaft collar).

Gold mining within the Reefton Goldfield commenced in the 1860s with individuals or prospecting teams, many of whom had headed to New Zealand from the Victorian Goldfields, panning their way up river valleys and creeks in ever more rugged terrain. These prospectors eventually tracked the source of the alluvial gold to outcropping quartz veins in the creek beds, and this led to the second phase of gold mining. This was the underground development and mining of the gold-bearing quartz reefs, commencing by local mining companies in the early 1870s. However, by the 1930s most of these deep quartz mines had ceased to operate, as the prevailing gold price could no longer sustain profitable mining. The final phase of local gold mining was the introduction of the bucket-line dredges, which could work the large river flats and extensive alluvial terraces at very low cost. Most of these large dredges had run out of available ground by the 1950s, although a few managed to operate until much later. Even today, a large number of small scale alluvial gold miners using excavators, trommels and screens are still working on the smaller creeks and in difficult areas left by the larger dredges.

Serious gold mining commenced in the local Reefton area in the early 1870s, initially with attempts to work the easily accessible but low-grade and extremely hard gold-bearing conglomerates in Murray Creek. With the rapid discovery of numerous reefs in the area, underground quartz mining soon took over, but this required companies to raise sufficient capital to develop the mines, and to construct and operate the stamp batteries to crush the ore. They also had to develop the long water races, through difficult terrain, to provide the water power to drive the machinery.

A large number of small mines were opened up in the hills around Reefton, with some becoming significant producers, which enabled them to pay out large dividends to their investors from the 1870s through until the early to mid 1880s. By this time the local mines had fallen into a depressed state, due to the lack of adequate finance and the technical expertise necessary to resolve their poor gold recoveries.



All this changed in 1896 when a South African entrepreneur, David Ziman, visited the district and saw the potential to be achieved given adequate capital, and modern technical expertise. He managed to raise the necessary capital from the Rothschilds in London, and proceeded to purchase and merge the larger mines in the Reefton area into the Consolidated Goldfields of New Zealand limited.

Initially, the mines within this London-based company consisted of the Welcome, Fiery Cross, Just-in-Time, Golden Fleece, Ajax, Energetic, Wealth of Nations and the Globe and Progress, but within a short time only the Golden Fleece, the merged Energetic and Wealth of Nations, and the Globe-Progress Mines proved to be profitable producers, and the others were let on tribute.

The Globe-Progress Mine, formed by the amalgamation of the pre-existing Globe and Progress Mines, has since become the largest gold producer on the Goldfield, with a total production of over 1,000,000 oz. This mine will feature in a number of the conference papers, and will be visited on one of the conference site tours. It has a number of features in common with the other mines of the Goldfield, but in other respects is unique.

The Globe-Progress Mine is typical of many of the other mines in that it had both free gold in the quartz reefs, and also refractory gold-bearing pyrite and arsenopyrite mineralisation in zones of brecciated host rock adjacent to the quartz reefs. The mine had significant tonnages of this refractory gold ore, whereas other major mines such as the Blackwater Mine had almost none. The Mine is also the only one to have been mined twice during its productive life. The Consolidated Goldfields subsidiary, Progress Mines of New Zealand, mined the quartz reefs underground between 1896 and 1919, producing approximately 400,000 oz of gold. This venture finished after the reefs were found to be disrupted or constrained by major faulting. Between 2006 and 2016, OceanaGold reopened the mine as a modern open pit operation, to recover the refractory gold mineralisation. This had defeated the former company, as it had been unable to achieve an adequate gold recovery from the refractory ore. The second operation produced around 610,000 oz during the ten year mine life, and is in the final stages of post-closure rehabilitation.

The Mine is also unique in that it is the only modern open pit mine in the Goldfield to have ceased mining and to be undergoing post-mining site rehabilitation/restoration on high value conservation land.

The Mine is also typical of many other Reefton underground quartz mines in losing its quartz orebodies against constraining or bounding faults. This is common throughout the Goldfield, and many of the smaller mines closed due to inadequate finances, needed to maintain ore reserves effectively, especially when faced with the loss of a quartz orebody due to faulting.

Globe-Progress Mine, under the management of the Progress Mines of New Zealand, had both the financial resources and technical expertise to undertake considerable work over a number of years, in an attempt to resolve its faulting problems and locate its lost? orebodies. They were the only mine to make extensive use of underground diamond drilling to relocate fragmented ore zones, and penetrate through faults to try and locate faulted orebodies. They also contracted some of New Zealand's outstanding geologists to map the surface structurally over the mine area, in an effort to elucidate the faulting problems. They undertook very early (1935-1938) geophysical surveys using resistivity techniques, which can map non-outcropping quartz reefs and fault zones. Finally, in the late 1930s, they employed deep surface diamond drilling in an attempt to locate faulted extensions to the known ore zones. As such this is the only mine in the Reefton Goldfield to have employed such modern scientific exploration techniques to try to solve their resource problems.

## Conference Programme 15-20 October 2023

### Sunday 15th October

5.00 - 7.30pm Pre-registration at St John's Training Hall  
7.30pm Ice-Breaker at Dawsons Hotel

### Monday 16th October

8.00 - 8.45am Registration at Reefton Community Centre  
8.45 - 9.00am Official Welcome to Reefton by Conference Convenor  
9.00 - 9.15am Official Welcome by AMHA President

9.15 - 10.30am **Session 1: Chair : Ross Barnett**

9.15 - 9.45am Paul Thomas, Quartzopolis and the Reefton Goldfield Heritage  
9.45 -10.30am Keynote Address: John Taylor, Mining Heritage Sites  
Abandoned Sites or Community Assets

10.30-11.00am **Morning Tea**

11.00 - 12.30pm **Session 2: Chair : Ross Barnett**

#### **Reefton Goldfield Geology & Mines**

11.00 -11.30am Paper 1 John Taylor, The Reefton Goldfield Geology and Mineralisation  
11.30 -12.00pm Paper 2 Tony Fortune, Anecdotes of the Reefton Goldfield  
12.00 -12.30pm Paper 3 John Taylor, The importance of Historic Goldfields Data.

12.30 - 1.30pm **Lunch**

1.30 - 3.00pm **Session 3: Chair: Nic McArthur**

#### **Alluvial Gold Mining & Water Races**

1.30 - 2.00pm Paper 4 Ross Barnett, "A result in excess of Expectations". The  
Norwegian Party of Waitehuna Gully, Otago, New Zealand  
2.00 - 2.30pm Paper 5 Dave Stone, The Rimu Gold Dredge  
2.30 - 3.00pm Paper 6 John Taylor, Modern interpretation of historic alluvial  
gold drilling data.

3.00 - 3.30pm **Afternoon Tea**

3.30 - 4.30pm **Session 4 Chair: Wendy Carter**

#### **Gold Miners - People & Superstitions**

3.30 - 4.00pm Paper 7 Julia Bradshaw, Gold Mining Women in New Zealand  
4.00 - 4.30pm Paper 8 Anne Both, Ghoulies and Ghosts and things that go bump.  
4.30 - 5.15pm **"Whispers of Gold" Documentary**

**Tuesday 17th October**

9.00 -10.30am	<b>Session 5 Chair : Nic Haygarth</b> <b>Reefton Gold Mining &amp; Exploration</b>
9.00 -9.30am	Paper 9 Bob Brathwaite, Mining of gold-rich quartz at Kirwan's Reward.
9.30 -10.00am	Paper 10 John Taylor, Historic Geophysical Surveys of the Reefton Goldfield.
10.00 -11.00am	<b>Morning Tea</b>
11am -1.30pm	<b>Local Heritage Site Visits (OceanaGold &amp; Globe-Progress Mine Visit)</b>
1.30 - 3.00pm	<b>Session 6 Chair: Ross Both</b> <b>Australian Mining Ventures</b>
1.30 - 2.00pm	Paper 11 Nic Haygarth; "this mountain may run your motor car" : J.T. Moate and the Adelaide Oil Exploration Company
2.00 - 2.30pm	Paper 12 Geoff Hudson, Mining Technology Transfer : England-Russia-New Zealand-Australia.
2.30 - 3.00pm	Paper 13 John Ferguson, Allan Blackman, Rochelle Bull & Denise Juler, One Moment in Time: Who was at the Scottish Gympie No, 2 on 16 <sup>th</sup> June 1900?
3.00 - 3.30pm	<b>Afternoon Tea</b>
3.30 - 4.30pm	<b>Session 7 Chair: Anne Both</b> <b>Mining Communities &amp; Personalities</b>
3.30 -4.00 pm-	Paper 14 David George, Jack Barry, a wild colonial Boy?
4.00 - 4.30pm	Paper 15 Philip Hart, A different sort of mining community.
4.30 -5.15 pm	<b>AMHA Annual General Meeting</b>
5.30pm - 6.30pm	<b>AMHA General Meeting</b>

**Wednesday 18th October**

9.00-10.00	<b>Session 8: Chair:</b> Nicola Williams <b>Geoconservation &amp; Mining Heritage</b>
9.00-10.00	Paper16 Angus Robinson, Geoconservation Documentary
10-10.30	Paper17 Ken McQueen, Options for linking mining history with Geoheritage in Australia
10.30 – 11.00	<b>Morning Tea</b>
11.00 – 1.30	<b>Heritage Site Visits (Blacks Point Museum &amp; Stamper Battery)</b>
1.30 – 2.30	<b>Lunch</b>
2.30 – 3.30	<b>Session 9 Chair:</b> Geoff Hudson <b>Geoconservation &amp; Mining Heritage</b>
2.30 – 3.00pm	Paper 18 Nic Haygarth, Review of the Second International Conference on Mining and Underground Museums at Wieliczka & Zabrze, Poland, May 2023
3.00 - 3.30pm	<b>Afternoon Tea</b>
3.30 - 4.30pm	<b>Session 10 Chair:</b> Mary Traves <b>Mining Heritage &amp; Mining History</b>
3.30 - 4.00pm	Paper 19 Paul Thomas, The Runanga Miner's Hall & Rise of the NZ Labour Party.
4.00 - 4.30pm	Paper 20 John Taylor, Mining Heritage Mitigation. Tools in the Toolbox.
4.30 - 5.15pm	<b>“Jos Divis” Documentary</b>
5.15 - 6.15pm	<b>Advisory Committee (St John's Meeting Hall)</b>

**Thursday 19th October**

9.00 - 10.00am	<b>Session 11 Chair:</b> Simon Nathan <b>Historic Mines &amp; Explorers</b>
9.00 -9.30am	Paper 21 John Taylor, Dr. Macolm Maclaren : New Zealand's Greatest Economic Geologist ?
9.30 – 10.00am	Paper 22 Don Maclean, The Historic Bawdwin Pb/Zn Mine, Myanmar
10.00 -10.30am	<b>Morning Tea</b>
10.30 -1.30pm	<b>Heritage Site Visits (Echo Coal Mine)</b>
1.30 -2.30	<b>Lunch</b>
2.30 – 4.00pm	<b>Session 12 Chair:</b> Nic McArthur <b>West Coast Mines</b>
2.30 -3.00pm	Paper 23 Simon Nathan, The saga of coal mining around Seddonville, Buller Coalfield
3.00-3.30pm	Paper 24 John Caygill, The Uranium Prospect in the Lower Buller Gorge.
3.30 -4.00pm	Paper 25 Mary Traves, The Lost Quarry, Dobson.
6.30 for 7.00pm	<b>Conference Dinner at Dawson's Hotel</b>

**Friday 20th October**

- 9.00 -10.30am      **Session 13 Chair:** Jim Staton  
**West Coast Alluvial & Quartz Gold Mines**
- 9.00-10.00am      Paper 26 John Barry, “There was gold in the grass”. Mapping the hidden  
Landscape of the Charleston Goldfield.
- 10.00 -10.30am      Paper 27 Simon Nathan, Processing gold-bearing quartz ore in the early  
20<sup>th</sup> Century: an illustrated case study from the Snowy River battery,  
Waiuta, New Zealand
- 10.30 – 11.00am      **Morning Tea**
- 11.00- 12.30pm      **Session 14 Chair:** Simon Nathan  
**Mining Technology & Communities**
- 11.00- 11.30am      Paper 28 Jim Staton, Stamper Battery Reconstruction.
- 11.30 – 12.00      Paper 29 John Taylor, The Bella Pump House, Thames Goldfield,  
New Zealand
- 12.00-12.30pm      Paper 30 Julie Benjamin, Buller Residents and the 1949 Ranfurly  
Shield Challenge.
- 12.30 – 1.30pm      **Lunch**
- 1.30 -3.00pm      **Session 15 Chair:** Nicola Williams
- 1.30-2.00pm      Paper 32 Charles Brunning, The Denniston Coalfield 150th Anniversary.
- 2.00 – 2.30pm      Closing Session
- Promotion of the 28<sup>th</sup> Annual Conference, Leonora, Western Australia
- 2.30-3.00pm      **Afternoon Tea**
- 3.00pm      **Conference Closes**

**Post - Conference Field Trip**

**Saturday 21st October**

- 8.30am      Depart Reefton for Westland Mineral Sands and Charleston Goldfield
- 4.30pm      Book into Westport Hotels

**Sunday 22<sup>nd</sup> October**

- 9.00am      Denniston and Stockland Coalfields
- 5.00pm      Return to Westport

**Monday 23<sup>rd</sup> October**

- 7.00am      Bus departs Westport for Christchurch via Greymouth & Arthurs Pass

## **“A result in excess of expectations”? The Norwegian Party of Waitahuna Gully, Otago, New Zealand**

Ross Barnett

Adjunct Professor, School of Earth and Environment

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During the nineteenth century many nationalities were represented in the gold rushes. However, only recently have the experiences of non-Anglo groups, including indigenous peoples, received increased attention. Important here are questions relating to the extent to which cultural and environmental factors affected perceptions of risk, subsequent decision-making, and the success of different mining operations. Therefore, it is important to understand how different mining partnerships viewed the environment and its constraints and responded to the opportunities they perceived.

The Norwegian Party, of Waitahuna Gully Otago, was one such mining partnership. The group were not part of the initial 1861 gold rush, arriving in New Zealand in two stages, in 1864 and 1866, at a time when there was a net migration loss with Australia. Against all odds the group prospered. Between 1869-74 the party of five, largely inexperienced miners, constructed one of the longest water races in Otago, and over 42 years (1874-1915) became the largest producer on the Tuapeka Goldfield.

While structural factors, in the form of a laissez faire institutional environment, favoured the development of such partnerships, the reasons for the Party's success lay more in the close-knit nature of their partnership, the strategic decisions they made regarding the development of their water race infrastructure, and their experimentation with different mining methods, all of which enabled them to profitably mine the Blue Spur Conglomerate, a difficult gold resource.

**There was Gold in the Grass**  
**Mapping the Hidden Landscape of the Charleston Goldfield**

John Barry<sup>1</sup>, Andrew Cook<sup>2</sup> and Stuart Henley<sup>3</sup>

<sup>1</sup>Geologist, 24 Disraeli Street, Westport, 7825, New Zealand

<sup>2</sup>Geologist, 24 Wakefield Street, Westport, 7825, New Zealand

<sup>3</sup> Geologist, 49 Domett Street, Westport, 7825, New Zealand

During planning of the Westport to Charleston walking/cycleway some thought was given to the possibility of making the 150 year old gold workings accessible to visitors. At Charleston today there are no signage or brochures available to educate visitors about this forgotten mining heritage area. While there have been numerous books and newspaper articles written about Charleston's history, the type and extent of the gold workings have not been investigated in-depth, as most are concealed under scrub and regenerating native bush. To address this deficiency a landscape map of the northern part of the Goldfield has been prepared using data collected by a handheld GPS and LIDAR imaging. Although the miners have long gone, recent fieldwork has shown that the extensive disturbances made during their search for wealth on the flat, wet, elevated terraces remain. These include water races, tailings piles, cement mounds, sluicing faces, tunnels, shafts and modified terrace heights.

Discovered at a comparatively late stage in the West Coast gold rushes, the Charleston find was made in August 1866 by a prospecting party led by William Fox. Within weeks a large town of flimsy tents and log cabins grew up on the terrace above Constant Bay; however the initial rush was short lived, as by August 1867 the easily worked ground was "well nigh done". By this time Charleston had grown into a substantial town with about 80 licensed premises, 3 banks, a newspaper and a town-crier. At the same time, individual miners working small claims using traditional methods were gradually replaced by licensed co-operative groups and companies who ran modest ground sluicing and cement crushing operations. Mining at a reduced scale persisted up to World War 1. The last large scale operation, Powells long lived beach mining venture, closed in 1960. Up to 1 million ounces of gold may have been won from the Charleston Goldfield; however a significant amount could have been sold informally to avoid gold duty.

The deposits targeted by the miners comprised heavy mineral bearing coastal marine sediments deposited on platforms cut in older rocks during interglacial high stands of sea level. The mineral suite contained significant ilmenite, garnet and magnetite, with accessory zircon, monazite and gold. Difficulties were experienced in gold recovery, as it was not only exceedingly fine but dispersed within cemented sands and gravels so that crushing was required to liberate the metal. In addition to elaborating on these introductory notes our presentation will introduce the results of goldfield mapping. It will show how the original landscape has been modified by different mining methods which have unique signatures on terrain models derived from LIDAR data. Such maps have enabled correlations to be made with marine terraces of Addisons Flat and the Northern Terraces of the Westport Goldfields.

## **Buller Residents and the 1949 Ranfurly Shield Challenge**

Julie Benjamin

Historian, 38 Church St Onehunga Auckland 1061

This paper is based on a series of oral history interviews undertaken in the Buller District between 2019 and 2020. My research was funded by an Oral History Award from the Ministry for Culture and Heritage, Wellington.

I focus on interviews with three Buller residents – one female, two male - who lived or worked in coal-mining communities outside Westport, from the 1920s to the 1950s. The paper explores the various ways in which the trio were connected, by using excerpts from each participant's stories of their childhood and young adulthood. The paper then outlines a journey which all three took down to Dunedin, when the Buller Rugby Football Union challenged Otago for the Ranfurly Shield, on Saturday 30 July 1949.

I begin with the oldest interviewee, Vera Cargill née Cooper; who was born in Millerton in 1925 and died in Westport in 2019. In 1942 she left Millerton to work at the Hotel Buller in Westport, after finishing her education at Granity District High School. Aged 23 at the time, Vera, along with her brother Bert Cooper and several friends, went on an excursion train trip from Westport to Dunedin and back, to support the Buller team.

The second interviewee is George Smallholme, born in 1926 in Granity. George lived most of his life in Granity and Westport, where the Smallholme family ran a carrying business. George played rugby for Granity Rover and Millerton Rangers, and in the winter of 1949, aged 22, he was playing at half-back for the Buller team. He drove to Dunedin with his older brother Oliver, captain of the Buller team, and three others, in Oliver's new Ford V8.

The last participant, Bob Pratt, was born in 1936. As a small child Bob lived in Cascade Creek, a tiny coal-mining camp beyond Coalbrookdale, between 1936 and 1941. The family lived in Denniston from 1941 to 1948, and finally moved to the foot of The Hill in Waimangaroa. After qualifying as a fitter and turner, Bob worked in several Denniston mines from the mid-1950s onwards.

Bob, aged 12, went on the excursion train with his mother, Lilian Pratt.

Several Buller team members and many supporters came from coal-mining towns 'out country'. This paper looks at the concept of community, particularly within small townships on the Denniston-Stockton plateau, and how they related to the greater Buller District, particularly when playing or supporting a sport. Examples of public perceptions of both the team and its community of supporters are examined.



## **Our Country: Life in North Buller mining communities, from the 1920s to the 1950s**

Julie Benjamin

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This paper will focus on the lives of four interviewees - one woman and three men - who lived and/or worked in coal-mining communities northeast of Westport, in the sparsely populated area commonly referred to by Buller residents as 'Out Country'.

My paper is based on a series of oral history interviews undertaken with each participant in their home, between 2015 and 2020. My research was funded by two Oral History Awards from the Ministry for Culture and Heritage, Wellington.

I will start by looking at the early life of the oldest interviewee, Vera Cargill née Cooper, who was born in Millerton in 1925. She left the township in 1942 after finishing at Granity District High School at the age of 16.

Harry Halliday was born in Westport in 1932. He worked above ground, then underground, at the Whareatea mine on the Denniston plateau, between 1951 and 1952.

Bill Blythe, the third interviewee, was born in Westport in 1934 and worked above ground at the Coalbrookdale mine, near Burnetts Face, from 1949 until 1951.

The last, Bob Pratt, was born in 1936. As a child Bob lived firstly in Cascade Creek, a tiny mining settlement beyond Coalbrookdale, from 1936 until 1940, then in Denniston from 1940 to 1948. Bob qualified as a fitter and turner and went straight to work in the Denniston mines from the mid-1950s onwards.

This paper outlines the 'Out Country' childhoods of Vera Cargill and Bob Pratt, who were brought up in mining communities on the Denniston-Stockton plateau. Through their recollections we also get a sense of the lives of their fathers and mothers. The decisions Vera and her older sisters had to make, regarding finding work, are considered.

The early lives of Bill Blythe and Harry Halliday are also examined. Why did these two teenage boys choose to stay at home but seek work at Denniston and Coalbrookdale, shortly after leaving school in Westport? What were their work conditions like, back then? And why did they leave the mines?

**GHOULIES AND GHOSTIES ----- and things that go bump  
Miners superstitions past and present**

Anne L. Both  
Burnsides Historical Society

Miners are said to be superstitious and prone to respect the folklore related to their workplace, and as they moved across the world, these beliefs were carried with them. Some of these superstitions had their origins in pagan times, and a belief in the need to respect the gods and spirits which protected the earth beneath which they worked. Most required acknowledgement of some kind, in the form of propitiation as a means of survival in a workplace fraught with danger. Such propitiation was given using a variety of offerings, including animal sacrifice.

The superstitions related to the possible prize of rich loads to mine, while at the same time, ignoring a perceived warning of imminent catastrophe could result in disaster or death.

Underground manifestations were believed to take the form of various spirits, whilst above ground they appeared in more concrete form, such as black cats or redheaded women, harbingers of disaster or death.

As formalization of religion began to predominate, some of the former adherence to pagan beliefs faded; Colonial imperatives for using increased industrialization in mining also contributed. As improvement in safety conditions continued in mines, many of the miners' formerly held superstitions were discounted, and are thus less likely to be given serious consideration in the present day. However, there are exceptions to any rule.

Obvious exceptions include the acknowledgement given to El Tio or El Diablo in mines of South America, and the present day practices of artisanal miners in some African countries.

This paper considers some of the superstitions and spirits which have exerted a strong influence over mineworkers in the past, and will discuss examples of current practices in some parts of the mining world.

## Gold mining women in New Zealand

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While goldmining in New Zealand, as elsewhere, was almost completely dominated by men, there were women who were physically involved in mining as well. To date there has been little research on this subject in New Zealand and there are limited sources available. At the time it was not seen as respectable for a woman to do this kind of work, and it was usually not mentioned in contemporary sources.

Women did not passively follow their menfolk to the diggings. Just like the men, many women were swept along with the excitement of the rushes and the chance to find a fortune. Wāhine mined with their families, and European women mined with other women, their husbands or on their own.

Changing attitudes and debate about the role of women from the 1890s onwards meant that women who were still alive at this time became objects of interest and some details of their lives were recorded.

Drawing on primary sources, newspapers and work by family historians, this paper will provide examples of women who mined, including famous Inangahua identity, Biddy of the Buller.

**Figure 1.** Biddy of the Buller, photographed by James Ring in 1893.



Source: Copyright File – James Ring, Greymouth. Archives New Zealand, R26186804.

## **Mining of gold-rich quartz at Kirwans Reward and its relationship to adjacent granite-related quartz-scheelite veins, Reefton Goldfield**

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In 1896, William Kirwan discovered loose boulders, of a few kilograms up to 3 tonnes, of gold-bearing vein quartz within a fault shatter zone. This was at an elevation of about 1200 m on the flank of the Victoria Range, about 12 km north-east of the town of Reefton. Kirwans lies about 6 km east of the 10 km-wide corridor which contains most of the gold-quartz lodes of the Reefton Goldfield; the Kirwans Reward Gold Mining Company was formed in 1898 to mine the loose boulders. A ten-head battery, later enlarged to fifteen heads, was erected in Kirwans Creek, 600 m lower in elevation than the workings, which were connected to the battery by an aerial tramway. Mining continued until 1908, with a total production of 29,780 tons, yielding 12,698 oz of gold. The deposit was mined by open cut over an irregular-shaped area of 300 m by 150 m; the open cut went to a depth of up to 40 m, at which point the loose quartz cut out<sup>1</sup>. Numerous winzes and adits, constructed to explore below and around the shatter zone, were unsuccessful in finding payable quartz veins, although low-grade quartz veins up to 2 m wide were found near Kirwans Hill, about 1 km north of the open cut at an elevation of about 1,400 m. Henderson<sup>1</sup> suggested that these veins represented “poorer ore on the same lode-channel as that which furnished the rich broken quartz”.

In the 1980s, regional and deposit scale mapping and geochemical surveys, conducted in large part by Gold Mines of New Zealand, led to the discovery of western and eastern sheeted quartz-scheelite-tourmaline-muscovite-pyrite-sphalerite, greisen-related vein systems hosted in Ordovician greywacke (Greenland Group) at Kirwans Hill<sup>2</sup>. The Kirwans Hill greisen-related vein systems may be sourced from the nearby Bateman Creek Granite of Late Devonian age. The western vein system coincides with the north-west striking, low-grade gold-bearing veins mapped by Henderson<sup>1</sup>. Subsequent diamond drilling of the eastern and western vein systems has shown a few intercepts of low-grade gold (best of 1 m @ 0.41 g/t), with numerous intercepts of scheelite (500-5,800 ppm W) mineralisation<sup>3</sup>.

In conclusion, the gold-rich quartz mined at Kirwans Reward may represent the upper, peripheral part of a granite-related scheelite-bearing vein system.

### **References**

<sup>1</sup> John Henderson, *The Geology and Mineral Resources of the Reefton Subdivision*. New Zealand Geological Survey Bulletin 18, 1917.

<sup>2</sup> Franco Piranjo and Phil Bentley, *Greisen-related Scheelite, Gold and Sulphide Mineralisation at Kirwans Hill and Bateman Creek, Reefton District, New Zealand*. New Zealand Journal of Geology and Geophysics, 1985, Volume 28, pp. 97-109.

<sup>3</sup> Patricia Durance and D. Polette, *A Review of the Kirwan Hill Tungsten and Gold Prospect, West Coast*. Mineral Deposits of New Zealand, Exploration and Research (A. Christie, editor), Australasian Institute of Mining and Metallurgy Monograph 31, 2016, pp. 71-480.

## **The Uranium Prospect in the Lower Buller Gorge, New Zealand**

John Caygill

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In November 1955, a chance roadside discovery by two elderly prospectors, Fred Cassin and Charles Jacobsen, in the Lower Buller Gorge (South Island, New Zealand) aroused great public interest. The discovery initiated a thorough search for uranium in the Hawk's Crag Breccia formation on both sides of the Buller River, and continued intermittently over the next 23 years.<sup>1</sup>

From 1955 to 1972, the steep bush-clad hills on each side of the Buller River in the Lower Buller Gorge, located about 25 km south east of the town of Westport, New Zealand, were intensively prospected for uranium over a distance of 2–4 km and a height of 400–500 m. This work was carried out by the L&M (Lime and Marble) subsidiary Buller Uranium, and supported with government grants and DSIR and Mines Department expertise. At first on the north side, and later on the south side of the gorge, camp sites with huts and helicopter landing pads were established as bases for exploration of the steep gullies, rock outcrops and precipitous faces.

On the north side of the gorge, accessed by the Westport to Reefton railway line, a four-wheel drive track was bulldozed up from a railway siding, through dense bush to just below the top of 'Trig C' (later named Mt Cassin), 660 m above the river. A number of prospecting adits were excavated on both sides of the river and, on the south side, 300–400 m above the Buller Gorge Highway, diamond drilling was carried-out in 1971, (in a joint venture with Carpentaria Exploration), from three platforms cantilevered against the tree-clad slopes. Drilling results confirmed what years of sampling had indicated, that the mineralization was too thin and discontinuous and potential ore values were too low for viable mining of the resource.

Primary uranium minerals included coffinite, uraninite and thucholite. The main secondary minerals were autunite/meta-autunite, torbernite/meta-torbernite, and 'gummite'.

Though ultimately unsuccessful, this prospect was noteworthy in several ways, including accessing the challenging terrain, and the first significant use of helicopters in a New Zealand exploration project. It is also noteworthy for the international context in which it took place, spanning the opening phases of the nuclear age, from the launch of the first nuclear-powered submarine in 1954, and promises of 'power too cheap to meter', through to nightmare armageddon scenarios evoked by cold-war incidents such as the Cuban missile crisis (1962). The formal conclusion of the prospect occurred a month before the Three Mile Island near-meltdown in 1979, which slowed or stalled new power plant production world-wide.

This presentation covers the history of the prospect on the ground, and alludes to the wider political context. It also mentions the other related uranium prospect at the time, which was in the upper Bullock Creek - Pororari River catchments of the central Paparoa Range.

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<sup>1</sup> Elaine Bolitho, *Reefton School of Mines*, Friends of Waiuta Inc, Reefton, 1999, pp 97-110.

## **Mining Our History and Heritage**

Russell Deyell and Jo Hart (authors)

Presented by Paul Thomas

Runanga Miners' Hall Trust

*' Old buildings are witnesses to the aesthetic and cultural history of a location, helping to give people a sense of place and connection to the past as well as providing inspiration for the future.'*

Using the Rūnanga Miners' Hall as a case-study, the presentation will examine the enablers and constraints operating within the context of fully restoring a Category One heritage building in New Zealand, for future community use. The Rūnanga Miners' Hall was built by the New Zealand State Miners' Union and was the place where in 1909 the constitution for the Federation of Labour was written. This organisation which called for 'one big workers' union', eventually developed a political arm, which was the New Zealand Labour Party. After a long, hard struggle to save the Hall from demolition in 2014, the wheel has come full circle and the Hall has now been nominated for UNESCO world heritage listing, as an internationally important Worker' Hall. The status of the Runanga Miners' Hall derives from its symbolism as the cradle of social democracy in NZ, and incubator of the world's first comprehensive Welfare State, enacted by the first NZ Labour Government of 1935-49. Many of those leaders had direct roots back to the Miners' Hall.<sup>1</sup> The paper will examine the necessary planning and resources needed for developing and administering a heritage asset; the bureaucracy surrounding heritage assets in NZ; an assessment of the strengths, weaknesses, opportunities and threats to the Runanga Miners' Hall project, and finally thoughts on creating maximum impact at community, local, national and international levels.

<sup>1</sup> Aotearoa/New Zealand presently has no UNESCO heritage listed buildings.

## One Moment in Time: Who was at the Scottish Gympie No. 2 on 16 June 1900?

John Ferguson<sup>1</sup>, Allan Blackman<sup>2</sup>, Rochelle Bull<sup>3</sup> and Denise Juler<sup>4</sup>.

<sup>1</sup> 2 Glasshouse View Court, Buderim, Q4556; <sup>2</sup> Gympie Gold Mining and Historical Museum, Gympie, Q4570; <sup>3</sup> Gympie Regional Libraries, Gympie, Q4570; <sup>4</sup> Gympie Family History Society, Gympie, Q4570.

On the 16th June 1900, a Who's Who of the Gympie community responded to the invitation of the Scottish Gympie Gold Mines Ltd. to celebrate the opening of their No. 2 shaft and winding plant. While only at 87 ft., the shaft was heralded as being "on the threshold of its mission to 2,000 ft". In the absence of Directors (all being in Glasgow or the UK) the local General Manager, Mathew Laird, chaired a long series of speeches. Civic leaders, mine managers, company directors and service providers held forth in the optimistic spirit of the day.<sup>1</sup>

**Figure 1.** Gathering of Mining Men at the opening of the Scottish Gympie No. 2 on 16 June 1900.



Source. The Sydney Mail and NSW Advertiser, Sat. 7 July 1900.

Fortunately, a photograph was taken by local photographer, A. Bevan. This shows approximately 75 figures in formal attire of the era, but without names.<sup>2</sup> The names of only 17 actual attendees are known from newspapers, but these are without linkages to figures in the photograph. This lack of identification is a regrettable deficiency in the history of the Gympie goldfield and community. In 2023 a volunteer group began formulating databases of photographs and people relevant to the photograph from 16 June 1900, as well as a list of possible attendees. The aim is to identify and link some of the figures with names. While the majority of figures will remain unidentified, some links have already been made. In the life and cycles of a Goldfield, people, companies, shafts and ounces of gold, etc., ebb and flow. The challenge to identify figures in old photographs is analogous to the re-treatment of scattered heaps of buried tailings; the bullion recovered will be the identity and profile of prominent not-to-be forgotten men. This presentation provides a progress report.

<sup>1</sup> *Scottish Gympie Gold Mines. Starting of new machinery.* The Gympie Times, Tues. 19 June 1900, p2.

<sup>2</sup> *Gympie and Some of Its Gold Mines.* Sydney Mail and NSW Advertiser, Sat. 7 July 1900, p 23-26.

## Jack Barry, a wild colonial boy?

David George<sup>1</sup>

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William Jackson Barry, 1819-1906, arrived in New South Wales in 1829 aboard *The Red Rover*. He began work as a butcher's boy in George Street Sydney, branching out into stock work for his employer, Charles Smith.

Much of his life is recorded in three editions of his book, which was first published in 1879<sup>2</sup>; a second edition appeared in 1897.<sup>3</sup> Following a successful lecture tour of Australia in 1898 he produced a third edition in 1903.<sup>4</sup> Barry's first book was well received in London, and was accorded a glowing review in *The Times*. To this day a copy of the book is carried by the royal library in London.

Barry mined in California and then in Victoria, on his return to Australia in 1856. He ventured into New Zealand in late 1862 and eventually became the mayor of the goldfields town of Cromwell. He not only prospected for gold, but for other metals around New Zealand, from gold in Bannockburn, to gold and silver in Te Aroha. By 1874 his luck had played out and he took on writing and lecturing as a career.

In the main he became popular in New Zealand, Australia and in Great Britain, but by the mid twentieth century his work was regarded by several writers as second hand at best, and that his recorded life was much of a fantasy. This view gradually worked its way into the public record.

Robert Wilkin, the owner of Wanaka Station in the Upper Clutha Valley between 1858 and 1866, mentioned Barry in his diaries. Barry purchased mutton from him for his butchery, and this led me to a paper trail where the record tallied with Barry's own account.

True, it is impossible to validate some portions of his work. He served on whalers in his heyday, and in the Battle of Canton in 1840, and for these events there is a paucity of written records, as might be expected. However, where records do exist Barry's memoirs do tally; for example, his three voyages to California can be authenticated; he also served as foreman in a jury at Brown's Diggings in Victoria

The question I asked in my research is this: was Barry a reliable source of information about his life and times? Once described as possibly being a child convict, and later a bushranger, it appears there is a very different narrative. As yet there is no evidence as to the identity of Barry's forebears and connections; my presentation will make suggestions, and attempts to explain the reasons for his initial obfuscations. This is also a plea to include Barry's work in the acknowledged written record, and to encourage people to read it.

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<sup>1</sup>George David, *Barry, The Credibility of William Jackson Barry*, 150 Years of Riches, 1862-2012 Conference, Cromwell, Otago, 2012.

<sup>2</sup>Barry, Capt WJ, *Up and Down*, Sampson, Low, Marston, Searle & Rivington, London, 1979.

<sup>3</sup>Barry, Captain W. Jackson, *Past and Present*, McKee and Gamble, Wellington NZ, 1897.

<sup>4</sup>Barry, Captain, *Glimpses of the Australian Colonies and New Zealand*, Brett, Auckland, 1903.



## **A different sort of mining community**

Philip Hart

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Te Aroha mountain and its surrounding district was contested by rival iwi (tribes) for hundreds of years. After three hearings in the Maori Land Court, ownership had been granted, in 1878, to Ngati Tumutumu/Ngati Rahiri, the local iwi. Consequently, as the locations of both the 1880 discovery of gold by Hone Werahiko and the site of the hastily-planned Goldfields Township of Te Aroha were on Maori land, it was necessary to proclaim a separate Te Aroha Mining District with special regulations providing Maori landowners with all the income from miners' rights, residence and business sites, and cutting rights for kauri trees. After Te Aroha township was established, most Maori continued to reside a few kilometres downriver at Omahu (later Tui) Pa, on the fringes of a predominantly Pakeha community. Whereas the leading Maori landowners benefited financially from the goldfield, most Maori, lacking appropriate Pakeha skills, were employed as labourers. Although many participated in some aspects of Pakeha life, the days of Maori dominance of the district were over.

In 1880, Te Aroha was on the frontier of Pakeha (European) settlement, with land-hungry settlers preparing to establish farms on newly available land; delighted by the discovery of gold, they hoped for a prosperous and permanent goldfield. These non-miners were joined in the initial rush by experienced miners and by mining speculators. Most would-be prospectors had little if any mining experience, and some came mostly for the excitement, notably upper-class colonists and Englishmen. The 'Kelly Gang' formed by some of these men amused but also irritated real miners, for whom mining was not a frivolous game but a skilled occupation requiring serious work. There was a second, more sedate, rush in late 1881 after Hone Werahiko found much better gold in the Waiorongomai Valley.

After these rushes, the district was dominated by miners trying to make a living from hard-rock mining and by farmers transforming swamps into pioneering farms. Te Aroha quickly became the service centre for a predominantly farming district, with many miners moving to live in the adjoining settlements of Waiorongomai and Quartzville. As the 1880s progressed, an elite accused of trying to dominate the district for its own economic benefit was challenged by miners and other workers. Yet despite rancour against the 'Upper Ten', there were friendly contacts in churches, hotels, sports, horse racing, the hot pools, dances, and a wide variety of entertainments, and all levels of society united in efforts to support the mining industry.

Te Aroha's thermal hot pools made this community unique compared with any other mining settlement. The Hot Springs Domain was developed explicitly to attract tourists, and reports of miracle cures obtained from the Te Aroha Sanatorium attracted visitors from all over Australasia and even further afield. This tourist trade meant some socializing between locals and tourists, with visitors being encouraged to visit both mines and battery.

Although small-scale mining continuing into the early twentieth century, agriculture and tourism had become dominant in the district. The initial mining community had differed from others through Maori involvement, through younger members of the upper stratum of society joining in the initial rush, and through the development of a tourist trade that attracted members of both national and international elites to visit for relaxation and medical treatment.

## ‘This mountain may run your motor car’: J.T. Moate and the Adelaide Oil Exploration Company

Nic Haygarth<sup>1</sup>

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Being cut off from overseas manufacturing and resources during World War One (1914–18) made Australians feel economically vulnerable, one of the effects being the creation of an atmosphere in which nationhood was equated with greater industrial self-sufficiency.<sup>1</sup> In the years 1920–25 the Commonwealth Government offered a £50,000 reward for the discovery of a payable oil field in Australia.<sup>2</sup> The call to patriotism and the prospect of financial reward was a high octane mix which unleashed on the public speculators whose statements—giving them the very kindest construction—were ‘super-optimistic’. One such company was the Adelaide Oil Exploration Company (A.O.E.C, 1920–54).

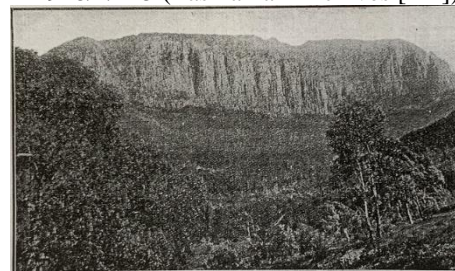
In May 1921 J.T. Moate of the A.O.E.C. was granted a six-month-long licence to prospect for oil over 76,800 acres of the Tasmanian highlands, covering most of the area from Cradle Mountain to Lake St Clair (see Figure 1). Clearly he had either forgotten what winter conditions were like in the Tasmanian high country, or didn’t need to remember since he had no intention of going there. Whichever the case, in July 1921 Moate announced erroneously that asphaltum (a form of asphalt or bitumen) had been found ‘in very large quantities in an inland position’ in Tasmania.<sup>3</sup> The on-ground evidence for this claim was, apparently, a telegram from the Mount Pelion East works superintendent (that is, Moate’s son-in-law Edwin J. Stott): ‘Rocks saturated with petroleum, strong odour in cutting’<sup>4</sup>. An extraordinary paper (Figure 2) followed in August. Under a photo of Mount Pelion West was a banner reading

‘This Mountain May Run Your Motor Car’. Beneath that was an even more striking claim. Eminent oil experts, it was written, confidently asserted that the A.O.E.C.’s licenced land ‘contain[ed] the greatest potential amount of wealth hitherto controlled by any one concern in the British Empire, and, probably, in the whole world, outside the United States of America’<sup>5</sup>

Figure 1: Map of the area discussed.



Figure 2: Mount Pelion West, from file AB948/1/225 (Tasmanian Archives [TA]).



### This Mountain May Run Your Motor Car.

(The above picture is from a photograph of Mount Pelion West, in Western Tasmania, showing columnar diabase resting on coal measures strata, and forms a portion of an extensive area—about 100,000 acres—held by THE ADELAIDE OIL EXPLORATION COMPANY, LIMITED, under licence to search for coal and oil.)

<sup>1</sup> See Laura Williams, ‘A Sheep-run or a Nation?: the Evidence from Kelsall & Kemp (Tasmania) and Patons & Baldwins’, Launceston, Master of Arts thesis, University of Tasmania, 1988.

<sup>2</sup> ‘£50,000 Reward for the Discovery of Oil’, *Daily News* (Perth), 29 September 1920, p. 6.

<sup>3</sup> J.T. Moate, quoted in ‘Oil Prospects: An Expert’s Opinion’, *Register* (Adelaide), 2 July 1921, p. 10.

<sup>4</sup> E.J. Stott, a director of the A.O.E.C., to shareholders, 27 July 1921, AB948/1/225 (TA).

<sup>5</sup> ‘This Mountain May Run Your Motor Car’, AB948/1/225 (TA).

## Review of the Second International Conference of Mining and Underground Museums at Wieliczka and Zabrze, Poland, May 2023

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Nobody does a conference with more flair than the Cracow Saltworks Museum at Wieliczka, Poland. The theme was ‘Mining heritage = human heritage’, recognising the universality of mining in the human experience for countless thousands of years. The venue for the first half of the conference was the World-Heritage-inscribed Wieliczka Salt Mine, the underworld palace with 245 km of galleries, with salt carvings and statues representing 700 years of mining folk lore and sacred practice. All the action took place in subterranean chambers reached by way of a traditionally clunky miners’ cage.

Day Three of the conference was conducted in a theatre 320 metres underground at the Guido Coal Mine and Coal Mining Museum in Zabrze, Upper Silesia, 110 km from Wieliczka. This region was once an important centre of the Industrial Revolution, employing more than 400,000 miners. Proceedings on the final day of the conference were conducted *above ground* at the Queen Louise Coal Mining Heritage Park at Zabrze. At the beginning of the nineteenth century this mine was part of an ambitious plan to dig a 14-km-long drainage tunnel which served 25 coal mines between Zabrze and Chorzow, and took 64 years to complete. Today visitors to the Queen Louise can walk a section of the cleared, empty drainage tunnel. Another tunnel which served as a waterway for transporting coal to market is now a venue for underground rafting tourism.

The conference was exhilarating, unforgettable, rewarding and exhausting; a great lesson in the preservation and adaptive reuse of mining sites, the innovation of mining museums in Europe and the Americas, and how small institutions with few resources can tell big picture stories.

**Figure 1:** The St Kinga Chapel underground at the Wieliczka Salt Mine, Poland.



Source: Nic Haygarth

## Mining Technology Transfer: England-Russia-New Zealand-Australia

Geoff Hudson

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This paper draws heavily on the research carried out by my brother, Dr Russell Hudson<sup>1</sup>, in investigating the origins of our parents William Russell Hudson and Joyce Elizabeth Clarke, both of whom were born in the Eastern Goldfields of Western Australia.

### Figure 1: Thomas Plummer Clarke

My great grandfather, Thomas Plummer Clarke (1840-1905) was born in Frodsham, Cheshire and



completed his engineering apprenticeship at the Union Foundry in Boulton in 1865. He married Frances Stelfox, and went to Russia where he worked as a steam engineer in the textile industry for the next 20 years. He immigrated to New Zealand in 1885 and worked in the timber industry, then moved to Waihi in 1894 where he worked as an engineer and battery manager.

My grandfather, William George Clarke (1878-1941), the eighth of nine children, all born in Russia, studied assaying in Waihi, and following service in the Boer War moved to the Eastern Goldfields of Western Australia in the early 1900's with his brother Robert, a mining engineer.

Source: *Cyclopedia of New Zealand* (1902), Vol. II. p.504.

In 1905 he was appointed metallurgist on the Main Lode, Burbanks, and later that year married Elizabeth Annie Douglas, the local school teacher. Four children were born in Burbanks and the family moved to Kalgoorlie in 1915 or 1916. William Clarke worked on the Ivanhoe and Perseverance mines before joining the Kalgoorlie School of Mines as a research metallurgist in 1928, and over the following 12 years he investigated a variety of topics on flotation, roasting and treatment of gold ores, and processing of tin concentrates and sulphide ores.

Joyce Elizabeth Clarke (1909-1984), was the second of four children born in Burbanks, and following school in Kalgoorlie went to the Menzies primary school as a "monitor". The following year she did a one-year course at Claremont Teachers College in Perth, and was appointed to a one teacher school near Grass Patch in the marginal farming district between Norseman and Esperance. After three years she transferred to North Kalgoorlie Primary School where she taught for 3 years prior to marrying my father William Russell Hudson, a high school science teacher, in 1936. They lived in Kalgoorlie before moving to Bunbury in 1940, and in 1952 moved to Perth with their three sons.

The oldest son, Douglas Russell, and the youngest, Geoffrey Robert Thomas both became geologists. Russell's career was predominantly with the CSIRO Minerals Division in Perth where he did early research on the Kambalda nickel deposits, while Geoff joined Western Mining Corporation in 1967 where he was involved in mineral exploration and research, and, later, professional development and information services with the Australian Mineral Foundation Inc.

The Clarke family involvement in engineering, mineral processing and geoscience has spanned a period of four generations and more than 160 years in England, Russia, New Zealand and Australia, with technology transfer and research a persistent theme throughout this time.

<sup>1</sup> Russell Hudson, <https://freepages.rootsweb.com/~russellhudson/genealogy/clarke.htm>

## The Bawdwin Lead-Silver Mine, Myanmar: A pictorial journey back in time

<sup>1</sup> Donald R. Maclean

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The Bawdwin Mine in Shan State, Myanmar, is one of the world's great lead-silver mines. The mine was developed by the British in the early 1900's, centred on lead gossans that had been mined for silver by the Chinese from the 15th century. Herbert Hoover recognised the potential of the project, arranging the capital to develop the mine. He engaged the famous New Zealand economic geologist Malcolm McClaren, who visited and wrote several reports on the mine in the early 1900s. Tunnelling below the gossans discovered a fabulously rich lead-silver-zinc-copper deposit, and a railway was built to the township of Namtu 25 km away, where a processing and smelting complex was built.

In its heyday, prior to WWII, Bawdwin was the largest and richest lead mine in the world, helping to finance Herbert Hoover to become the United States President (1929-1931). Following WWII (when the mine was briefly occupied by the Japanese), Myanmar became independent with the mine becoming nationalised but production dwindled over the ensuing years, with the mine largely depleted in the early 2000s.

The author visited and worked on the project from 2016 to 2017. Much of the mine and processing complex remains, providing a fascinating historic insight into the mine and the large industrial complex it supported. This paper will present a pictorial journey through the Bawdwin Mine and the Namtu processing/smelting complex.



## Options for linking mining history with geoheritage in Australia

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Australia has a rich and extensive history of mining and is steeped in mining heritage, although much of this history and heritage is not well known or appreciated by the modern population. Most Australians are aware of the economic and cultural significance of the early gold rushes and some of the other larger mineral discoveries, but much more of our mining history could be brought to light and its significance better understood.

There are strong links between mining history and geoheritage. Many important geological and mineralogical discoveries have been made during mining and mineral exploration; exposed features in mines and quarries demonstrate the evidence. Near-surface altered and deformed host rocks are a small but important part of many landscapes, and commonly these form prominent or unusual landscape features that have led to their recognition as potential sites of ore deposits. The giant gossan of the Broken Hill orebodies and the association of polymetallic ores with prominent hills in the Cobar region provide examples. Mines have been the source of many important mineral collections, including species of important scientific value as well as exceptional beauty. This provides another link with geoheritage.

Illustrating the economic contribution from the geology of an area through mining its ore deposits is one example. As mining has been such an important component of Australia's cultural development, mining history can also contribute a cultural aspect to geoheritage. On the other hand, mining heritage can be significantly enhanced by reference to the geoheritage. For example, including an explanation of the geology surrounding a mine, particularly the broader geological setting and ore deposit controls, can give visitors a better understanding of the history of the mine. Parameters such as the size, geometry and grade of a deposit are features critical to its successful mining, and all are controlled by the geology. Currently many mining heritage sites lack a clear explanation of these important geological aspects.

Incorporating historic mining sites, museums and mining trails within geotrails and geoparks is an obvious way to integrate mining heritage and geoheritage. Throughout Australia there are already established mining heritage sites, museums and mining trails. For example, the Gold Trails in NSW, the Goldfield Track in Victoria and many local walks typically connected to a single site or museum. It should be possible to incorporate or at least reference these in geoparks and geotrails; in many overseas countries this type of integration has already been successfully achieved. Where existing mining heritage is outside heritage listed and protected parks or trails a new category of 'geotrail' could be considered. A key requirement to advance the integration of mining heritage and geoheritage is a comprehensive register of historic mining sites, including their key mining heritage structures and artefacts.

A driving force for geoheritage is an interest in increasing tourism, particularly in regional Australia. By integrating mining heritage with geoheritage, mining history tourism could make a valuable contribution to geotourism. Two examples will illustrate:

- how geological features can be combined with mining heritage at a site on the south coast of New South Wales, and;
- how a proposed geo-region in the New England area can benefit from including existing mining heritage aspects.

## The saga of coal mining around Seddonville, Buller Coalfield

Simon Nathan<sup>1</sup>

<sup>1</sup>Formerly GNS Science

The Seddonville mining area is at the northern edge of the Buller Coalfield, near Westport. Mining there was never very successful, but the area has considerable historical interest for several reasons: it was the site of New Zealand's first State Coal Mine, later a laboratory for the development of hydraulic mining, and also the home of one of New Zealand's longest-lived private mines.

Although the first coal discoveries were made in the 1860s, the area was inaccessible until the opening of a railway line in 1893, and the largest settlement was named after Premier RJ Seddon. In order to challenge the near monopoly of the Westport Coal Company, Seddon set up a number of government-owned mines, and the first State Coal Mine was opened at Seddonville in 1903. Mining was beset by problems because the coal was not a single seam, but a series of pods and lenses. Seddonville State Mine closed in 1914, although one of the nearby coal lenses was successfully worked as the privately-owned Charming Creek mine from 1929-86.

Westport entrepreneur and engineer Tom Moynihan developed methods of mining using water to transport the coal (hydraulic or hydro-mining). This was strongly opposed by the unions who feared loss of jobs, but the Seddonville mine was one where he was able to develop and test his ideas away from union influence. The old Seddonville state mine workings were converted into a hydro mine in 1936, and many other mines throughout the country adopted Moynihan's techniques (but with virtually no acknowledgement).

**Figure 1:** Coal seam exposed at the Mokihinui Mine, near Seddonville



Source: Photo: Alexander Turnbull Library ½-035123

This huge coal seam, about 11 metres thick, was originally worked by the Mohikinui mine. A shaft has been driven into the lower part of the seam. British coal miners were used to working seams only 2-3 metres thick, and their traditional mining methods left much of the coal in ground. Later generations recovered much of this coal by hydraulic mining.

## Processing gold-bearing quartz ore in the early 20<sup>th</sup> century: an illustrated case study from the Snowy River battery, Waiuta, New Zealand

Simon Nathan<sup>1</sup>

<sup>1</sup>Formerly GNS Science

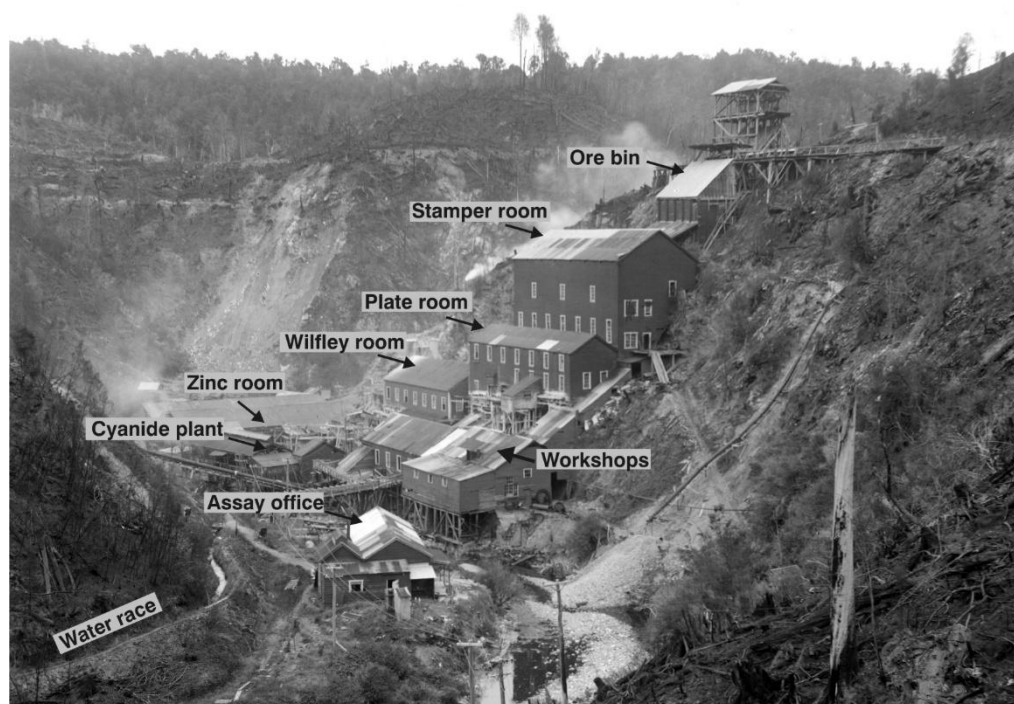
The Snowy River battery, at Waiuta, New Zealand, processed gold-bearing quartz ore from the nearby Blackwater mine between 1908 and 1938. When built in 1908, and incorporating the latest technology, it was a typical stamper battery of the early 20<sup>th</sup> century. With a few modifications it continued to process ore until it was replaced by new plant at the Prohibition shaft in 1938. We are fortunate that Joseph Divis took a series of photographs in early 1931 which illustrate the steps in processing the ore.

The battery was sited on the side of a steep valley, so that gravity could be used to move the ore as it was processed through different stages to extract the gold. Most of the plant was powered by water; a water race fed a Pelton wheel which turned the main shaft to power the stampers and other mechanical equipment.

There were five stages in processing the ore:

1. Crushing to release gold (and other minerals);
2. Capture of free gold on mercury-coated copper plates;
3. Physical concentration of gold and other heavy minerals not captured in step 2;
4. Cyanide treatment to dissolve gold, and re-precipitation by reaction with zinc;
5. Smelting and refining of gold bullion.

In 1924 an Edwards furnace was installed to roast the concentrates from step 3, oxidising some mineral components so that cyanide processing was enhanced; however, an unanticipated consequence was arsenic contamination of the area around the battery.



**Figure 1:** View of the Snowy River battery with buildings labelled.

Source: Photo by Joseph Divis, about 1930-31. *Alexander Turnbull Library 1/1-39807-G*



## Stamper battery rebuilds.

Jim Staton<sup>1</sup>

Retired, formerly Ranger, Department of Conservation Hokitika, New Zealand.

This presentation discusses three recent hard rock stamper battery rebuilds; the Golden Lead, Lord Brassey (or Kirwans) – both in the Reefton goldfield, and Culliford's to the north of Reefton in the Wangapeka Valley. Why did they fail after so much speculation – a familiar story?

The Golden Lead battery was made by A & G Price of Thames in 1886 for the Enterprise GM Company, and was located in the Owen River goldfield, approximately 115km north east of Reefton. Purchased by the Golden Lead in 1889, it was restored in 2008.

The Lord Brassey (Kirwans battery) was made by Dispatch Foundry in Greymouth in 1898; Dispatch is approximately 110km south of the battery site. This battery was restored over four years from 2009.

The third battery, Culliford's, was made by Langford's Foundry in Melbourne in 1870; landed at Port Nelson, it was then carted 110km to the site. The NZ Forest Service carried out the first rebuilding, in 1980; the battery was rebuilt over two years from 2021, and completed in 2023.

**Figure 1:** Lord Brassey

**Figure 2:** Golden Lea

**Figure 3:** Culliford's



Source: Author provided.

<sup>1</sup> Staton was project manager for the three rebuilds and has advised on four other stamper battery projects. He has been involved in industrial heritage management and advice over the past 50 years for the NZ Forest Service and Department of Conservation.

## The Rimu Gold Dredge – an historical photograph record

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<sup>1</sup>Mining Engineer, Rosco Contractors Ltd. Reefton

The Rimu bucket line dredge was a well-known New Zealand gold mining success story. Operating over a period of 32 years from 1920 to 1951, the dredge produced nearly 320,000 oz of gold and moved nearly 50 Million bank cubic metres of gravel to do so.

The photographic record<sup>1</sup> contained in the accompanying presentation was curated by historian Margaret Mort from records stored at the West Coast Electric Power Board, a successor to the original hydro-electric power company that supplied the dredge during its working life. The photos are thought to have been taken by Mining Engineer, Promoter and foundation Director Robert Cranston of California.

The photographs are of particular value in documenting the construction of the original 1920 timber dredge, and its steel successor which was constructed in 1931. The conference presentation focuses on construction techniques widely in use 100 years ago, but now superseded by modern methods and equipment.

**Figure 1:** Rimu Gold dredge – Oct 1931



Source: Author provided West Coast Electric Power Board

<sup>1</sup> The photographs were first presented at the 2006 Alluvial Gold Conference, held in Alexandra, New Zealand

## The Lost Quarry, Dobson

Mary Trayes<sup>1</sup>

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Between the late 1870's and the end of 1911 the marine sandstone overlying coal measures either side of the Brunner Gorge (Grey River, South Island, New Zealand) was quarried intermittently. The stone was used for building, paving and gravestones, the bulk of it being taken from the south side of the Grey River at the east end of the Dobson Flat, where the Brunner Gorge begins. Stone quarried here was then transported to the Port of Greymouth utilising the railway completed in 1876 to service the coal mines just upriver. Both sandstone and coal been known from the earliest days of European exploration of the West Coast, Thomas Brunner having camped in 1848 on the small sandstone island, (Motutapu or Rocky Island), which lies in the Grey River at the downstream end of what is today known as the Brunner Gorge. It was from there, on his canoe explorations upstream with Maori guides, that Brunner noted a coal seam near river level on the north bank. Exploitation of Brunner's find only really got under way in the 1860s after settlement began in the greater Greymouth area as a result of the gold rushes. By the 1870s those wishing to exploit the coal were pushing for a railway to be built to the Brunner Gorge and geologists were visiting the West Coast in search of further mineral resources. Dr Hector, first director of the New Zealand new Geological Survey, visited the Brunner Gorge area at least twice, searching for and mapping further coal outcrops and other strata in the area. In the late 1870s he named the sandstone, 'Island Sandstone', after Motutapu - Rocky Island. All this, and more, is known of the early economic and social history of the area because it was well recorded in newspapers, government reports and on maps, all of which are readily accessible today in both written and digital format. However unlike the history of coalmining at the Brunner Gorge, the history of the quarry has not come through to the modern day. Knowledge of it has become 'lost.'

The writer postulates that this loss is due to the quarry's having been located at the eastern end of the seven kilometre long Brunner Gorge, an area where coal mining predominated between the 1860s and 1960s. Furthermore, when development of the Dobson Coal Mine began in 1920, it was in the same area where the quarry had been, and old quarry rock lying around was used to make the concrete for the foundations of the mine's compressor shed. After the Dobson Mine closed in 1968, and its above ground infrastructure removed, there would have been few locals who could recall the existence of the quarry, and this is borne out by none of the modern day books about the coalmining history of the area making any reference to quarrying of the sandstone. The only modern day publication found which refers to the Dobson Quarry is a small booklet about New Zealand building stones.<sup>5</sup> Today, past industrialisation at the Brunner Gorge is well remembered, with a number of memorials and two actively managed heritage sites, the large Brunner Mine Site managed by the Department of Conservation and the small Dobson – Brunnerton Heritage Park established by local people in 2018. Located by the roadside at the east end of Dobson, it is right opposite the former Dobson Mine, and its predecessor, the Dobson Quarry. To date only the mine has been remembered here but it's hoped that more about the quarry might be included in future; the marine sandstone quarried at Dobson was recognised by the West Coast pioneers as being a good 'freestone' (easy to work) with multiple applications in the building trade, for paving, and for monumental masonry. Whilst the porosity was in question for some applications, two buildings constructed of 'Dobson Stone' are still standing. Both are in Heritage New Zealand Category 1, one the former Government Building in Christchurch (and now the Heritage Hotel, Christchurch), and the other the old Greymouth Courthouse. Whether or not there are any 'Dobson Stone' gravestones still standing is unknown.

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<sup>1</sup> Hayward BW, *Granite and marble: A guide to building stones in New Zealand*. GSNZ Guidebook No. 8, 1987.