Gold in pyrites

Ore produced from the Port Phillip mine during the first few years came from quartz reefs above the water table. Here, the base metals that accompanied the gold when it was first deposited had been decomposed by downward percolating rainwater to iron oxides (essentially rust), from which the gold could easily be separated. As mining progressed below the natural water table the base metals were met in their undecomposed state, as sulphides of iron, arsenic, lead and zinc. These base-metal sulphides were collectively referred to as ‘pyrites’ after their most common constituent, iron pyrites or ‘fool’s gold’. ‘Pyrites’ constituted about 1% of the volume of ore mined at Clunes.

The pyrites problem

Once pyrites were encountered, a proportion of the gold in the ore was lost, trapped within the base-metal sulphides. The pyrites problem was not new. Different methods of extracting the gold ‘locked up’ in pyrites had been tried around the world for decades. To date, all had proved too expensive or too cumbersome to be used on the increasing quantities of pyrites being produced by mines in Victoria in the early 1860s.

By about 1859, pyrites had begun to appear in quartz mined close to the water table in the Port Phillip mine. Assays showed that as much as 25oz of gold were being lost in each ton of pyrites contained in the tailings leaving the batteries. With the pyrites content being only 1% however, around 100 tons of quartz had to be crushed to produce one ton of pyrites. Gold grades exceeded 1oz per ton in the early years of mining and the loss of say, 5dwt per ton (25%), of the gold could be tolerated.
Recovery of the small fraction of the tailings consisting of pyrites would not have been cost-effective at that time, owing to the additional labour required to clean the blanket strakes more frequently. More importantly, a satisfactory method of recovering the gold 'locked up' within the pyrites was still to be developed. Even the world-renowned St John Company relied on a primitive method of stockpiling its tailings for a year or more, to allow air and moisture to decompose the pyrites grains and liberate part of their contained gold. Weathered tailings were then re-treated in a laborious process made possible largely by its use of slave labour.

Treatment rates at the Port Phillip works increased substantially in 1860 following the upgrading of the battery house. At the same time, gold grades fell due to the more rapid mining rates required to keep the batteries supplied, combined with less 'hand-picking' of the ore. As a result, the quantity of gold lost in pyrites in the tailings became proportionally more significant. A further incentive to solve the pyrites problem was the Old Man reef. This massive reef had remained almost untouched due to its generally low gold grade but, ‘...the quartz contains an immense quantity of iron pyrites,...'\(^1\) If the pyrites could be collected and effectively treated, it would provide a considerable increase in profit from the ore presently being mined, while the Old Man reef could provide a large additional ore resource.

It was due largely to the efforts of the Port Phillip Company's technical staff that a practical method was evolved over a two-year period of constant experimentation. Despite the costs incurred and the commercial advantage that the company could have gained, it freely disseminated the results of its research to the mining industry, enabling other treatment plants throughout Victoria to benefit from the work. The company established such a leading position in pyrites treatment that the government appointed Rivett Bland to a board of enquiry into the subject in 1874.

**First steps towards a solution**

From the start of operations in 1857 the Port Phillip Company had carried out regular assays on the tailings leaving the battery house, a practice probably introduced by battery manager Joseph Robson. Five years later, despite the enormous increase in Victorian quartz crushing operations, it was still the only company conducting this

\(^1\) *Reports of the Mining Surveyors: Creswick Division*, October 1861, p.427.
systematic process.\textsuperscript{2} Accurate assaying was a vital step in determining how much gold was being lost in the tailings, and whether modifications of the treatment process to increase gold recovery were having the desired effect. The company opened a substantial assay office at the works early in 1861, employing George Joseph Latta as chemist and assayer to devise a cost-effective method of extracting gold from the pyrites.\textsuperscript{3} At about the same time, Joseph Robson and works manager Henry Thompson began experimenting with different methods of collecting and treating pyrites from the battery tailings.

The first breakthrough in pyrites treatment came when Latta and Thompson determined that most of the gold in the pyrites was physically rather than chemically contained. In theory, unless the battery stamps pulverised each base-metal sulphide grain to a size such that any ‘locked up’ gold particles were liberated, they could not be recovered by amalgamation with mercury. In practice, very fine grinding created its own particular problems including lack of throughput and the creation of intractable ‘slimes’.\textsuperscript{4} ‘Flouring’ or coating of mercury droplets with a film of sulphides also occurred, reducing their amalgamating efficiency.

In the next advance, Latta and Thompson found from microscopic examination of pyrites that most of the contained gold occurred as coatings on cracks and cleavage planes within the individual sulphide grains. Grains of pyrites only one-thousandth of an inch across still carried coatings of gold on the individual crystal faces.\textsuperscript{5} Like tiny fragments of gold leaf, the coatings were so fine that, if dried, they would literally float on water. Most were being washed away and lost with the tailings in the conventional treatment process and a different approach was needed to overcome this. A logical alternative would be to collect most of the pyrites from the tailings as a concentrate, letting the pyrites-poor residue flow to waste in Creswick Creek. The small volume of pyrites concentrate could then be dealt with separately, using processes that would overcome the problems of recovering very fine gold flakes from the pyrites grains.

Rivett Bland sent samples of Clunes pyrites to Britain for testwork by Dr John Percy of the Government School of Mines, metallurgist William Herepath of Bristol, and London-based assayers Johnson, Matthey & Company. All three consultants

\textsuperscript{2} Dicker's Mining Record, vol.1, 24 October 1862, p.1.
\textsuperscript{5} Dicker's Mining Record, vol.7, 18 September 1866, pp.188-190.
experimented with various liquid and gaseous reagents that had the potential to selectively dissolve either the gold or the sulphides. A chlorination process developed by Plattner during the 1850s was an early favourite. John MacDonnell and James Vetch, two of the Port Phillip Company’s directors, travelled to Saxony and Austria in mid-1861 to bring detailed knowledge of Plattner’s process back to Britain.6

Each of the consultants in turn rejected chemical methods, including Plattner’s process, on the basis of cost or unsuitability in a ‘remote’ location such as Victoria. Their opinions differed on whether or not to roast the pyrites, and the merits of separating magnetic material (iron fragments from the stamp heads) from the pyrites concentrate. All agreed however, that the best way to recover its contained gold was to grind pyrites very finely in the presence of mercury.7 John Percy and Johnson, Matthey & Company concurred with Bland’s view that pyrites should be roasted prior to grinding, to decompose the sulphides, and avoid ‘sickening’ the mercury by the presence of arsenic and sulphur.

Within a few weeks of receiving reports from the British experts, Bland published their conclusions in the local press.8 His release of what would these days be regarded as commercially sensitive information served two purposes. The reports confirmed that the Port Phillip Company was at the forefront of metallurgical research and efficient gold recovery, and good publicity was always welcome. More importantly, Bland was schooled in the nineteenth century ethos of progress through enlightenment. As the industry leader, here was an opportunity to pass on information that could lead other companies to more profitable operations.

Two problems still remained to be overcome on a commercial scale: collecting the maximum amount of pyrites from the tailings, and economically extracting the gold from the pyrites concentrate. Quartz mining companies throughout Victoria, who faced the same problems, followed the Port Phillip Company’s progress with keen interest.

7 Ibid., pp.65-74.
8 Star, 26 November 1862.
Extracting gold from pyrites

Thompson and Latta’s experiments to recover fine gold from pyrites began in May 1862 with tests of Hinck’s locally patented amalgamating process. At the same time Joseph Robson designed a machine of his own, adapted from the Mexican arrastra. Robson’s machine proved superior to Hinck’s amalgamator but was still not a commercial proposition, due to its limited throughput.\(^9\) Robson and William Lancashire of the Clunes Foundry did however, register a patent over the unusual grinding action of his machine.\(^10\)

The next significant advance came in July 1862. George Latta ground two 20-ton batches of pyrites concentrates under controlled conditions in a Chilean mill, one batch in its ‘raw’ state, the other roasted first to decompose the sulphide minerals. Extremely fine gold particles, liberated by the grinding action, but then lost by being washed away instead of amalgamating with the mercury in the Chilean mill, amounted to over 20% of the total gold in both batches.\(^11\) Despite this, nearly 20% more gold was recovered from the roasted pyrites, compared to the results from the raw pyrites sample.

A Chilean mill was the most suitable and readily available grinder for production scale use but its normal method of operation required modification when grinding pyrites. Instead of a constant stream of water flowing through the basin of the mill to carry away the finely ground waste (and the very fine, ‘flaky’ gold), the mill had to be operated almost dry. In practice, a batch of slightly dampened pyrites was ground in the mill in the presence of a large quantity of mercury, ensuring that each liberated ‘flake’ of gold had sufficient contact with mercury to be amalgamated. Only then was the mill carefully flushed with water to remove the finely ground waste, before treating another batch. One man could operate two Chilean mills in this manner, treating around 18 tons of pyrites per week and recovering over 90% of its contained gold.\(^12\)

Encouraged by the results of the grinding tests, Thompson and Latta now concentrated on developing the most effective pyrites roasting process. After a series of experiments, Latta designed an improved reverberatory furnace (where heat was

\(^9\) Ibid., 5 September 1862.
\(^{10}\) Archer, Patents, p.65.
\(^{11}\) Latta, Treatment, p.658.
\(^{12}\) Reports of the Mining Surveyors and Registrars, Quarter ending 30 September 1864, p.15.
forced back or ‘reflected’ on to the furnace’s contents), for which he and Henry Thompson were granted a patent in September 1862.\textsuperscript{13} Latta constructed a small-scale furnace of the new design for roasting trials on the pyrites. This then served as the production unit until a commercial-scale furnace was built in late 1865.

Still experimenting with alternative processes that might improve gold recovery from the tailings, Thomson and Latta constructed a 5-ton capacity blast furnace in late 1862, according to David Wilkinson’s patent smelting process. Rivett Bland had chaired a government committee two years earlier, which had assessed the patent and its original pilot-scale furnace.\textsuperscript{14} In principle, a blast of hot air and steam would decompose pyrites grains in the battery tailings, the fine ‘flaky’ gold they contained coalescing into tiny droplets under the effects of the blast. Conventional blanket strakes or amalgamation troughs would then trap the spherical droplets more easily than the formerly flat flakes.\textsuperscript{15} Wilkinson personally supervised the first trial which, in view of its potential importance to the mining industry (and a government subsidy of £250), was attended by government geologists Alfred Selwyn and Richard Daintree. In the event, no more gold could be recovered by Wilkinson’s process than by the company’s existing treatment methods and the trials were discontinued.\textsuperscript{16}

**Separating pyrites from battery tailings**

Thompson and Latta’s work on the pyrites problem during 1861-2 had been a remarkable success. The difficulties of recovering gold from pyrites at a commercial scale had been overcome. All that was needed now was a viable method of removing and concentrating pyrites from the bulk of the battery tailings.

The Port Phillip Company had begun experimenting early in 1862 to develop a low-cost method of separating pyrites from the tailings leaving the batteries. The method had to be able to process large quantities of tailings (100 tons or more per day) to produce a pyrites concentrate from which the gold could subsequently be recovered.

\textsuperscript{13} Archer, *Patents*, p.84.
\textsuperscript{15} *Report of the Directors*, 1863, pp.11, 12.
\textsuperscript{16} *Star*, 19 December 1862, 7 January 1863.
Trials of an early spitzkasten (density separator) and a revolving blanket system (to minimise cleaning time) both proved impractical. Henry Thompson and Joseph Robson then experimented with ripple or ‘percussion’ tables, similar to those designed by Evan Hopkins to separate pyrites from sulphide-rich South American gold ores. A month of trials however, proved that the blanket-covered strakes were more effective than percussion tables in recovering the much smaller proportion of pyrites in Clunes quartz. Further experiments to find a more efficient method of concentrating pyrites from the ‘blanket sands’ produced by the strakes eventually led to the construction of a buddle in early 1864.  

Buddles had been used for many years in Cornish mines, to concentrate tin and copper ores. Like many mineral-concentrating devices, the buddle relied on a current of water to separate lighter particles from those of a greater density. It consisted of a circular basin about 18 feet in diameter, sloping gently inwards to a central discharge point, through which the rejected material flowed via a pipe to the tailings dam. Rotating inside the buddle were a number of downward-sloping distributing pipes, and upward-sloping ‘scraper’ arms parallel to the buddle floor.

\[\text{Borlases Buddle with Munday's Patent Scrapers}\]

\[\text{\textsuperscript{18}}\]

\[\text{\textsuperscript{17}}\] Ibid., 2 May 1864.  
‘Blanket sands’, consisting of grains of pyrites and quartz, were mixed with water and introduced through the downward-sloping distributing pipes to the outer edge of the buddle floor. The denser pyrites grains settled out there, while the lighter quartz grains were carried downward by the water flow, across the smooth surface created by the scraper arms, and into the central discharge point. The pyrites concentrate was cleaned from the outer part of the buddle floor periodically for subsequent roasting, grinding and amalgamating operations.\textsuperscript{19} Initial trials were highly encouraging, reducing the blanket sands to a much smaller volume of pyrites concentrate.

The buddle continued operating throughout 1864, undergoing further modifications by the Port Phillip Company’s John Munday, who took out a patent on an improved scraper system for the machine. Company craftsmen constructed a working model buddle in late 1864, fitted with Munday’s patent scrapers, for the Mining Commission’s collection at the University of Melbourne.\textsuperscript{20}

By late 1864, Thomson and Latta’s work on the pyrites problem was essentially complete. Within a short time the methods they had developed were adopted by treatment plants throughout Victoria, remaining the industry standard for nearly three decades until the introduction of the chlorination and cyanidation processes.

Henry Thompson left the Port Phillip Company in 1865 and by the middle of that year was managing the Good Hope Company on the Crooked River goldfield, north of Sale in Gippsland. He managed the Good Hope mine until 1867-8, introducing percussion tables of his own patented design to separate pyrites from the tailings.\textsuperscript{21}

The reason for Henry Thompson’s sudden departure from Clunes is not clear, but he seemed to maintain fairly frequent and cordial contacts with the Port Phillip Company. He was the company’s longest serving employee, arriving in charge of the Cumberland miners, and had been Rivett Bland’s lieutenant since late 1852. He had managed the treatment works throughout its period of growth and innovation. Now that it was well established, he possibly felt the need to find fresh challenges. In addition to managing the Good Hope mine, Henry Thompson wrote a number of

\textsuperscript{19} Star, 6 June 1864.
\textsuperscript{20} Letters and invoice from R.H.Bland to F.McCoy, Mining Commission correspondence 1856-58, National Museum of Victoria, NMV 15917, Museum Victoria.
papers on mining topics during 1867-8 and set up business as a consulting mining engineer with offices in Temple Court, Melbourne.\textsuperscript{22}

\textbf{Thompson and Latta’s patent reverberatory furnace}

Increasing battery treatment rates during 1865, coupled with improving recovery of pyrites from the tailings, created the need for a much larger pyrites roasting furnace. George Latta designed a production-scale version of the patent reverberatory furnace, which was constructed at the south end of the old battery house. Partly cut into the hillside, the firebrick-lined furnace led to a series of condensing chambers, followed by a 300-foot long ground-flue (covered trench) leading to a 20-foot high chimney stack at the top of the hill. Completed in mid-January 1866, the furnace was declared a complete success when it was fired for the first time later that month.\textsuperscript{23}

The furnace was constructed with the firebox (‘A’ in the diagrams on the next page) at the base. Heat rose up the inclined hearth ‘B’ of the furnace, boosted by a blast of hot air introduced via the heating tubes ‘C’ from an engine-driven fan. Pyrites was fed into the upper end of the furnace from trapdoors beneath storage hoppers at each side. Using long metal rakes, the furnace-men gradually dragged a 2-3 inch thick layer of pyrites down the hearth, turning it frequently to ensure uniform heating. In the strongly oxidising blast the pyrites soon reached a dull red heat, sulphur and arsenic being driven off as fumes. The fumes travelled up the tunnel, drawn by the draught from the chimney at the upper end of the long ground-flue. Water sprayed on to porous brick screens (baffles) in two collection chambers cooled and condensed the fumes as sulphuric and arsenious acids. These collected on the chamber floors and were removed periodically. Dust drawn out of the furnace by the draught collected in an adjacent chamber and was periodically recirculated with the pyrites.

At full production, over ‘…two tons of arsenic per month…’ collected in the condensing chambers, but the system was so effective that the government analytical chemist could detect only the merest trace of arsenic in the chimney fumes.\textsuperscript{24} Emission of a certain amount of sulphuric acid vapour still needed to be overcome.\textsuperscript{25}

\begin{flushright}
\textsuperscript{22} Dicker’s Mining Record, vol.11, 7 December 1868, p.133. \\
\textsuperscript{23} Star, 23 January 1866. \\
\textsuperscript{24} Latta, Treatment, p.658. \\
\textsuperscript{25} Star, 23 January 1867.
\end{flushright}
but the new furnace was a significant improvement healthwise on the prototype, and
the even more primitive kiln-roasting method.

![Thompson and Latta's Patent Furnace](image)

After the sulphide minerals had been decomposed, the roasted pyrites was raked
down into a trough ‘D’ and then out into a storage pit ‘E’. Here it was covered with
damp sand and sprayed with water to promote fracturing in any quartz grains
present, prior to grinding in the Chilean mill. About four tons of pyrites were treated
each day, ‘raw’ pyrites entering the furnace from the storage hoppers at the same
rate as the roasted material was discharged into the storage pit.

**Later developments in pyrites treatment**

News of the company’s successes in treating pyrites spread rapidly during 1866,
prompting neighbouring companies to begin extracting pyrites from their own tailings.
Initially lacking the expertise and equipment to extract gold from the pyrites, they
brought their concentrates to the Port Phillip works for treatment.\(^{27}\) By mid-1867, the
company’s reputation had spread considerably further, four tons of pyrites were sent

\(^{26}\) Report of the Pyrites Board, Appendix K, p.75.
\(^{27}\) New North Clunes Quartz Company quarterly report, *Clunes Guardian and Gazette*, 3 November 1868.
for treatment from the Amelia reef in the Blue Mountains of New South Wales.\textsuperscript{28} George Latta reported testing pyrites from mines near Avoca and Gaffney’s Creek during 1872-3.\textsuperscript{29} This work was probably undertaken on a consulting basis, rather than with the view to commercial treatment.

The Port Phillip Company installed a second baddle at the treatment works in late 1867, and a third in late 1868. Settling boxes were also introduced to scavenge very fine pyrites grains from the tailings before they finally entered the tailings dam. As an economy measure during a period of low gold grades in early 1870, three more buddles were built at the new battery house to extract pyrites directly from the tailings in a one-step operation. This obviated collecting the pyrites on blanket strakes first, saving the associated costs of cleaning and replacing the blankets.

\textsuperscript{28} \textit{Star}, 24 June 1867.
\textsuperscript{29} Ibid., 2 December 1872, 31 May 1873.
\textsuperscript{30} \textit{Illustrated Australian News for Home Readers}, Melbourne, Ebenezer and David Syme, 19 June 1869.
Blanket strakes remained in use at the old battery house, possibly to cater for ore containing a lower pyrites content. Even here, cost savings were achieved by discontinuing amalgamation of the blanket sands to collect fine, free gold prior to concentrating and roasting the pyrites.31

Treatment of pyrites made a substantial contribution to the gold produced by the Port Phillip mine from 1864 onwards. Some 400 tons of pyrites concentrates were collected each year by the buddles, for later roasting and grinding in the Chilean mills. About 4oz of gold (worth around £15) was being recovered from each ton of pyrites in early 1872, at a treatment cost of only £1 13s per ton.32 In all, the Port Phillip Company treated 7,182 tons of pyrites over a 24-year period, recovering 29,300oz of gold (about 8% of the total gold it produced from quartz crushing), for a profit of £92,421.33

**The significance of pyrite treatment technology**

In the bigger picture, devising a practical method which recovered some 70-80% of the gold ‘locked up’ in base-metal sulphide minerals was the Port Phillip Company’s most significant contribution to gold milling technology in Victoria. This was the climax of the company’s research and development efforts. By the early 1870s, over 70,000 tons of pyrites concentrates and pyritic gold ores were being treated in Victoria each year using this type of technology.34

Jan Todd argues that importation of British technology in the 1890s, in the form of the Macarthur-Forrest cyanidation process, saved the day for languishing Australian gold ore treatment technology.35 Certainly this was true for the recently discovered fine-grained, refractory telluride ores of Kalgoorlie. However, those of simpler mineralogy, including many Victorian ores, were quite amenable to roasting and amalgamation by the Port Phillip Company’s process. Even the Kalgoorlie ores required roasting prior

31 *Star*, 27 July 1870.
32 Ibid., 24 January 1872.
to cyanidation, as did other gold ores containing appreciable quantities of antimony, bismuth, cobalt or copper, which act as cyanicides.\textsuperscript{36}

It was not as Todd implies however, that there was simply no answer to the pyrites problem in Australia until the introduction of cyanidation from Britain. Variations of the Port Phillip Company’s pyrites treatment process were widely used in Victoria for more than two decades before the introduction of Plattner’s chlorination process in the late 1880s, followed by the cyanide process in the early 1890s. Chlorination and cyanidation were simply further, more efficient steps in the evolution of sulphidic gold ore treatment.

G. B. O’Malley argues that the development of sulphide roasting was a significant, colonially developed contribution to Australian and subsequently worldwide metallurgical practice.\textsuperscript{37} This was the legacy of the Port Phillip Company’s pioneering work in pyrites treatment during the 1860s.

In the broader picture, just as there had been a wave of metallurgical breakthroughs in gold ore treatment in the late 1850s and early 1860s, in which the Port Phillip Company had been a major player, so there was a further wave three decades later. By then however, the focus of colonial innovation had moved from Victoria to the mines of Queensland, Western Australia and Broken Hill.

O’Malley argues that colonially developed sulphide roasting technology, research into telluride ore treatment at Kalgoorlie, and the flotation process developed at Broken Hill were exported to goldfields worldwide. This balanced the import of overseas technologies such as chlorination and cyanidation.\textsuperscript{38} Geoffrey Blainey likewise regards the latter part of the nineteenth century as a time of essentially balanced importing and exporting of rapidly evolving metallurgical technology.\textsuperscript{39}

\begin{footnotesize}
\bibitem{37} O’Malley, \textit{The Mineral Industries}, pp.737-739.
\bibitem{38} Ibid.
\bibitem{39} Blainey, \textit{Rush}, p.255.
\end{footnotesize}
Chapter 8

Investments in other mining companies

Financing of early mining companies in Victoria

In 1854 Anthony Gabrielli, a London stockbroker and financier with rumoured links to the Rothschild financial empire, had arranged £700,000 in municipal loans for the councils of Melbourne and Geelong. Returning to Victoria some years later to invest British capital in Australian railway companies, Gabrielli also attempted to float the ‘Victorian Mining Association’ during April 1858. He envisaged that the Association would lend money to Victorian co-operative mining associations (companies) to finance their growth, in return for shares and directorships in the ventures. The Association was to raise £1,000,000 in capital by the issue of 100,000 shares of £10 each.

While expecting a large degree of support from local investors, Gabrielli was apparently prepared to provide the entire capital through his British connections if necessary.¹ The launch of the Association was timed to take advantage of legislation, then before parliament, aimed at fostering the formation and regulation of mining companies. This legislation was to include limiting shareholders’ liability to the par value of the shares they held. The Mining Association Act Amendment, commonly known as ‘Ireland’s Act’, was passed in June 1858. Gabrielli however, abandoned his proposal, possibly due to continuing uncertainty in the granting of mining leases.²

The Colonial Mining Journal, Railway and Share Gazette, first published in Melbourne in September 1858, was a strong advocate of company mining and the large-scale use of machinery. It published a series of editorials during 1859, promoting the injection of capital into the goldfields to establish large, efficient mines and modern treatment plants equipped with the latest technological improvements. In August 1859, the Journal published the prospectus of the Victoria Gold Mining Company, promoted by Richard Schlesinger. Offering 50,000 contributing shares of

¹ Star, 19 April 1858.
£20 each, initially paid to 5s, to local investors the company’s proposal was similar in some respects to Gabrielli’s unfulfilled scheme.\(^3\)

The Victoria Gold Mining Company would invest in new mining companies by subscribing for their shares, in each case protecting its own interests by holding a majority of the new company’s shares. To provide additional finance to existing mining companies, it proposed to lend money at reasonable rates, the borrowing company’s machinery being secured as collateral. In addition, the company proposed to lease land for the conduct of large-scale mining and crushing enterprises, citing the highly successful arrangement between the Port Phillip and Clunes companies.\(^4\)

Enthusiastically endorsing the float, the Journal predicted that the new company would give rise to a rapid development of the colony’s mineral resources.\(^5\) By early October 1859 the Victoria Gold Mining Company had been floated, beginning business by investing in existing mining company shares. Advertising as a ‘cash purchaser’ of shares early the following year,\(^6\) the company enjoyed considerable early success, declaring a 25% dividend in September 1860.\(^7\)

**Investments by the Port Phillip Company**

More than a year before Gabrielli’s proposal, Rivett Bland had appreciated the value of investing in emerging mining companies, entering agreements with two deep lead mining co-operatives at Creswick in early 1857. The Port Phillip Company had provided the two parties with steam engines, pumps and other equipment that they could not afford to purchase, in exchange for a share of their future profits. This was the first attempt by the company to invest its capital (or machinery that capital could purchase) in the mining ventures of other Victorian companies.

Nearly two years passed before the Port Phillip Company’s next venture into outside investment in 1859, during which time it had established itself at Clunes and built up a reliable income stream. Shortly before declaring the company’s first dividend in early 1859, the directors had advised Bland that any profits in excess of £10,000 per

---

\(^3\) *Colonial Mining Journal*, vol.1, 4 August 1859, pp.204, 206.
\(^4\) Ibid., p.206.
\(^5\) Ibid., p.199.
\(^6\) Ibid., vol.2, 2 February 1860, p.93.
\(^7\) Ibid., vol.3, 6 September 1860, p.5.
annum for dividends should be invested in ‘…such further mining operations as may in your judgment be profitably undertaken.’ This, the directors believed, would give the company a spread of investments and avoid relying solely on the future prospects of Clunes.

Bland advised the board that he had recently begun negotiations with the owners of the Nintingbool Estate near Smythesdale, southwest of Ballarat. Part of the estate lay at the head of the Woady Yallock alluvial diggings and probably contained the gold-bearing reefs from which the alluvial gold had been eroded. He proposed to participate in the float of the Nintingbool Mining Company, which would lease part of the estate in return for a 2½% royalty on gold produced. The company’s capital would be £12,000 in 24 shares of £500 each, twelve held by the landowners, six by the Port Phillip Company, and six to be taken up by other parties. Bland was to be appointed to the board of the new company.  

The company’s second investment followed the formation of the Bagshot Mining Company in about September 1859. The Bagshot Company had purchased private land northeast of Bendigo, close to the proposed Bendigo–Echuca railway line. Raising £40,000 by the issue of 8,000 shares at £5 each, the company had £25,000 in working capital after purchasing the land. Bland subscribed for 100 shares, taking a seat on the board to protect the Port Phillip Company’s interests. Albert Dumaresq (the Port Phillip Company’s Chilean mill manager), with previous experience at the Santa Anna silver mine in Colombia, was appointed manager and mining superintendent of the Bagshot Mining Company.

Another opportunity in the Nintingbool district presented itself in late 1859. Two companies at Brown’s Diggings, some 4 miles south of Nintingbool, had fought a protracted legal battle over a section of deep lead alluvial ground situated between their leases. Four smaller syndicates had also been involved, winning settlements against one of the two larger companies, the Great Britain Company. To break the impasse a new company, the United Brown’s Diggings Mining Company, was formed with a capital of £20,000 in 100 shares of £200 each. It acquired a lease over the disputed ground and all the assets of the two main contenders, the Great Britain and

---

8 Report of the Shareholder’s Committee, 1860.
10 Ibid., pp.22, 23.
11 Star, 8 April 1858.
North Briton companies, for £19,000.\textsuperscript{12} Bland purchased five shares, took his mandatory seat on the board and seconded H. S. Leake, secretary of the Port Phillip Company at Clunes, to administer the new company’s finances.\textsuperscript{13}

Before the end of 1859, Bland purchased five dividend-paying shares in the Clunes Company as a hedge against its profiting more than his company from the revised crushing agreement signed earlier that year. The Port Phillip Company also provided technical assistance and a small amount of funding to a syndicate prospecting for quartz reefs in the Creswick area.\textsuperscript{14}

All of these investments took place within a period of a few months and are significant. They represent one of the earliest investment programs in Victorian mining ventures by a British-owned company, albeit on a small scale, well before the main boom of British investment in Australian gold mining in the late 1880s.\textsuperscript{15}

\textbf{A question of corporate policy}

Some shareholders of the Port Phillip Company however, were opposed to its new ‘outside’ investment policy. At a shareholders meeting in July 1859, the directors were criticised for proposing to invest in the Nintingbool Company while the company still had a £5,000 mortgage over its ‘Collins Street property’. Questions were also raised about the scope of the company’s Royal charter, the legalities, and the possible liabilities, of investing in other mining companies. Not satisfied with the directors’ responses, shareholders insisted on appointing a committee to investigate the issue of outside investments. After several months’ examination of the company’s charter, deed of settlement, annual reports and correspondence with Rivett Bland, the shareholders’ committee presented a lengthy report at the annual meeting on 19 January 1860.\textsuperscript{16}

\textsuperscript{13} Star, 9 November 1859.
\textsuperscript{14} Report of the Directors, 1860, p.29.
\textsuperscript{15} Blainey, Rush, pp.100, 101.
\textsuperscript{16} Report of the Shareholder’s Committee, 1860.
The committee found that all the shares that had been purchased were in mining companies, not quartz-crushing companies, like the now-successful Port Phillip Company. Since its birth in 1852, the company had consistently lost money on its mining ventures. Worse still, it was only a partner in these new ventures, not the sole owner, as it had been in its own operations. While accepting that the directors had acted in good faith, the committee concluded: ‘…it is not advisable that this Company should hold Shares in other Mining Companies.’ Reluctantly accepting the committee’s findings the board wrote to Bland, instructing him to sell all the shares as soon as possible.

Bland had however, already sold all the marketable shares at a profit before receiving the board’s instructions. He had deemed this necessary to meet the proposed dividend distribution of £10,000 in 1860, coming as it would, so soon after the heavy expenses incurred in upgrading the crushing works. As it turned out, the directors’ plans to declare the next dividend in July 1860 were overturned by the committee’s insistence that the £5,000 mortgage on the Melbourne premises be paid off first.

Bland’s pre-emptive action addressed most of the committee’s concerns over the company’s speculative investments, but the future of the Nintingbool venture remained unresolved. The Nintingbool Company had leased 300 acres of the estate in late 1859 and agreed to spend £2,400 in development work. The Port Phillip had supervised this work and contributed most of the £600 for its share in the venture before the board’s letter called a halt. Unable to sell the shares after this due to a downturn in the Victorian mining market, the directors decided that the matter should be resolved by the shareholders at the company’s next meeting in early 1861.

**The Victoria (London) Mining Company, Limited**

In mid-September 1860, the Port Phillip Company’s shareholders received a circular from the directors. It informed them of the shareholders’ committee resolution on 27 August that the company ‘…will not permit itself to be engaged in Mining speculations or adventures.’ However, the directors continued, some shareholders had since approached them, expressing a willingness to invest in Victorian mining ventures.

---

17 Ibid., p.9.
They believed that the Port Phillip Company had gained considerable experience in Victorian mining and, unlike conditions in the early 1850s, both labour and legislation were now turning in favour of company operations.

As a result, the directors proposed to form a separate company to participate in Victorian mining ventures, under the ‘able guidance’ of Rivett Bland. Shareholders in the Port Phillip Company would be entitled to subscribe to the new company in proportion to their current shareholdings. It would be formed as a limited liability company to protect its shareholders in the event of failure and would operate in parallel with the Port Phillip Company, but be able to mine or invest in shares in the most flexible manner possible. It was to be called the Victoria (London) Mining Company, Limited (‘Victoria Company’), and its first acquisition was to be the Port Phillip Company’s interest in the Nintingbool Mining Company.\(^{19}\)

Incorporated on 1 November 1860, the Victoria Company had the same six-man board of directors as the Port Phillip Company and an authorised capital of £25,000 (later increased to £50,000) in £1 shares, initially paid to 5s. It purchased the Port Phillip Company’s 25% interest in the Nintingbool Mining Company for £1,250 in November-December 1860. This ended the Port Phillip Company’s direct involvement in speculative mining investment, but marked the start of a decade of significant investments by its offshoot in mining ventures throughout Victoria.

When news of the successful float of the Victoria Company reached Bland in February 1861, he purchased five of the 344 shares of £40 each, paid to £30, in the recently formed St. Arnaud United Quartz Mining Company. Charles Harvey and other directors of the Clunes Company had promoted the venture to purchase and work Wilson’s reef at St. Arnaud. The property ultimately became the Lord Nelson mine, the largest gold producer (over 320,000oz) in the district.

Bland also purchased four of the 140 shares of £50 each, paid to £10, in the Gemini Company’s deep lead mine at Brown’s Diggings, south of Nintingbool. In this case H.S. Leake, a former secretary of the Port Phillip Company, was promoting the new company. Leake later managed the United Brown’s Company, in which Bland had invested some of the Port Phillip Company’s funds a year earlier. In September 1861,

\(^{19}\) Ibid., pp.7, 8.
Bland purchased another four fully paid Gemini Company shares, subsequently selling all eight for a profit of £154.\textsuperscript{20}

Although the Victoria Company was a speculative enterprise, Bland was taking no unnecessary risks at this stage, investing in companies promoted by people he knew and trusted. He also took a seat on both companies’ boards, partly to oversee his investment but also to give them the benefit of his experience in mining matters. Bland was still residing in Melbourne at this time, presumably because this sort of investment activity would have relied on close contacts with other company directors and share brokers in Melbourne and Ballarat. In 1863, he was invited to serve as a director of the National Bank of Australasia, which was hoping to attract more business from mining companies.\textsuperscript{21}

A small part of the Victoria Company’s first acquisition, the Nintingbool lease, was let out for sluicing operations at a modest 2½% royalty in 1862. An earlier, more ambitious proposal had fallen through after a rush to New Zealand had drawn away most of the local miners. With prospects at Wilson’s reef improving during 1862, Bland purchased another 16 shares in the St. Arnaud Company and invested £2,320 buying three of the 40 shares in the Buninyong Company’s deep lead mine, southeast of Ballarat. The Buninyong mine had already produced nearly 25,000oz of gold but now needed more development work, to be funded by small but regular calls on the shares.

The Victoria Company began buying pyrites in 1862, from syndicates and small companies lacking the equipment or the expertise to extract its contained gold. There were obvious links between this and the research into pyrites treatment being conducted by the Port Phillip Company at the time, although pyrites purchased by the Victoria Company was later shipped to London and sold.\textsuperscript{22}

In the years following 1862, the number and spread of the Victoria Company’s investments grew rapidly. With this increasing diversity, and usually a minority shareholding, it would have been virtually impossible for Bland to join the boards of

all the companies involved. Investments in Clunes-based companies over the same period tended to be fewer but proportionally larger, probably reflecting his more intimate knowledge of their activities and potential. Rivett Bland was often sought as a director of Clunes-based mining companies. These directorships were usually backed by a substantial shareholding, either personally, or on behalf of the Victoria Company.

Banks such as the National Bank of Australasia loaned money to finance mining ventures during the 1860s but at very high interest rates of 10-12%, secured against the company’s machinery and personal guarantees by its directors. This made bank finance unattractive to the more speculative mining ventures, which nevertheless still needed to obtain risk capital.

At the same time, foreign investment in the Victorian mining industry was virtually non-existent. Mining journals, newspapers and industry representatives made numerous appeals for British investment during the 1860s, to foster the expansion of Victorian gold mining. Local mining industry representatives even went to Britain on

Location map of mining and investment ventures

---

promotional visits, but capital was not forthcoming. In this financial climate, the Victoria Company’s investment of £50,000 of British capital, spread over more than 30 speculative mining companies, was highly significant.

Many of the companies in which the Victoria Company bought shares were in the Ballarat area, mining deep leads beneath the basalt capping that stretches from Lake Wendouree to Sebastopol, then down the Yarrowee Creek valley to Durham Lead. They were often formerly producing mines that were recovering from flooding, financial problems or company restructuring. Others were new companies in highly prospective areas. All were chosen for having significant ‘upside’ for capital growth, and a quick return by way of dividends.

Between 1862 and 1869, Bland purchased shares in the Great Extended Redan, Royal Saxon, United Extended Band of Hope, and Park companies at Ballarat; the Bonshaw, Prince of Wales, Winter’s Freehold, and United Albion and Prince of Wales companies at Sebastopol, and the Buninyong Company near Durham Lead. On balance, this group of investments was reasonably successful, returning over £5,000 in capital gains by 1869.

The Victoria Company’s investments fared well overall for the first few years. Its assets grew steadily, and dividends of 7s per share were declared in 1864-5, and a further 2s in 1865-6. Profit growth slowed somewhat during 1865-6, but 1867 proved a disaster. Many of the mines were experiencing difficulties in locating sufficient ore, while some were suffering from poor management. To compound these troubles the share market slumped. In a short time the company’s assets were halved, with almost £20,000 written off in failed investments, and the value of the remaining shares reduced by over £7,000 to £20,679.24

More than half of the loss came from written off investments in just two companies, the Corinella and the Lord Malmesbury.25 Shareholdings in the company’s first two investments, the Nintingbool and St. Arnaud United companies were also written off at this time, at a loss of just over £2,100. Losses on shareholdings in the Australasian and Minerva companies, mining gold and antimony ores near Costerfield, amounted to a further £2,750.

25 Ibid.
By way of perspective, the Victoria Company’s overall losses in 1867 were equivalent to between one-half and three-quarters of the capital value of the Port Phillip Company’s treatment works at Clunes.

After such a severe downturn, it took several years for the Victoria Company’s remaining shareholdings to recover somewhat in value. No new investments were made after 1869 and apart from paying calls on existing shares, expenditure was kept to a bare minimum until times improved.

It seemed that the worst was over by the end of 1870. The value of the company’s shares in the South Clunes Gold Mining Company rose substantially that year, as its prospects improved and it paid its first dividend. The Victoria Company suffered a further reverse however, in 1871. Two of its largest remaining investments, in the Buninyong and the London & Melbourne companies, were written off at a loss of over £10,700. Its remaining assets dipped below £10,000, a level that persisted for the rest of its life.

As an investment vehicle, the Victoria Company purchased an interest in other companies rather than owning them outright, except for the Glen Donald Company. This was formed in 1864 to explore for extensions of the Haphazard reef into the Port Phillip Company’s ground at Clunes. It is not clear whether the Clunes Company was unwilling to explore for the so-called Glendonald reef, likely to be situated well to the west of the main reef lines, or whether Rivett Bland wanted it to be an independent operation. In either case the Port Phillip Company could not undertake the work directly, as certain of its shareholders had already expressed their opposition to the company’s involvement in mining. Forming the Glen Donald Company, wholly owned by the Victoria Company, overcame these problems.

Although shaft sinking and underground development located the Glendonald reef, it proved to be uneconomic and work stopped in September 1865. The company’s capitalised expenditure of £1,555 was written off in 1867. In this particular case, the Port Phillip Company’s ‘anti-mining’ shareholders were right in their decision to concentrate on quartz crushing.

On the whole, the Victoria Company’s investments in Clunes-based companies were more successful than those further afield, probably due to Rivett Bland’s much closer involvement. Bland joined the board of the South Clunes Gold Mining Company when
the Victoria Company purchased its original shareholding in 1864, and was still a
director at the time of his death in 1894.\textsuperscript{26} Certainly the shareholding in the South
Clunes Company proved to be a consistent (and the only) source of income after
1875, enabling the Victoria Company to pay at least 6s in dividends over the next 14
years. With a shareholding in the subsequent South Clunes United Company as its
only asset, the Victoria Company fell dormant after the closure of the South Clunes
mine in 1895, and was probably wound up not long after.\textsuperscript{27}

Over a thirty-year period, the Victoria Company returned about 15s in dividends to its
shareholders on each £1 share, around 75\% of their original investment. On this
basis it could be judged as something of a failure, although speculative mining
investment is always a risky business. The company had, however, put money into
some 35 gold mining ventures in Victoria at a time when local investment funds were
in short supply. This benefited both the local mining industry and Victoria as a whole.

Investment by the Port Phillip and Victoria companies in speculative Victorian mining
companies during the late 1850s and 1860s was a microcosm of the British
investment boom in Australian mining companies that was to occur three decades
later. Donald Denoon links the start of large-scale British investment in Australian
mining to the Colonial and Indian Exhibition held in London in 1887.\textsuperscript{28} A stamp battery
in the Exhibition’s Queensland display crushed rich gold ore from Charters Towers, a
scene reminiscent of the Port Phillip Company’s model battery at the International
Exhibition in London 25 years earlier. Now however, in 1887, the time was right and
millions of pounds of British investment funds began to pour into Australia, compared
to the Victoria Company’s £50,000 of the 1860s.

\textsuperscript{26} Clunes Guardian and Gazette, 2 March 1894.
\textsuperscript{27} Mining Journal, vol. 65, 9 March 1895, p.274.
\textsuperscript{28} Denoon, Settler Capitalism, p.128.
Chapter 9

The Port Phillip Company’s later years

Consolidation

By the late 1860s, the Port Phillip treatment works mine had reached their optimum size and efficiency, with relatively little technological change after this time. Similarly, mining production peaked in the late 1860s and early 1870s and then began to decline. American mining engineer T. A. Rickard, comparing milling practices in America during the 1890s to those of Australia and New Zealand, believed that technology at the major mines of Bendigo and Ballarat was badly lagging. He condemned the almost universal lack of rock crushers, automatic feeders or systematic assaying practices, and the reluctance to adopt modern overseas gold milling practices.

He singled out the then-closed Port Phillip mine as the best example of good milling practice in Victoria.1 It had embraced all those techniques that he accused the later mines of ignoring (and it had done so three decades earlier). While its treatment process had been simple in metallurgical terms, and had not changed materially in later years, he believed the mineralogy of its ore was correspondingly simple and its process therefore reflected intelligent milling.

After the rapid growth of both the mine and the treatment works during the 1860s, the following decade was therefore more a time of consolidation. Rivett and Martha Bland took up residence in Clunes in 1867-8, building a substantial villa at the northern end of Camp Parade, Clunes, on a block of land purchased from the company. It was the ideal location for a mine manager’s house, overlooking Creswick Creek and the Port Phillip works across the valley. Surrounded by a typical English garden, the villa was home to the Blands for the rest of their lives.

---

1 Rickard, Stamp Milling, pp.102-118, 196-201.
Mine development had been pushed ahead in the late 1860s in an effort to stay in advance of production, but the work had proved slow and costly as the distance from the shafts across to the reefs increased with depth. Often, where the reefs were first intersected in the deeper levels, they were narrower and of lower gold grade than on the higher levels. Increasing amounts of development driving and bulk sampling were therefore required on the deeper levels before better grade oreshoots could be delineated and opened up for mining. Large tonnages of ore were needed to keep the treatment works running at full capacity while this deep development took place. Once again, remnant quartz in the near-surface sections of the reefs was looked to in 1870 as a low grade, but easily accessible source of supply.

An outcropping section of the Old Man reef, where gold had first been discovered at Clunes, had not been mined previously as the inclined tramway to the old battery house ran across it.\(^2\) Bulk sampling in December 1870 showed that this material carried 9dwt of gold per ton, about 50% richer than the ore currently coming from underground, and being at surface, it could be mined very cheaply.

This proved to be the first of a succession of ‘pockets’ of better grade remnant ore discovered during the next two years in the upper 150 feet of the mine. Even remnants of deep lead alluvial gravels found in the northern part of the mine at the 100-foot level carried payable gold values. While not part of the ‘grand plan’ for progressively deeper workings, these resources provided the time and much of the income necessary to develop the deeper workings and bring them into production.

The South shaft was deepened to 690 feet in 1871, enabling development of both the No.7 and No.8 levels to begin in the south part of the mine. Over the next few years, most of the development and stoping took place either on the deeper levels in the northern part of the mine, or at the shallow levels in the south. It was not until 1880 that sinking of the South shaft recommenced, reaching its final depth of 896 feet in April 1881.

Little development took place below the No.7 level in the South shaft, other than an eastern crosscut at the No.10 level to connect with the Old Man reef workings from the North shaft. The North shaft was better situated to reach the north plunging oreshoots in the northern part of the mine and had the added advantage of better

\(^2\) Star, 26 January 1871.
hoisting facilities. It was also the only pumping shaft, consequently its deepening was essential for the progressive draining and development of the mine.

The large quantities of shallow remnant ore mined during 1871-2, together with small amounts from the still-developing deeper northern levels kept the crushing plant fully employed, but the average yield drifted steadily lower to just over 3dwt of gold per ton in the last quarter of 1872. Only the overall efficiency of the operation and its large throughput enabled it to continue, in the expectation of better returns when large-scale stoping commenced in the deep northern levels.

In an effort to further reduce treatment costs, the Port Phillip Company began transferring the five batteries from the old battery house to the new building in July 1871. To avoid disrupting production, the batteries were moved and recommissioned individually during a period of just over one year. Two new buddles, with cast-iron basins instead of the earlier wooden design, were installed at the new battery house, as well as a second rock crusher. Driven by the more fuel-efficient No.2 Neath Abbey engine, capable of delivering 120-horsepower, all 80 stamp-heads and ancillary equipment were operating under the one roof by about August 1872.

![Port Phillip Reduction Works, 1872](image)

---

Production began to fall in early 1874 as the enormous near-surface resources in the mine finally ran out, with insufficient ore being available from the deeper levels to meet the shortfall. The batteries were subsequently forced to operate on reduced hours, adding to the effects of a general depression in quartz mining in the district. At the end of 1874, only the Port Phillip and New North Clunes companies were still operating at Clunes.⁴

Considerable optimism arose in 1875 following the discovery of a rich new reef in the deepest levels of the North shaft, the so-called New Eastern reef, which carried grades of better than 1oz of gold per ton.⁵ Despite this find, only about two-thirds as much quartz was crushed between 1874 and 1876 as in the preceding two years. The quantity of gold produced remained fairly constant however, due to the average gold grade rising to 5-6dwt per ton as a result of richer ore mined from the deep levels on the Old Man and Robinson’s reefs.

Gold grades began to fall again in 1876 and a number of company miners were laid off in favour of tributers, particularly in the higher, southern levels of the mine.⁶ To ensure that production continued even if only poor grade quartz was available, Bland negotiated a reduction in the landowners’ royalty payment if the yield fell below 4dwt of gold per ton. This was the break-even grade for the operation. Both companies had lost money during 1873-4 when the average yield had fallen below this level.⁷

Development of the No.11 level continued throughout the lean times of 1876, opening up the rich New Eastern reef for stoping. Improving yields towards the end of the year saw a resumption of sinking of the North shaft, and refurbishment of the South shaft to raise quartz being produced by up to 25 parties of tributers.⁸

After mid-1876, development and stoping in the deep levels at the northern end of the mine was undertaken by contract labour, while increasing numbers of tributers carried out large scale stoping in the shallower southern levels. About 250 tributers were working in the mine in early 1878,⁹ their efforts contributing substantially to the

---

⁴ Reports of the Mining Surveyors and Registrars, Quarter ending 31 December 1874, p.26.  
⁵ Star, 18 December 1875.  
⁶ Ibid., 22 May 1876.  
⁸ Star, 16 October 1876.  
⁹ Ibid., 24 January 1878.
mine’s output. Gold production during 1877 exceeded 25,000oz for the first time since 1868, while nearly 20,000oz were produced in 1878.

A slow but steady decline in production set in after 1878. The shallower levels of the mine were producing considerably more ore (and more gold) than the reefs in the deep levels. At the same time, it was essential to maintain the momentum of deep development work. Sinking of the North shaft continued, reaching the No.12 level at 1090 feet in June 1877 and the No.13 level at 1190 feet in July 1880.

Ventilation of the deep workings became more difficult with the increasing distances from the shafts and less frequent connections between the levels by means of winzes. The situation was substantially improved in 1878 by the introduction of the Root’s blower, which provided a more positive airflow in even the deepest workings.

In February 1879, after about two years’ production by tribute mining from the middle and upper southern levels of the mine, the Port Phillip Company purchased the claim of the Criterion Quartz Mining and Crushing Company. This adjoined the southern boundary of the Company Paddock.

---

Although the Criterion Company had earlier won nearly 50,000oz of gold from the claim, its workings had not been as systematic as those of the Port Phillip mine. By extending the Port Phillip mine levels southward, the company’s tributers could now extract any remnant ore, or material that the Criterion Company had considered to be too poor to mine at the time. Oreshoots plunging southward in the Port Phillip mine, particularly within the Old Man reef, could now be followed further down-plunge, and deeper levels opened out beneath the old Criterion workings.

Tribute mining continued throughout 1879-81 on the shallow levels in the Criterion ground. Combined with ore from the deeper levels of the Old Man reef, which also extended to the south beneath the Criterion workings, it provided the last three years of profitable operations enjoyed by the Port Phillip mine.\(^\text{12}\)

The quantity of gold produced gradually fell during this same period, despite occasional patches of rich quartz in the Criterion ground and better grade ore from parts of the Western reef in the deep northern levels. Rivett Bland negotiated a further alteration in the royalty agreement with the landowners in September 1881. In future they would receive a proportion of the net profits (if any), rather than a payment based on the quantity of gold produced.\(^\text{13}\)

\(^{13}\) *Star*, 24 January 1882.
Crushing Works of the Port Phillip Company, Clunes

(Perspective drawing reproduced by permission from the Knowledge Resource Centre, Department of Primary Industries, Victoria. Title: 'Crushing works of the Port Phillip Company, Clunes' 1885. See footnote 14 for source details)
Decline

In spite of steadily decreasing production in the early 1880s, development work was pushed ahead in the anticipation of discovering new resources. Most of the ore in the shallow levels throughout the mine had been exhausted by late 1882, but for a while some production still came from the middle levels on Robinson’s and the Eastern reefs.

An eastern crosscut from the South Shaft at the No.10 level reached the Old Man reef in March 1882. While poor in grade where first intersected, exploratory driving, particularly to the south into the Criterion ground, opened up better grade ore. Largely ignored until this time, the deeper sections of the Old Man reef became the mainstay of production for the next few years, with extensive stoping taking place between the No.5 and No.11 levels.

The long-term future of the mine lay in discovering large quantities of payable ore in the deep northern levels, particularly the No.13 level at a depth of 1,190 feet. Crosscuts to both the west and east of the North shaft at this level progressed very slowly owing to hard ground conditions, until the introduction of two Mitchell rock drills in late November 1881.15

Operated by compressed air, the drills increased the rate of advance almost immediately, but progress slowed once more when a diorite dyke, or sheet-like basic igneous intrusion, was struck in the eastern crosscut. The dyke had been injected up a major west-dipping fault, one of the structural controls that had led to the formation of the Clunes goldfield. Even at a considerable distance from the dyke the rocks were still extremely hard and without the rock drills, very little progress would have been possible.

After taking almost two years to advance 557 feet, the No.13 level eastern crosscut was halted in June 1883. No quartz reefs had been found after progressing about 400 feet beyond the diorite dyke.16 This substantially downgraded the prospectivity of the deep ground to the east, in effect, below the dyke. The western crosscut reached Robinson’s reef but it proved uneconomic, and crosscutting continued to the Western

15 *Star*, 5 December 1881.
16 Ibid., 18 June 1883.
reef, struck at 971 feet from the shaft.\textsuperscript{17} It also appeared to be poor grade and despite extending the crosscut further to the west, no other reefs were encountered.\textsuperscript{18}

By mid-1883, the mine had incurred a loss of over £1,000 due to falling production and the high cost of the development crosscuts on the No.13 level. The shortfall was made up from the two companies’ reserve funds.\textsuperscript{19} Royalty payments to the landowners, renegotiated to a net profit basis, ceased as a result of the loss.

It was essential that development continue, so driving commenced late in 1883 on a small reef structure, 70 feet east of the main Western reef on the No.13 level. The structure improved sufficiently with driving and rising to justify stoping below the No.11 level on the same structure, the New Western lode. Carrying widely varying grades of 1-17dwt of gold per ton, ore produced from the New Western lode was a welcome boost to the declining supplies from the Old Man and Robinson’s reefs during 1883-4. Access via the Port Phillip mine was offered to adjoining leaseholders in late 1884, in return for crushing any ore they produced. This generated a small but welcome increase in battery throughput.\textsuperscript{20}

Still operating with a negative cashflow in early 1885, the Clunes Company held a meeting in April to decide its future. Most shareholders favoured winding up the company as soon as possible. The directors argued that more capital should be raised for deep development before simply abandoning the mine. The payment of £117,000 in dividends over the years, on a capital investment of only £1,500, surely merited an attempt to keep the company going.

Despite the directors’ pleas, shareholders voted by a narrow majority to wind up the company.\textsuperscript{21} This move was in progress when a new discovery on the No.13 level was announced in early July.\textsuperscript{22} Shortly afterwards the motion to wind up the company was deemed to be informal and the company resumed ‘business as usual’. A month later it agreed with the Port Phillip Company to deepen the North shaft by another 200 feet and open out the No.15 level, in the hope of improved prospects at this greater depth.\textsuperscript{23}

\begin{flushleft}
\textsuperscript{17} Ibid.  \\
\textsuperscript{18} Ibid., 3 December 1883.  \\
\textsuperscript{19} Ibid., 31 July 1883.  \\
\textsuperscript{20} Ibid., 5 November 1884.  \\
\textsuperscript{21} Ibid., 11 April 1885.  \\
\textsuperscript{22} Ibid., 13 July 1885.  \\
\textsuperscript{23} Ibid., 10 August 1885.
\end{flushleft}
Expectations increased shortly after deepening of the North shaft began. The country rocks had become more favourable-looking and quartz veins were passed through, some carrying at least trace amounts of gold. By May 1886, when the No.14 level was commenced at 1,290 feet, the Clunes Company’s directors had decided to borrow money to meet its accumulated share of development costs, using its machinery in the mine as security. Ongoing development expenses would then be met by calls on its shares, the first calls since the company’s formation in 1857.

The eastern crosscut at the No.14 level struck a quartz reef, the first to be found on the eastern (lower) side of the dyke, while the western crosscut passed through several quartz reefs dipping westward from the shaft. None carried any appreciable amounts of gold however, and shaft sinking towards the No.15 level resumed shortly afterwards.

Despite the directors’ efforts, the Clunes Company found it impossible to borrow against its assets in the mine. Its debt to the Port Phillip Company, which was ‘bankrolling’ the entire development cost in the interim, rose to over £2,000 during the first half of 1886. Part of the company’s interest in the mine’s machinery was assigned to the Port Phillip Company as security, while efforts to recover unpaid share calls continued.

By the time of its annual meeting in late January 1887, the Clunes Company was feeling the strain. It had made twelve calls of 1s each on its shares over the past year but the shareholders were increasingly defaulting, and the company was unable to sell the forfeited shares to cover the calls. Tribute mining during the second half of 1886 had lost money and most of the battery workers had since been stood down. Although expenditure had been restricted to the bare minimum needed to continue sinking the North shaft, the Clunes Company was getting deeper into debt and was considering ending its amalgamation agreement with the Port Phillip Company.

Most of the Port Phillip Company’s reserve fund had been exhausted by the losses incurred over the previous six years and it too resorted to calling on its shares in early 1887. Rivett Bland voluntarily reduced his salary from £1,400 to £600 per annum.

---

24 Ibid., 26 January 1886.
25 Ibid., 29 July 1886.
26 Ibid., 1 February 1887.
27 Clunes Guardian and Gazette, 18 March 1887.
Sinking of the North shaft finally reached its target depth of 1,400 feet in May 1887 and the No.15 level crosscuts to both east and west commenced almost immediately. Passing through the diorite dyke, the western crosscut struck the most promising of the reefs previously intersected on the level above, but again, it carried only traces of gold. It was a similar story with the eastern crosscut. The reefs were persisting at depth but not carrying sufficient gold to be mineable.

Tributers were still mining small quantities of ore on the higher levels of the Western reef and New Western lode, and moves were under way to reopen the South shaft to parties of tributers in late 1887. None of this was of real consequence however, substantial new ore resources had to be found or the mine was finished. Sinking of the North shaft resumed in September 1887 but after progressing only ten feet, halted at 1,415 feet. The blow had fallen. The London directors of the Port Phillip Company had ordered all work to cease.

The half-yearly meeting of the Clunes Company on 30 January 1888 was a sombre occasion. It was to be the company’s final meeting. It still owed the Port Phillip Company more than £5,000 for its share of development costs and had no prospect of meeting the debt. As a result, the board of the Port Phillip Company had instructed Bland to terminate the amalgamation agreement. The Clunes Company had pledged its machinery to the Port Phillip Company as security and, although independent valuations now put its worth at only £3,450, Bland accepted it in full settlement of the debt.

It was a sad end to a company that over a 30-year period had paid its shareholders the equivalent of £111 in dividends on each original £15 share, an average annual rate of return of around 25%. The company had paid out most of its profits in dividends, keeping little in reserve. Even the Port Phillip Company was no better off in this regard, its reserve fund was exhausted as well.

Since 1857 the two companies had mined and crushed 1,306,764 tons of quartz. Including yields from alluvial mining, they had produced 514,814oz of gold, valued at £2,064,482. After paying the landowners an incredible £139,237 in royalties and rent, the Clunes Company had paid dividends totalling £118,415, and the Port Phillip Company £225,029.28

---

The struggle for development funds

Assuming complete control of the Port Phillip mine in February 1888, Rivett Bland let out portions of the mine on tribute to generate some income, while the directors of the Port Phillip Company considered the best course of action for the future. A little over 5,000 tons of quartz had been crushed by mid-1888 when tribute mining ceased due to poor returns and the mine closed. Bland then put the mine on standby, running the pumps sufficiently to keep the water level down while awaiting a decision from London.

Closing the mine brought to an end the longest chapter of Rivett Bland’s life. The mine had been the centre of his world for 31 years and it must have caused him great sadness to shut down his world-famous crushing works and dismiss the men who had served him so faithfully.

Bland seemed to sense that 1888 was the end of an era. He wrote a history of the Port Phillip Company’s work at Clunes, which he published later that year as a small booklet. He summarised the entire mining and crushing operation from its earliest days and included precise tables of gold production, profits and dividends. Bland saw the company’s greatest achievements as the successful development of the Clunes mine at a time when the depth potential of quartz reefs was still in doubt, and the progressive development of the treatment works. He paid tribute to his staff and their dedication in achieving the highest standards of plant efficiency. It was both one of the earliest corporate histories written in Victoria and a summary of the second half of Rivett Bland’s life.

Two possibilities were put to the shareholders at an extraordinary general meeting of the Port Phillip Company in London on 31 August 1888. Wind up the company, or raise £25,000 in new capital to continue the deep development of the mine. After lengthy and heated discussion, the shareholders appointed a committee to review the situation and put forward a recommendation to the board. Months dragged past with no news from London.

---

29 Bland, History, 1888.
30 Ibid.
31 Clunes Guardian and Gazette, 19 October 1888.
Finally, in early February 1889, Bland received a telegram from London. The shareholders’ committee had been unable to make a firm recommendation so the directors had decided to voluntarily liquidate the company, in the hope that it could later be reconstituted with fresh capital.\footnote{32 Mining Journal, vol. 59, 2 February 1889, pp.130, 131.} Unable to sell the Port Phillip mine as a going concern, the company’s liquidator subsequently received authorisation from the shareholders to transfer its assets to a new company, in effect the successor of the Port Phillip Company.\footnote{33 Ibid., 20 April 1889, p.451.} Shareholders in the old Port Phillip Company would be offered shares in the new company on a 2:1 basis.

Several months later on 23 July 1889, the Port Phillip Gold Company, Limited came into being in London, with C. Dixon as chairman,\footnote{34 Ibid., 27 July 1889, p.851.} and Rivett Bland subsequently elected as resident director in Victoria. All 200,000 shares in the new company of 5s each, paid to 3s, were taken up by British investors, raising £30,000 in working capital to sink the North shaft a further 200 feet.

Work commenced in Clunes during August 1889. As well as deepening the North shaft, several levels were extended south into the former Criterion ground to reach unworked portions of the Old Man and Eastern reefs. Tribute parties raised 3,480 tons of ore over the next two years to produce 838oz of gold, providing the company with a small profit. The ore was crushed at the South Clunes United battery, the quantities being too small to warrant reopening the company’s own treatment plant.

It took almost a year to deepen the North shaft and begin opening out the No.17 level at a depth of 1,600 feet in August 1890. Crosscuts to the east and west reached 188 feet and 203 feet respectively by February 1891, both passing through several small quartz veins, but with little signs of gold. Eventually the western crosscut passed through the diorite dyke, after which more promising quartz veins were encountered. At last report the western crosscut was in favourable ground at a distance of 364 feet from the shaft.

In 1889, the government established a wide-ranging Royal Commission to investigate the state of the gold mining industry in Victoria. The Commission met in Clunes in mid-1890 to assess the local mining industry. Despite the beginnings of physical frailty, at 79 years of age Rivett Bland’s mind was still extremely sharp and his
memory clear. He gave lengthy evidence on matters ranging from gold recovery to tribute agreements, from royalty payments to financial aid for exploration and development. Bland updated his booklet on the history of the Port Phillip mine and produced a second edition in 1890. While the 1890 edition ends on an optimistic note, there is a feeling that he did not expect to see the mine reopen.

Deepening of the North shaft resumed in February 1891 with the aim of reaching a depth of 2,000 feet before putting out any further crosscuts. By September, the shaft was at 1,745 feet, the last 20 feet passing through promising quartz-veined ground. At this crucial stage, Bland received a telegram from the London directors to suspend operations.

The two years of development work had been more expensive and considerably slower than originally estimated. The company’s £30,000 capital was now exhausted and three calls of 6d each had been made, raising about £13,000, but most of this

36 Bland, History, 1890.
had also been spent. Financial depression in Britain was causing increasing reluctance to pay share calls. In any case, only £5,000 remained in uncalled capital so the heavy development costs had to stop before the company went bankrupt. In the interim, tribute mining on the upper levels was seen as a way of gaining time, and some income, before deciding on the next course of action. Tributing however, produced only 1,127oz of gold from 6,344 tons of ore in the period between late 1891 and early 1894.

The grand amalgamation proposal and its aftermath

Thomas Cornish became a London director of the Port Phillip Gold Company, Limited during 1891. A mining engineer and entrepreneur, he had lived in Victoria before moving to Britain and had over 20 years' association with mines in Clunes and Ballarat. He had last visited Clunes in 1889 and was convinced of the wisdom of sinking the North shaft until payable quartz was found. Successes in deep sinking on the Sandhurst (Bendigo) goldfield were often cited by the Port Phillip Company, and by mining experts and the press in Victoria, as excellent reasons to persist at the Port Phillip mine.

After development work stopped in September 1891, Thomas Cornish commenced a virtual one-man crusade in London to resume the deep sinking program at Clunes. Only two mines were still at work in Clunes by mid-1892, the South Clunes United and Dixon’s New North Clunes companies. Both were experiencing financial problems. These two companies’ leases adjoined the Port Phillip Gold Company to the south and north respectively. Cornish’s vision was to amalgamate all three companies’ assets to form one operation covering virtually the entire goldfield. The ‘super company’ would have three crushing plants with a total of 180 stamp-heads. It would also have a number of strategically located shafts from which to carry out development, mining and pumping operations under one management.

Cornish’s long-distance negotiations with the adjoining companies at Clunes continued throughout 1892, overshadowed late in the year by news of fabulous gold finds at Coolgardie, Western Australia. By mid-1893, when it seemed that agreement

38 Clunes Guardian and Gazette, 23 November 1891.
39 Ibid.
40 Ibid., 27 September 1892.
was near, news of the first gold finds at Kalgoorlie began to spread, adding to the exodus of miners from towns like Clunes. At the same time, British capital started to flood into the new goldfields of Western Australia, to the detriment of investment in ‘old’ goldfields such as Clunes. Persevering with his plan however, Thomas Cornish, by then chairman of the Port Phillip Gold Company, Limited, sailed to Victoria to complete the amalgamation agreement, arriving in Clunes in November 1893.\textsuperscript{41}

The South Clunes United Gold Mining Company had experienced a financial crisis shortly before Thomas Cornish’s arrival. It had run out of funds for development and pumping, and its shareholders were forfeiting their shares rather than pay the calls. Faced with imminent closure, the directors managed to reorganise the company by placing 24,000 new £2 shares at a discount of £1 each. This raised £24,000 in urgently needed capital, but doubled the number of shares on issue to 48,000.\textsuperscript{42} Over 4,000 of the shares were taken up by local residents in the hope of keeping mining alive in Clunes.\textsuperscript{43} The problem was that ownership of the company changed significantly just as Cornish arrived. In effect, the amalgamation proposal had to be negotiated afresh with the new shareholders. It was not until late April 1894 that Thomas Cornish sailed for Britain with firm agreements from both the South Clunes United and Dixon’s New North Clunes companies.\textsuperscript{44}

Returning to London, Thomas Cornish chaired a meeting of the Port Phillip Gold Company, Limited in June 1894, at which his amalgamation proposal received overwhelming support. An increase in the company’s capital from £50,000 to £175,000 would be achieved by the issue of another 300,000 fully paid shares of 5s each, together with issuing 200,000 preference shares of 5s each. The 500,000 fully paid shares would then be distributed between the three companies, in return for their contributing their assets to an amalgamated company. Working capital of £50,000 would come from the issue of the 200,000 preference shares, which would receive a dividend of 10\% per annum over that of the ordinary shares. This was the ‘carrot’ to attract new capital to the proposal. The 500,000 fully paid shares were merely a redistribution of assets between the three companies and did not raise any capital.\textsuperscript{45}

\begin{footnotes}
\item\textsuperscript{41} Ibid., 14 November 1893.
\item\textsuperscript{42} Ibid., 17 November 1893.
\item\textsuperscript{43} A.J.Giddings, \emph{The Clunes Mines: Past History, Future Prospects, Being information collected by the Clunes Borough Council (Victoria, Australia), with views of the Town, etc.,} Clunes, June 1902, p.12.
\item\textsuperscript{44} \emph{Clunes Guardian and Gazette}, 20 April 1894.
\item\textsuperscript{45} \emph{Mining Journal}, vol. 64, 30 June 1894, pp.704, 705.
\end{footnotes}
Once the working capital had been raised, the company proposed to dewater the entire line of workings and mine many unworked sections of reefs, identified by re-examining the plans of the three mines. Using mostly tribute miners, the venture would rapidly establish a cash flow from the six operational shafts and three complete crushing plants under its control. Its longer-term objective was to deepen the North shaft of the Port Phillip mine and locate payable extensions of the main quartz reefs.

Although a prospectus for the preference shares was issued around July 1894 the required funds do not appear to have been subscribed, probably due to speculation in Western Australian gold mining stocks, which was then at fever pitch. The proposed dividend rate on the preference shares was increased in October 1894 in an effort to gain underwriting support.\footnote{Ibid., vol.64, 27 October 1894, p.1179.} Despite several further attempts to secure underwriting over the following months, Thomas Cornish's plan to amalgamate the main mines of the Clunes goldfield finally fell through in early 1895 and the three companies went their separate ways.

Still owning the Port Phillip mine but having no funds, the Port Phillip Gold Company, Limited went into voluntary liquidation on 3 July 1895, to be reconstructed as the London-based Port Phillip Gold Company (Limited) with a capital of £50,000.\footnote{Ibid., vol 65, 6 July 1895, p.797.} Under its new chairman, Ronald C. Power, the Port Phillip Gold Company (Limited) abruptly changed its corporate objectives, investing in Western Australian mining properties rather than at Clunes.

The Port Phillip Gold Company (Limited) allowed the mining lease over the Port Phillip mine to lapse in June 1897. When it subsequently applied for a renewal, owners of freehold land near the mine brought cases for compensation before the Warden’s Court, arguing that the surface and underground workings had devalued their properties.\footnote{Clunes Guardian and Gazette, 14 September 1897.} During the hearing, the landowners also pressed for payment from the company for the value of the shafts and machinery on the surface. The case had such important ramifications for the mining industry in Victoria that by mutual agreement it went for hearing before the Supreme Court.\footnote{Ibid., 5 October 1897.}
By this time, local sentiment had turned against the company for ‘locking up’ the Port Phillip mine for years without any progress being made. With mining activity in Victoria languishing, the townspeople felt that the Minister for Mines should intervene if necessary, to ensure a positive outcome for both Clunes and Victoria as a whole.

The Supreme Court ruled that the landowners should receive compensation, the amount to be determined by the Mining Warden. Following lengthy hearings in the Warden’s Court, compensation was finally fixed at £4,000 in April 1898, nearly a year after the case began. Unhappy with the compensation ruling and reluctant to accept an alternative reverse-amalgamation proposal from local entrepreneur Walter Palmer Wynne, who in the interim had secured the lease over the former South Clunes United mine, the Port Phillip Gold Company (Limited) played for time.

After allowing the company three extensions of time to pay the compensation, the Minister for Mines finally deemed its lease application void after 7 July 1898. The company’s forty-one year association with Clunes was over. Many in Clunes would have argued that it should have ended some years earlier, to give a local consortium the opportunity to reopen the mine, but now it was too late.

Rivett Henry Bland, resident director of the Port Phillip and Colonial Gold Mining Company and its successor, the Port Phillip Gold Company, Limited for nearly 42 years, died on 18 February 1894, aged 83. He had been unwell when Thomas Cornish visited Clunes in late 1893, but maintained a keen interest in the outcome of the amalgamation proposal to the very end. The Port Phillip mine had been a vital part of half his lifetime and Bland’s death closely matched the demise of the mine he had created. Tributers raised the last ore from the mine in March 1894, while Clunes miners continued to leave for the burgeoning Western Australian goldfields.

In addition to being instrumental in the Port Phillip Company’s achievements over four decades, Rivett Bland made lasting contributions to the Clunes community. He helped found the local Mechanics’ Institute and its successor, the Clunes Free Library, serving as president of both. He bequeathed his library, fossil and mineral collections to the libraries, museums and schools of mines in the district. On behalf

50 Ibid., 12 July 1898.
51 Ibid., 20 February 1894.
52 Ibid., 20 March 1894.
of the Port Phillip Company, Bland donated 8 acres of land as the site for the North Clunes State School, established in 1875.\textsuperscript{54} He was involved with the Ballarat Fine Art Gallery in its formative years, donating the first four paintings in its collection in 1884-5.\textsuperscript{55} The four works were by Australian artist J.A.Turner.\textsuperscript{56}

A practising Anglican all his life, Bland was instrumental in the establishment of St Paul’s Church of England in Clunes, laying its foundation stone in 1871. Thereafter he served as a committee member and churchwarden of St Paul’s, and as a lay minister at Ballarat.\textsuperscript{57}

In spite of increasing frailty, Rivett Bland served as resident director of the Port Phillip Gold Company, Limited until his death on 18 February 1894. The town hall flag flew at half-mast and most shops and businesses remained closed the following day, as a sign of respect for Clunes’ best-known and most respected citizen.\textsuperscript{58} Three days later, as his coffin was transferred to the Melbourne train at Ballarat, the city’s muffled bells tolled as a mark of respect and farewell.

Rivett Bland was buried in the Melbourne General Cemetery on 22 February beside Martha, who had died in 1882 at the age of 67. Mourners at his graveside included ‘...clergymen, doctors, lawyers, engineers, bankers, shippers, miners, railway and commercial men,...a small but very representative gathering, for he was himself a representative man.’\textsuperscript{59}

Over a century later, despite periodical rekindling of interest in its remaining potential, the Port Phillip mine is still closed, with little sign of its former glory.

\textsuperscript{54} Richard Aitken, Talbot and Clunes Conservation Study: Part B – Background Information, Talbot, Shire of Talbot and Clunes, 1988, p.369.
\textsuperscript{55} Bland Papers 1832-1893, Letters from J.A.Powell, Ballarat Fine Art Gallery to Bland, July 1890, Letters No.12(iii, iv).
\textsuperscript{56} The paintings were entitled; ‘The Last Load’, ‘The Bush Inn’, ‘The Start’, ‘The Finish’.
\textsuperscript{57} Clunes Guardian and Gazette, 27 February 1894.
\textsuperscript{58} Ibid., 20 February 1894.
\textsuperscript{59} Ibid., 27 February 1894
Conclusion

Technically and administratively, the Port Phillip Company was a pacesetter in the gold mining environment in which it operated. While it encountered obstacles in its early days, valuable experience was gained, which the company was able to use when circumstances changed in its favour. A conjunction of technological advances, changing socio-economic attitudes and a legislative quirk, then provided the company with a unique opportunity to establish a successful large-scale mining operation at Clunes.

Timing was all-important. Much earlier, and the Clunes venture would probably have failed due to strong anti-company sentiment and to some degree, less advanced quartz crushing technology. Any later, and another company could have negotiated a mining agreement with the Clunes landowners. Alternatively, the government may have yielded to the diggers’ lobbying and resumed the private land. In this event, individual diggers would quickly have ‘picked the eyes out’ of the quartz reefs, creating a fragmented, less attractive proposition for subsequent company mining.

Much of the company’s success, particularly in its first decade, was due to the management and vision of its resident director, Rivett Henry Bland. He recognised the potential of the Clunes reefs and brought together his company, the landowners, and the local diggers, in a mutually beneficial enterprise. He recruited experienced staff who brought the latest overseas technology and practices to Clunes, adapted them to local conditions, and placed the company in a pre-eminent position in colonial gold mining. Knowledge gained in ore treatment at Clunes was freely disseminated to the Victorian mining community and ultimately to the industry worldwide.

The Port Phillip Company operated the largest hard-rock gold mine in Victoria between the late 1850s and the early 1880s, an era of predominantly small mines.¹ The company and its offshoot, the Victoria Company, contributed materially to the Victorian mining industry during the 1860s by investing in speculative mining companies at a time when other funding, especially British capital, was in short supply.

¹ Blainey, Rush, p.255.
The Port Phillip Company’s shift in corporate philosophy in 1860, favouring crushing over mining and investment activities, led it to become essentially a single-project operator. As a consequence, research and innovation virtually ceased once its unique metallurgical problems at Clunes had been overcome. By the time ore processing ceased the works, while still remarkably efficient, had become technologically outdated. Deeper mine development slowed markedly during the 1880s due to difficult mining conditions and decreasing profitability, the latter possibly precluding the introduction of new mining equipment and practices.

A continuing lack of funds hampered the subsequent search for new ore resources at depth and the Port Phillip mine finally closed in 1891. A flood of British investment into Australia shortly after this went into speculation on the new goldfields of Queensland and Western Australia, rather than reopening an old mine on an old goldfield in Victoria.

Port Phillip mine site, 2001
## Dividend Payments

**Port Phillip and Colonial Gold Mining Company**

<table>
<thead>
<tr>
<th>Month / Year Declared</th>
<th>Dividend Number</th>
<th>Dividend Amount</th>
<th>Cumulative Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1859</td>
<td>1</td>
<td>1s</td>
<td>1s</td>
</tr>
<tr>
<td>July 1859</td>
<td>2</td>
<td>1s</td>
<td>2s</td>
</tr>
<tr>
<td>January 1860</td>
<td>3</td>
<td>1s</td>
<td>3s</td>
</tr>
<tr>
<td>July 1861</td>
<td>4[a]</td>
<td>1s</td>
<td>4s</td>
</tr>
<tr>
<td>January 1862</td>
<td>4[b]</td>
<td>1s 6d</td>
<td>5s 6d</td>
</tr>
<tr>
<td>July 1862</td>
<td>5[a]</td>
<td>1s</td>
<td>6s 6d</td>
</tr>
<tr>
<td>January 1863</td>
<td>5[b]</td>
<td>1s 6d</td>
<td>8s</td>
</tr>
<tr>
<td>July 1863</td>
<td>6[a]</td>
<td>1s</td>
<td>9s</td>
</tr>
<tr>
<td>January 1864</td>
<td>6[b]</td>
<td>1s 6d</td>
<td>10s 6d</td>
</tr>
<tr>
<td>July 1864</td>
<td>7[a]</td>
<td>1s</td>
<td>11s 6d</td>
</tr>
<tr>
<td>January 1865</td>
<td>7[b]</td>
<td>1s</td>
<td>12s 6d</td>
</tr>
<tr>
<td>July 1865</td>
<td>8[a]</td>
<td>1s</td>
<td>13s 6d</td>
</tr>
<tr>
<td>January 1866</td>
<td>8[b]</td>
<td>1s</td>
<td>14s 6d</td>
</tr>
<tr>
<td>July 1866</td>
<td>9[a]</td>
<td>1s</td>
<td>15s 6d</td>
</tr>
<tr>
<td>January 1867</td>
<td>9[b]</td>
<td>1s</td>
<td>16s 6d</td>
</tr>
<tr>
<td>August 1867</td>
<td>10[a]</td>
<td>1s</td>
<td>17s 6d</td>
</tr>
<tr>
<td>October 1867</td>
<td>10[b]</td>
<td>1s</td>
<td>18s 6d</td>
</tr>
<tr>
<td>January 1868</td>
<td>10[c]</td>
<td>1s 6d</td>
<td>£1</td>
</tr>
<tr>
<td>May 1868</td>
<td>11[a]</td>
<td>1s</td>
<td>£1 1s</td>
</tr>
<tr>
<td>July 1868</td>
<td>11[b]</td>
<td>1s</td>
<td>£1 2s</td>
</tr>
<tr>
<td>October 1868</td>
<td>11[a]</td>
<td>1s</td>
<td>£1 3s</td>
</tr>
<tr>
<td>January 1869</td>
<td>11[d]</td>
<td>1s 6d</td>
<td>£1 4s 6d</td>
</tr>
<tr>
<td>May 1869</td>
<td>12[a]</td>
<td>1s</td>
<td>£1 5s 6d</td>
</tr>
<tr>
<td>January 1870</td>
<td>12[b]</td>
<td>1s 6d</td>
<td>£1 7s</td>
</tr>
<tr>
<td>July 1871</td>
<td>13[a]</td>
<td>1s</td>
<td>£1 8s</td>
</tr>
<tr>
<td>January 1872</td>
<td>13[b]</td>
<td>1s</td>
<td>£1 9s</td>
</tr>
<tr>
<td>January 1873</td>
<td>14</td>
<td>1s</td>
<td>£1 10s</td>
</tr>
<tr>
<td>February 1877</td>
<td>15</td>
<td>1s</td>
<td>£1 11s</td>
</tr>
<tr>
<td>October 1877</td>
<td>16[a]</td>
<td>1s</td>
<td>£1 12s</td>
</tr>
<tr>
<td>January 1878</td>
<td>16[b]</td>
<td>1s</td>
<td>£1 13s</td>
</tr>
<tr>
<td>October 1878</td>
<td>17[a]</td>
<td>1s</td>
<td>£1 14s</td>
</tr>
<tr>
<td>January 1879</td>
<td>17[b]</td>
<td>1s</td>
<td>£1 15s</td>
</tr>
<tr>
<td>February 1880</td>
<td>18</td>
<td>1s 4d</td>
<td>£1 16s 4d</td>
</tr>
<tr>
<td>February 1881</td>
<td>19</td>
<td>8d</td>
<td>£1 17s</td>
</tr>
</tbody>
</table>
Notes on Production Statistics

The Port Phillip and Colonial Gold Mining Company held an annual meeting of shareholders in London from 1856 onwards, usually in late January to coincide with its month of birth. Accounts and production data presented in each annual report to shareholders covered activities in Victoria for the period ending about mid-September the previous year. The lag was originally due to the time taken for information to reach London and then be processed prior to the meeting. The same mid-September reporting year was perpetuated however, even in subsequent times of faster communications.

Production statistics for the Port Phillip mine and treatment works were compiled on the basis of a 28-day ‘month’. To equate more closely to a calendar year, two of the 28-day periods (usually ‘March’ and ‘September’) covered 42 days each, extending into the adjacent calendar months to a varying degree. This creates difficulties when attempting to reconstruct the mine’s production on to the more widely used calendar month / calendar year basis, for comparison with other mines and Victorian mining statistics.

The production table in Appendix 4 attempts to address these problems. Weekly production data is available from the commencement of quartz crushing in June 1857 until mid-September 1862. This data has been allocated as closely as possible to calendar quarters, succeeded by the calendar quarterly returns of the Creswick Mining Registrar to September 1891. Newspaper reports were used to complete the data until the end of mining in March 1894. Gold won from deep lead mining operations within the ‘Company Paddock’ has also been tabulated on the same basis. The contribution of tribute mining to the overall production totals from 1874 onwards is shown where data is available.

Slight discrepancies have arisen in this process. Rivett Bland’s production data from 1857 to the initial suspension of mining in July 1888 indicates that 1,306,764.5 tons of quartz were crushed to produce 480,813oz 3dwt 10gr of gold (including gold won from the treatment of pyrites). The corresponding figures on a reconstructed calendar-quarter basis are 1,305,517 tons for 479,223oz of gold. Bland’s data is accepted as being the more reliable total for production to 1888.

Calendar-quarterly figures can, however, be compared directly with Mines Department statistics for other Victorian mines and goldfields, as well as with production from the other mines at Clunes. The quarterly figures also provide a better picture of the fluctuations in production rates and gold recovery, as illustrated by the summary graphs in Appendix 3.
Appendix 4

Production Table

Quarterly, annual and cumulative production statistics for the Port Phillip mine are presented in the table overleaf.
<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Clunes Q.M.Co. Tons</th>
<th>Ozs Gold</th>
<th>Tributers Tons</th>
<th>Ozs Gold</th>
<th>Pyrites Tons</th>
<th>Ozs Gold</th>
<th>Grade dw/ton</th>
<th>Quarterly Results</th>
<th>Yearly Production</th>
<th>Cumulative Yearly Production</th>
<th>ALLUVIAL TOTAL GOLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1857</td>
<td>June</td>
<td>341.3</td>
<td>407.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>407.23</td>
<td>23,867</td>
<td>407.23</td>
<td>407.23</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>1612.3</td>
<td>2936.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2936.61</td>
<td>36,429</td>
<td>2936.61</td>
<td>36,429</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>2193.0</td>
<td>3436.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3436.90</td>
<td>31,344</td>
<td>3436.90</td>
<td>31,344</td>
</tr>
<tr>
<td>1858</td>
<td>March</td>
<td>3221.0</td>
<td>4886.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4886.90</td>
<td>30,344</td>
<td>4886.90</td>
<td>30,344</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>3833.5</td>
<td>5952.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5952.60</td>
<td>31,056</td>
<td>5952.60</td>
<td>31,056</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>3959.4</td>
<td>3811.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3811.45</td>
<td>21,210</td>
<td>3811.45</td>
<td>21,210</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>4982.0</td>
<td>6404.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6404.60</td>
<td>25,711</td>
<td>6404.60</td>
<td>25,711</td>
</tr>
<tr>
<td>1859</td>
<td>March</td>
<td>3692.0</td>
<td>3999.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3999.85</td>
<td>21,668</td>
<td>3999.85</td>
<td>21,668</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>4261.0</td>
<td>4281.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4281.40</td>
<td>20,096</td>
<td>4281.40</td>
<td>20,096</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>5279.0</td>
<td>4493.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4493.28</td>
<td>17,023</td>
<td>4493.28</td>
<td>17,023</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>5480.0</td>
<td>5359.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5359.02</td>
<td>19,558</td>
<td>5359.02</td>
<td>19,558</td>
</tr>
<tr>
<td>1860</td>
<td>March</td>
<td>2739.0</td>
<td>2592.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2592.00</td>
<td>18,927</td>
<td>2592.00</td>
<td>18,927</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>4696.0</td>
<td>4625.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4625.38</td>
<td>14,241</td>
<td>4625.38</td>
<td>14,241</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>6979.0</td>
<td>4890.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4890.41</td>
<td>14,015</td>
<td>4890.41</td>
<td>14,015</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>7536.0</td>
<td>5815.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5815.14</td>
<td>15,433</td>
<td>5815.14</td>
<td>15,433</td>
</tr>
<tr>
<td>1861</td>
<td>March</td>
<td>7222.0</td>
<td>5706.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5706.33</td>
<td>15,803</td>
<td>5706.33</td>
<td>15,803</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>9415.0</td>
<td>7333.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7333.38</td>
<td>15,578</td>
<td>7333.38</td>
<td>15,578</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>8087.0</td>
<td>5471.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5471.45</td>
<td>13,535</td>
<td>5471.45</td>
<td>13,535</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>9121.0</td>
<td>4639.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4639.90</td>
<td>10,174</td>
<td>4639.90</td>
<td>10,174</td>
</tr>
<tr>
<td>1862</td>
<td>March</td>
<td>8201.0</td>
<td>4802.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4802.48</td>
<td>11,712</td>
<td>4802.48</td>
<td>11,712</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>8684.0</td>
<td>6995.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6995.85</td>
<td>16,112</td>
<td>6995.85</td>
<td>16,112</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>9630.0</td>
<td>6630.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6630.81</td>
<td>13,771</td>
<td>6630.81</td>
<td>13,771</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>9510.0</td>
<td>6201.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6201.90</td>
<td>13,043</td>
<td>6201.90</td>
<td>13,043</td>
</tr>
<tr>
<td>1863</td>
<td>March</td>
<td>9448.0</td>
<td>5561.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5561.25</td>
<td>11,772</td>
<td>5561.25</td>
<td>11,772</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>9541.0</td>
<td>4919.92</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4919.92</td>
<td>10,313</td>
<td>4919.92</td>
<td>10,313</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>11068.0</td>
<td>5223.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5223.94</td>
<td>8,440</td>
<td>5223.94</td>
<td>8,440</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>10804.0</td>
<td>5305.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5305.68</td>
<td>20.0</td>
<td>5305.68</td>
<td>20.0</td>
</tr>
<tr>
<td>1864</td>
<td>March</td>
<td>9979.0</td>
<td>4105.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4105.78</td>
<td>68.3</td>
<td>4105.78</td>
<td>68.3</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>9495.0</td>
<td>2821.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2821.15</td>
<td>26.4</td>
<td>2821.15</td>
<td>26.4</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>13871.0</td>
<td>5388.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5388.68</td>
<td>76.0</td>
<td>5388.68</td>
<td>76.0</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>12483.0</td>
<td>4730.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4730.73</td>
<td>92.4</td>
<td>4730.73</td>
<td>92.4</td>
</tr>
<tr>
<td>1865</td>
<td>March</td>
<td>11640.0</td>
<td>3612.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3612.95</td>
<td>40.0</td>
<td>3612.95</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>13998.0</td>
<td>4293.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4293.50</td>
<td>82.0</td>
<td>4293.50</td>
<td>82.0</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>14079.0</td>
<td>6358.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6358.40</td>
<td>47.0</td>
<td>6358.40</td>
<td>47.0</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>13645.0</td>
<td>4976.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4976.60</td>
<td>0.0</td>
<td>4976.60</td>
<td>0.0</td>
</tr>
<tr>
<td>Year</td>
<td>Quarter</td>
<td>Clunes Q.M.Co.</td>
<td>Tributers</td>
<td>Pyrites treatment</td>
<td>Quarries treatment</td>
<td>Quarterly Results</td>
<td>Yearly Production</td>
<td>Cumulative Yearly Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>----------------</td>
<td>-----------</td>
<td>------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1866</td>
<td>March</td>
<td>13518.0</td>
<td>4166.82</td>
<td>78.0</td>
<td>328.41</td>
<td>4495.23</td>
<td>6.651</td>
<td>797.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>16436.0</td>
<td>3755.94</td>
<td>51.0</td>
<td>212.86</td>
<td>3968.80</td>
<td>4.629</td>
<td>2437.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>13965.0</td>
<td>4809.29</td>
<td>61.0</td>
<td>254.64</td>
<td>5062.93</td>
<td>7.251</td>
<td>1636.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>12918.0</td>
<td>3724.93</td>
<td>41.0</td>
<td>172.72</td>
<td>3907.65</td>
<td>6.034</td>
<td>2878.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1867</td>
<td>March</td>
<td>13394.0</td>
<td>4215.10</td>
<td>22.0</td>
<td>80.55</td>
<td>4295.65</td>
<td>6.414</td>
<td>1517.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>14082.0</td>
<td>8312.15</td>
<td>25.0</td>
<td>140.65</td>
<td>8452.80</td>
<td>12.005</td>
<td>933.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>15151.0</td>
<td>8007.60</td>
<td>95.0</td>
<td>405.15</td>
<td>8412.75</td>
<td>11.105</td>
<td>242.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>16095.0</td>
<td>7509.13</td>
<td>73.0</td>
<td>334.30</td>
<td>7843.43</td>
<td>9.746</td>
<td>311.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1868</td>
<td>March</td>
<td>15423.0</td>
<td>5983.45</td>
<td>87.5</td>
<td>401.15</td>
<td>6384.60</td>
<td>8.521</td>
<td>6384.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>17026.0</td>
<td>6833.35</td>
<td>93.0</td>
<td>314.00</td>
<td>7147.35</td>
<td>8.396</td>
<td>7147.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>17153.0</td>
<td>7055.90</td>
<td>133.0</td>
<td>468.75</td>
<td>7524.65</td>
<td>8.774</td>
<td>7524.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>17089.0</td>
<td>6719.60</td>
<td>76.0</td>
<td>281.60</td>
<td>7001.20</td>
<td>8.194</td>
<td>7001.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1869</td>
<td>March</td>
<td>14986.0</td>
<td>5808.95</td>
<td>92.0</td>
<td>345.75</td>
<td>6154.70</td>
<td>7.307</td>
<td>6154.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>16845.0</td>
<td>5808.95</td>
<td>117.0</td>
<td>363.65</td>
<td>6430.30</td>
<td>5.823</td>
<td>6430.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>15217.0</td>
<td>4066.65</td>
<td>111.0</td>
<td>363.65</td>
<td>4430.30</td>
<td>8.223</td>
<td>4430.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>16539.0</td>
<td>3715.45</td>
<td>75.0</td>
<td>258.65</td>
<td>3974.10</td>
<td>6.665</td>
<td>3974.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1870</td>
<td>March</td>
<td>17134.0</td>
<td>2225.00</td>
<td>96.0</td>
<td>273.15</td>
<td>2498.15</td>
<td>4.256</td>
<td>2498.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>13924.0</td>
<td>2565.00</td>
<td>142.0</td>
<td>419.05</td>
<td>2984.05</td>
<td>4.286</td>
<td>2984.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>13979.0</td>
<td>3743.10</td>
<td>123.0</td>
<td>405.75</td>
<td>4148.85</td>
<td>5.936</td>
<td>4148.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>16175.0</td>
<td>4425.15</td>
<td>143.0</td>
<td>573.00</td>
<td>4998.15</td>
<td>6.180</td>
<td>4998.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td>March</td>
<td>17008.0</td>
<td>4387.35</td>
<td>183.0</td>
<td>634.70</td>
<td>5622.05</td>
<td>5.906</td>
<td>5622.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>15934.0</td>
<td>3693.15</td>
<td>162.0</td>
<td>532.35</td>
<td>4225.50</td>
<td>5.304</td>
<td>4225.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>17296.0</td>
<td>4310.00</td>
<td>116.0</td>
<td>561.50</td>
<td>4871.50</td>
<td>5.633</td>
<td>4871.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>15548.0</td>
<td>3619.35</td>
<td>96.0</td>
<td>415.30</td>
<td>4034.65</td>
<td>5.919</td>
<td>4034.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>March</td>
<td>17136.0</td>
<td>3210.00</td>
<td>127.0</td>
<td>577.05</td>
<td>3841.25</td>
<td>4.900</td>
<td>3841.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>15348.0</td>
<td>2865.50</td>
<td>74.0</td>
<td>425.60</td>
<td>3291.10</td>
<td>4.289</td>
<td>3291.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>17767.0</td>
<td>3664.90</td>
<td>70.3</td>
<td>560.80</td>
<td>4225.70</td>
<td>4.757</td>
<td>4225.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>15257.0</td>
<td>1967.75</td>
<td>78.0</td>
<td>252.90</td>
<td>2491.65</td>
<td>3.266</td>
<td>2491.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1873</td>
<td>March</td>
<td>15380.0</td>
<td>2737.60</td>
<td>62.0</td>
<td>269.88</td>
<td>3007.48</td>
<td>3.911</td>
<td>3007.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>16195.0</td>
<td>3215.75</td>
<td>77.5</td>
<td>295.75</td>
<td>3511.50</td>
<td>4.337</td>
<td>3511.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>17148.0</td>
<td>3406.05</td>
<td>69.0</td>
<td>285.75</td>
<td>3691.80</td>
<td>4.306</td>
<td>3691.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>14617.0</td>
<td>3210.00</td>
<td>86.5</td>
<td>294.95</td>
<td>3464.95</td>
<td>4.744</td>
<td>3464.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1874</td>
<td>March</td>
<td>15764.0</td>
<td>3073.40</td>
<td>105.0</td>
<td>272.25</td>
<td>3400.65</td>
<td>4.300</td>
<td>3400.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>15335.0</td>
<td>2498.30</td>
<td>182.0</td>
<td>265.25</td>
<td>2985.20</td>
<td>3.480</td>
<td>2985.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>15248.0</td>
<td>2591.55</td>
<td>398.0</td>
<td>55.33</td>
<td>320.25</td>
<td>3.678</td>
<td>320.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>9602.0</td>
<td>1959.40</td>
<td>501.0</td>
<td>67.85</td>
<td>5691.80</td>
<td>4.431</td>
<td>5691.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1875</td>
<td>March</td>
<td>10418.0</td>
<td>2117.80</td>
<td>955.0</td>
<td>193.18</td>
<td>256.50</td>
<td>4.610</td>
<td>256.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>10370.0</td>
<td>2182.90</td>
<td>1350.0</td>
<td>366.00</td>
<td>2804.10</td>
<td>4.785</td>
<td>2804.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Quarter</td>
<td>Tons</td>
<td>Ozs</td>
<td>Gold</td>
<td>Grade</td>
<td>Tons</td>
<td>Ozs</td>
<td>Gold</td>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1875</td>
<td>September</td>
<td>11999.0</td>
<td>3150.25</td>
<td>1382.0</td>
<td>412.05</td>
<td>56.3</td>
<td>226.25</td>
<td>3768.55</td>
<td>5.663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>10773.0</td>
<td>2832.65</td>
<td>655.0</td>
<td>395.15</td>
<td>70.3</td>
<td>277.65</td>
<td>3505.45</td>
<td>6.135</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1876</td>
<td>March</td>
<td>9137.0</td>
<td>2407.15</td>
<td>884.0</td>
<td>496.98</td>
<td>51.3</td>
<td>234.50</td>
<td>3137.63</td>
<td>6.262</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>9137.0</td>
<td>2407.15</td>
<td>884.0</td>
<td>496.98</td>
<td>51.3</td>
<td>234.50</td>
<td>3137.63</td>
<td>6.262</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1877</td>
<td>March</td>
<td>8658.0</td>
<td>1692.70</td>
<td>1289.0</td>
<td>560.30</td>
<td>53.3</td>
<td>214.00</td>
<td>2454.95</td>
<td>4.936</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>8658.0</td>
<td>1692.70</td>
<td>1289.0</td>
<td>560.30</td>
<td>53.3</td>
<td>214.00</td>
<td>2454.95</td>
<td>4.936</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1878</td>
<td>March</td>
<td>8007.0</td>
<td>1765.40</td>
<td>2596.0</td>
<td>580.15</td>
<td>50.3</td>
<td>214.00</td>
<td>2982.55</td>
<td>5.354</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>8007.0</td>
<td>1765.40</td>
<td>2596.0</td>
<td>580.15</td>
<td>50.3</td>
<td>214.00</td>
<td>2982.55</td>
<td>5.354</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1879</td>
<td>March</td>
<td>7949.0</td>
<td>1978.20</td>
<td>6839.0</td>
<td>2774.08</td>
<td>61.3</td>
<td>263.25</td>
<td>3788.55</td>
<td>5.663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>7949.0</td>
<td>1978.20</td>
<td>6839.0</td>
<td>2774.08</td>
<td>61.3</td>
<td>263.25</td>
<td>3788.55</td>
<td>5.663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1880</td>
<td>March</td>
<td>7430.0</td>
<td>1847.80</td>
<td>10290.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>7430.0</td>
<td>1847.80</td>
<td>10290.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1881</td>
<td>March</td>
<td>7070.0</td>
<td>1675.40</td>
<td>2960.0</td>
<td>1391.78</td>
<td>50.3</td>
<td>214.00</td>
<td>302.55</td>
<td>3791.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>7070.0</td>
<td>1675.40</td>
<td>2960.0</td>
<td>1391.78</td>
<td>50.3</td>
<td>214.00</td>
<td>302.55</td>
<td>3791.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1882</td>
<td>March</td>
<td>6709.0</td>
<td>1529.80</td>
<td>9080.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>6709.0</td>
<td>1529.80</td>
<td>9080.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1883</td>
<td>March</td>
<td>6312.0</td>
<td>1376.40</td>
<td>10260.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>6312.0</td>
<td>1376.40</td>
<td>10260.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1884</td>
<td>March</td>
<td>5987.0</td>
<td>1133.40</td>
<td>11390.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>5987.0</td>
<td>1133.40</td>
<td>11390.0</td>
<td>3505.98</td>
<td>78.5</td>
<td>344.25</td>
<td>5226.63</td>
<td>6.172</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Quarter</td>
<td>Clunes Q.M.Co.</td>
<td>Tributers</td>
<td>Pyrites treatment</td>
<td>Quarterly Results</td>
<td>QUARTZ MINING - Annual Production</td>
<td>ALLUVIAL MINING</td>
<td>TOTAL GOLD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>----------------</td>
<td>-----------</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------------------------</td>
<td>----------------</td>
<td>------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tons Quartz</td>
<td>Ozs Gold</td>
<td>Tons Quartz</td>
<td>Ozs Gold</td>
<td>Grade dwt/ton</td>
<td>Tons Quartz</td>
<td>Ozs Gold</td>
<td>Grade dwt/ton</td>
<td>Tons Quartz</td>
<td>Ozs Gold</td>
<td>Grade dwt/ton</td>
<td>Ozs Gold</td>
</tr>
<tr>
<td>1885</td>
<td>March</td>
<td>3612.0</td>
<td>831.95</td>
<td>41.6</td>
<td>175.90 1007.85</td>
<td>5.581</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>3550.0</td>
<td>954.10</td>
<td>45.7</td>
<td>220.10 1174.20</td>
<td>6.560</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>3963.0</td>
<td>822.60</td>
<td>36.5</td>
<td>157.15 979.75</td>
<td>4.944</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>3087.0</td>
<td>661.43</td>
<td>30.9</td>
<td>152.50 813.93</td>
<td>5.308</td>
<td>14,222</td>
<td>3.076 5.6</td>
<td>1,286,223</td>
<td>475,589</td>
<td>7.4</td>
<td>12.35</td>
</tr>
<tr>
<td>1886</td>
<td>March</td>
<td>2512.0</td>
<td>522.43</td>
<td>27.8</td>
<td>121.80 644.23</td>
<td>5.129</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>2544.0</td>
<td>504.45</td>
<td>27.8</td>
<td>104.00 608.45</td>
<td>4.783</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>2655.0</td>
<td>341.83</td>
<td>37.0</td>
<td>134.70 476.53</td>
<td>3.590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>1045.0</td>
<td>178.90</td>
<td>18.0</td>
<td>82.65 261.75</td>
<td>5.010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1887</td>
<td>March</td>
<td>618.0</td>
<td>69.45</td>
<td>11.0</td>
<td>40.35 109.80</td>
<td>3.553</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>348.0</td>
<td>33.95</td>
<td>4.0</td>
<td>17.00 50.95</td>
<td>2.928</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>1309.0</td>
<td>139.68</td>
<td>5.5</td>
<td>17.45 157.13</td>
<td>2.401</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>1012.0</td>
<td>123.90</td>
<td>12.0</td>
<td>43.10 167.00</td>
<td>3.300</td>
<td>3.287</td>
<td>485.3 3.0</td>
<td>1,298,266</td>
<td>478,065</td>
<td>7.4</td>
<td>3.725</td>
</tr>
<tr>
<td>1888</td>
<td>March</td>
<td>1766.0</td>
<td>337.23</td>
<td>14.3</td>
<td>79.90 417.13</td>
<td>4.724</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>2722.0</td>
<td>431.35</td>
<td>27.5</td>
<td>121.05 552.40</td>
<td>4.059</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>763.0</td>
<td>99.80</td>
<td>22.0</td>
<td>88.60 188.40</td>
<td>4.938</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>5.251 1,158</td>
<td>4.4</td>
<td>1,303,517</td>
<td>479,223</td>
<td>7.4</td>
<td>0.00 506,324</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1889</td>
<td>March</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1890</td>
<td>March</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1891</td>
<td>March</td>
<td>477.0</td>
<td>119.18</td>
<td>119.18</td>
<td>4.997</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>691.0</td>
<td>129.83</td>
<td>129.83</td>
<td>3.758</td>
<td>1,168</td>
<td>249.4 4.3</td>
<td>1,304,685</td>
<td>479,472</td>
<td>7.4</td>
<td>129.83</td>
<td>506,573</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>404.0</td>
<td>44.59</td>
<td>44.59</td>
<td>2.207</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>650.0</td>
<td>134.98</td>
<td>134.98</td>
<td>4.153</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1892</td>
<td>March</td>
<td>597.0</td>
<td>178.34</td>
<td>178.34</td>
<td>5.974</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>661.0</td>
<td>230.81</td>
<td>230.81</td>
<td>6.964</td>
<td>2,312</td>
<td>589.5 5.1</td>
<td>1,306,997</td>
<td>480,061</td>
<td>7.3</td>
<td>230.81</td>
<td>507,162</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>3764.0</td>
<td>668.25</td>
<td>668.25</td>
<td>3.551</td>
<td>3,764</td>
<td>668.3 3.6</td>
<td>1,310,761</td>
<td>480,729</td>
<td>7.3</td>
<td>668.25</td>
<td>507,830</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1893</td>
<td>March</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1894</td>
<td>March</td>
<td>341.0</td>
<td>53.91</td>
<td>53.91</td>
<td>3.162</td>
<td>341</td>
<td>54.3 3.2</td>
<td>1,313,341</td>
<td>481,188</td>
<td>7.3</td>
<td>53.91</td>
<td>508,289</td>
</tr>
</tbody>
</table>
Bibliography

Format

The bibliography is arranged in the following order:

1. **Contemporary Sources**
   1.1 Manuscripts
      1.1.1 Official
      1.1.2 Unofficial
   1.2 Parliamentary papers
   1.3 Other official papers
   1.4 Newspapers and periodicals
   1.5 Journals and articles
   1.6 Books and pamphlets
   1.7 Photographs

2. **Modern Sources**
   2.1 Manuscripts
      2.1.1 Official
      2.1.2 Unofficial
   2.2 Other official papers
   2.3 Newspapers and periodicals
   2.4 Journals and articles
   2.5 Books and pamphlets
1. Contemporary Sources

1.1 Manuscripts

1.1.1 Official


Chief Secretary’s Office, Inward Registered Correspondence, VPRS 1189/84, Public Record Office Victoria.

Chief Secretary’s Office, Inward Registered Correspondence, [Disturbances over private land at Clunes], VPRS 1189/469, 1189/482, 1189/483, Public Record Office Victoria.

Creswick Courts, Petty Sessions and Mining Court Files 1856-1922, VPRS 5943/1, Public Record Office Victoria.

Creswick Division Mining Registrar, Mining Leases 1858-1876, VPRS 5956/1, Public Record Office Victoria.

Creswick Division Mining Registrar, Mining Registrar’s Correspondence and Papers, 1858-1911, VPRS 5955/1, 5955/2, Public Record Office Victoria.

Disposal of Auriferous Land at Clunes, 1855-6, VPRS 2599/523, Public Record Office Victoria.

Governor of Victoria, Inward registered correspondence, VPRS 4066/1, 4066/3, Public Record Office Victoria.

Governor of Victoria, Special Files 1854-1900, VPRS 1095/6, Bundle 2, No.50, Public Record Office Victoria.

Hotham, Charles, Despatches to Secretary of State, vol. 2, VPRS 1084/2, Public Record Office Victoria.

Howitt, A. M., Letter to Secretary for Mines regarding position of the Port Phillip anticline, Melbourne, 2 May 1900, Geological Survey of Victoria, Unpublished Report, 1900, 2 pp., 1 plan.

La Trobe, Charles, Despatches to Secretary of State, vol. 1, VPRS 1084/2, Public Record Office Victoria.

Mining Commission Correspondence 1856-58, National Museum of Victoria, Museum Victoria.

Passenger List, Barque ‘Fatel Oheb’, Inwards from Foreign Ports, June 1852, Public Record Office Victoria.


166

Records, Port Phillip and Colonial Gold Mining Company, La Trobe Manuscript Collection, MS12057, Box 2560/2, State Library of Victoria.


Straubel, Bernhard, Model of a single stamp of a three-head Battery, as formerly employed by the P. Ph. Gold Mº Cº, before the improved Stamps No.IV (Mus. Nº. 5714) were introduced, Melbourne, n.d., NMV 5864, Museum Victoria.

Straubel, Bernhard, Model of a Stamper [showing the fixing of a shoe by a conical tenon (Clunes)], Melbourne, n.d., NMV 13155, Museum Victoria.

Straubel, Bernhard, Model of the Clunes Stamping Battery No.IV according to the improvements adopted in 1861, Melbourne, n.d., NMV 5714, MV 11056, Museum Victoria.

Straubel, Bernhard, Model of the sections & surface workings of the Port Philip & Clunes Co Mining works at Clunes, Colonie of Victoria Australia, Melbourne, n.d., NMV 11401, MV 6754, Museum Victoria.

Straubel, Bernhard, Model representing Mr Bland’s new method of fixing Steel-socket heads of stamps to the socket lifters, Melbourne, n.d., NMV 21436, Museum Victoria.

1.1.2 Unofficial


Bland, R. H., Return of Quartz Crushed and Yield of Gold at the Port Phillip and Colonial Gold Mining Co.’s Works at Clunes; For the year ending 3rd October 1866, Clunes, 9 January 1867.


Research Note 839, ‘Note on Residency at York’, compiled by library staff, 9 September 1975, Battye Library, Perth.


Roe, J. S., ‘Report by J. S. Roe, Esq., Surveyor General, of his Expedition to explore the interior country south eastward from York, between September 1848 and February 1849’, *Exploration Diaries 1827-1871*, vol.4, Western Australia Department of Lands and Surveys, Perth, Battye Library, pp.136, 137, 182, 197, 198.


### 1.2 Parliamentary papers


Petition of the Miners, Storekeepers, and others, now or lately residing on Clunes’ Diggings, 16th January, 1857, *V. & P*. 1856-7, E, No.5.

Port Phillip and Colonial Gold Mining Company, Correspondence, *V. & P.*, 1858-9, vol.1, A12.

*Port Phillip Government Gazette*, Melbourne, No.28, 10 July 1850.


Victoria Government Gazette, Melbourne, 1857 to 1863.

Western Australian Government Gazette, 3 December 1836 to 5 March 1850.
1.3 Other official papers


*Charter and Supplemental Deed of Settlement of the Port Phillip and Colonial Gold Mining Company*, J.S.C Registry Office, 5 November 1868, BT31/1432/4195, Public Record Office, Kew, U. K.

*Deed of Settlement of the Port Phillip and Colonial Gold Mining Company*, London, R. Clay, Son, and Taylor, 6 April 1853, BT31/1432/4195, Public Record Office, Kew, U. K.

‘Gold Mining Lease Blocks at Clunes’, *Reports of the Mining Registrars*, Quarter Ended 30 June 1887, Melbourne, John Ferres, Government Printer, 1887, fig.1.


*Reports of the Mining Surveyors: Creswick Division*, Board of Science, Melbourne, October 1859 to October 1861.

*Reports of the Mining Surveyors and Registrars*, Melbourne, Department of Mines Victoria, Quarters ending September 1866 to June 1877.


1.4 Newspapers and periodicals

*Age* (Melbourne), December 1858.

*Argus* (Melbourne), June 1851 to April 1906.

*Australian Town and Country Journal*, Sydney, Frank and Christopher Bennett, October 1874 to May 1884.

*Ballarat Times*, August 1858 to October 1858.

*Clunes Advertiser*, May 1861 to November 1861.

*Clunes Guardian and Gazette*, November 1868 to December 1899.

Daily News (Geelong), quoted in Star, 20 September 1858.

Dicker’s Mining Record and Guide to the Gold Mines of Victoria, Melbourne, vols.1-11, February 1862 to December 1868.

Geelong Advertiser, July to August 1851.

Illustrated Australian News for Home Readers, Melbourne, Ebenezer and David Syme, 19 June 1869.


Ovens Constitution (Beechworth), quoted in Star, 21 September 1858.

Star (Ballarat), August 1856 to January 1882.

The Australian Mining Standard, Sydney, J. W. Pillar, June 1899 to November 1903.

The Times, (London), September 1851 to May 1890.

1.5 Journals and articles

Anon., ‘Report of the Commissioners appointed to examine the claims of companies to portion of the Cricket and Public Park Reserves at Ballarat’, Dicker’s Mining Record, vol.8, 26 June 1867, pp.279, 280.


Bland, R. H., ‘Underlie of the Reefs at Clunes’, Reports of the Mining Registrars, 31 March 1872, Melbourne, Department of Mines Victoria, 1872, p.22.

Bland, R.H., ‘Return of Quartz crushed, and yield of Gold obtained, together with a statement of the Mining operations carried on at Clunes by the Port Phillip and Clunes companies, for twenty years, from 1857 to 1877; and also a return of the additional yields up to the 30th June, 1879’, Geological Survey of Victoria, Progress Report No.6, Melbourne, John Ferres, Govt. Printer, 1880, pp.67-70.


Bland, R.H., 'Port Phillip and Clunes Companies: Return of Quartz Crushed and Yield of Gold, together with the Mining Operations carried on at Clunes by the Port Phillip and Clunes Companies for Twenty Years, from 1857 to 1877', Melbourne, Department of Mines Victoria, *Reports of the Mining Registrars*, 31 March 1886, Appendix F, pp.83-85.


Thompson, H. A., ‘On the formation of mineral veins and the deposit of metallic ores in them’, [read before the Royal Society of Victoria, August 12th, 1867], *Dicker’s Mining Record*, vol. 9, 27 August 1867, pp.80, 82, 28 September 1867, pp.122-124.


1.6 Books and pamphlets


Giddings, A. J., *The Clunes Mines: Past History, Future Prospects, Being information collected by the Clunes Borough Council (Victoria, Australia), with views of the Town, etc.*, Clunes, June 1902.


Moore, George Fletcher, *Diary of Ten Years Eventful Life of an Early Settler in Western Australia and also A Descriptive Vocabulary of the Language of the Aborigines*, Perth, University of Western Australia Press, facsimile edn, 1978 (1884).


Port Phillip and Colonial Gold Mining Company, *Extracts from the “Star” Newspaper, published in Melbourne [sic], 7th and 8th April, 1858, Received 16th June, 1858*, London, Richard Clay, 1858.


‘Research’ [pseudonym], *Statement of a Recently Claimed Discovery in Natural Science, Incentive to Mining Enterprise*, Melbourne, H. T. Dwight, 1870.

Richardson, Christopher, *Mr. John Diston Powles: or, The Antecedents, as a promoter and director of foreign mining companies, of An Administrative Reformer*, Printed for the Author, London, 1855.


### 1.7 Photographs

Bland, Rivett Henry, photograph, Clunes Museum.

Daintree, Richard, Clunes photographs, La Trobe Picture Collection, State Library of Victoria.

International Exhibition, London 1862, Model stamp battery photograph, La Trobe Picture Collection, State Library of Victoria.

Nettleton, Charles, Clunes photographs 1865-6, Clunes Museum.

2. Modern Sources

2.1 Manuscripts

2.1.1 Official


2.1.2 Unofficial


2.2 Other official papers


2.3 Newspapers and periodicals

*Age* (Melbourne), 20 April 1996.

*Argus* (Melbourne), 27 August 1932.
2.4 Journals and articles


2.5 Books and pamphlets


Smith, Flora & Barrett-Lennard, Donald, *A History of Houghton (Swan Location 11)*, published by the authors, East Guilford, W. A., 1979[?].


