

## **The King Battery and Mr Lidgey's Grand Vision for the Hampton Plains**

By GERARD MACGILL

**T**hough it operated for little more than two years from its commencement in March 1902, *King Battery* stands as a monument to an early attempt to establish a major gold mining enterprise on the Hampton Plains. The site is closely associated with the early development of the Eastern Goldfields region, and in particular with the various companies associated with Hampton Plains Estates Ltd, the successors to which remain influential to the present day. It has links to the early explorers Lefroy and Hunt; to the distinguished English mining engineer, Ernest Lidgey, sometime President of the Australasian Institute of Mining Engineers, who went on to pioneer an early, if not the earliest application of geophysical mineral prospecting in Australia; and to W.G. Manners, an engineer prominent in the development of the Eastern Goldfields.

### **The Hampton Lands**

The Hampton lands story began in earnest with the passage of the Land Act of 1882 which offered incentives to those willing to explore and develop the interior of Western Australia. Under the Act, persons leasing land had the option of obtaining freehold title at 2shillings 6pence [2s 6d] an acre for land selected within seven years of the date of lease. Freehold title to a further portion could be acquired at 5s an acre for land selected within the following seven years. Freehold title gave the holder exclusive rights to all minerals, water and timber on the property.<sup>1</sup> The Act applied to most of what is now the Kalgoorlie and Coolgardie Goldfields. C.C. Hunt, a young Scottish surveyor, had explored it in 1864 and 1865, and he described and named the Hampton Plains in honour of his sponsor, Governor Hampton.

In response to these Government incentives, a group of British investors formed the Hampton Plains Syndicate in 1886, 'all four of the trustees ... [being] Lords of the Realm ... [with] a strong sprinkling of other members of the aristocracy throughout the shareholders'.<sup>2</sup> The syndicate put together the first Hampton Lands and Railways

Syndicate,<sup>3</sup> which put a proposal to the government to drive a railway from York to Hampton Plains.<sup>4</sup> The syndicate despatched a party with instructions to follow Hunt's tracks and in due course marked out 19 blocks totaling 216,000 acres and a surrounding area of 1,216,000 acres<sup>5</sup> in the country between the centres now known as Coolgardie and Kurnalpi. In June 1889, the syndicate finalised an agreement with the Western Australian Legislative Council, taking up the 19 blocks as freehold and paying a fee of £27,000, which was said to have made a welcome contribution to the treasury of a cash-strapped colony.<sup>6</sup>

Although the land was taken up for agricultural and grazing purposes, the discovery in the 1890s of rich gold deposits at Coolgardie, Kalgoorlie, Londonderry, Burbanks and Kurnalpi, all close to Hampton-owned land, dramatically enhanced the potential of the freehold blocks, which had exclusive mineral rights.<sup>7</sup> Blocks 48 and 50 that were aligned along the trend of the Golden Mile, appeared to be particularly good prospects, and had indeed produced substantial amounts of alluvial gold. It has even been claimed that an 1890 find at MacPherson's Gully on Block 48 by Lou Jacoletti and George Withers sparked the interest of Bayley and Ford, who went on to make their historic discovery at Coolgardie.<sup>8</sup>

Hampton Plains Estate Ltd [HPEL], registered in October 1894, acquired the interests of the original Hampton Lands and Railways Syndicate.<sup>9</sup> At least ten other companies were floated in the course of the following four years to exploit the mineral potential of the Hampton land.<sup>10</sup> They promised much but delivered little. As early as 1897, the disgruntled shareholders of one of these companies, Hampton Goldfield Ltd, were lamenting the

ill success which has attended Hampton Goldfield Ltd throughout its melancholy career ... it would indeed be wonderful if there were any unanimity on the part of the shareholders, save in condemning the incompetence and extravagance that has attended the management of their affairs.<sup>11</sup>

Unhappily, these sentiments were destined to be shared by those who invested their hopes and fortunes in the mines of Blocks 48 and 50, and in *King Battery*.

The goldfields slid into decline in the early years of the 20<sup>th</sup> century but hopes were revived in 1919 when rich discoveries on Block 50 led to a second boom on the Hampton Plains when an area of 200 square kilometres was completely pegged, and

‘Celebration City’ created.<sup>12</sup> However, the Celebration mine, based on leases acquired by the newly formed Hampton Celebration (WA) Ltd, prospered only briefly and was closed with the collapse of the share market at the end of 1923.<sup>13</sup> Over the following 20 years the mine re-opened for brief periods in response to increases in the gold price, but the area was essentially quiescent until the 1960s nickel boom.<sup>14</sup> The state of the fortunes of the Hampton Plains companies in the 1950s can be gauged from the tenor of a letter from the London stockbroking firm Sutcliffe Ley and Co. to T. Stodart and Co. (later Evers Reed) of Kalgoorlie:

I have asked Mr. J.B. Terrell, attorney for Hampton Gold Mining Areas, of which I am chairman, to see you with a view of finding out if you would be willing to take our Company and Hampton Properties Ltd into your office, as we can no longer afford an independent office and General Manager.<sup>15</sup>

The combination of modern mining and processing technology and an improved gold price in the 1980s, led to the exploitation of previously uneconomic, lower grade deposits, including the Hampton-Boulder (the present New Celebration mine) on Block 50 and the White Hope on Block 48 (Figure 1). The Hampton Plains companies participated in this revival in association with mining companies such as Mt Martin Gold Mines NL.<sup>16</sup>

### **King Battery and associated mines of Blocks 48 and 50**

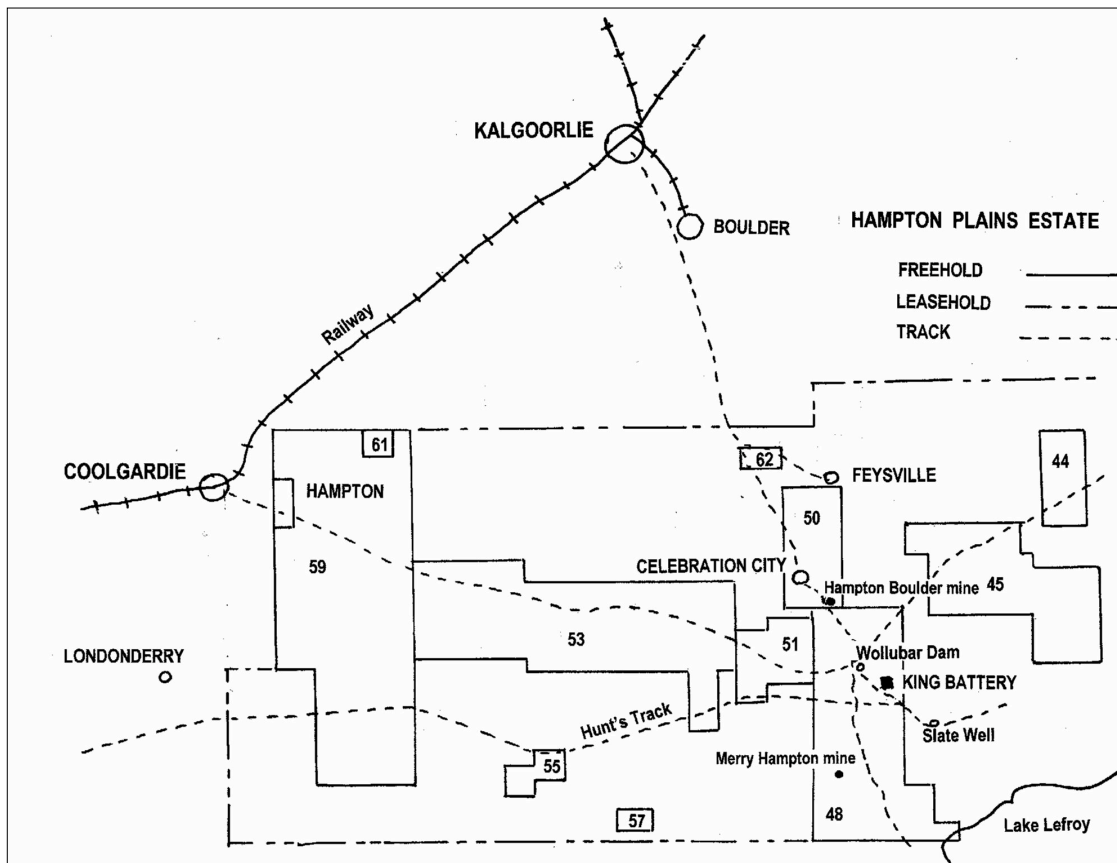
The concept of a group of mines serviced by a central battery seems to have been the brainchild of Ernest Lidgley, a mining engineer of sufficient repute to be elected president of the Australasian Institute of Mining Engineers in 1901.<sup>17</sup> For a while, Lidgley represented the Victorian Mines Department in London,<sup>18</sup> but at the time of his 1901 presidential address was a consultant to the Brunswick Syndicate Ltd, which worked goldmines in Gippsland.<sup>19</sup> He remained connected with this concern until at least 1904.<sup>20</sup> His connection with HPEL probably came via Victoria, where the company had a large interest in Victorian Deep Leads properties.<sup>21</sup>

Although Lidgley’s 1901 presidential address was on the topic of mining on private property in the Western Australian goldfields, he made much of the promising indications of mineralisation, proximity of the blocks to major deposits, and the

abundance of timber and water resources on HPEL properties. He clearly believed strongly in the economic potential of the area.

The year 1901 was to be one in which optimism about the prospects for Blocks 48 and 50 knew no bounds. Four mines were operating or being developed on the blocks: the King Mine, the Queen Mine,<sup>22</sup> the Merry Hampton and the Hampton-Boulder. The battery, manufactured by Fraser and Chalmers,<sup>23</sup> was under construction,<sup>24</sup> the main worry being that it might not be big enough to cope with the volumes of ore being daily discovered.<sup>25</sup>

**Figure 1: King Battery Locality Plan (showing block numbers)**



Source: Compiled by R. Hartley from, Ernest Lidgey, 1901 Presidential address, 'Mining on private property on the goldfields of Western Australia', *TAusIME*, Old Series, vol. 8-1, p. 2; Scott Wilson, 'Historic trip to the Hampton Plains Blocks 48 and 50', Amalgamated Prospectors and Leaseholders Association of WA, Kalgoorlie, 1997.

The *Kalgoorlie Miner* of 21 February 1901 reported the opening up of the Merry Hampton mine, which Directors believed would be of permanent value. The reef, it was alleged, continued down and was proved to over 220 feet in depth and 1,000 feet in

length [67.1m x 304.8m] therefore justifying Superintendent Lidgey's recommendation for erection of the mill. It was further noted that negotiations were underway for the purchase of a 20-stamp mill to be erected at Woollubar, where there was a large supply of fresh water and unlimited saline water near by. Abundant fuel would enable ore to be treated at low cost and the 1,200 pound stamps was expected to treat four to five tons of ore per stamp per day, or a total of 100 tons in that period. Though primarily constructed for the Merry Hampton, the Directors believed it would treat ore from other sites and attract prospectors to settle on the estate.<sup>26</sup>

Further promising finds and intersections were reported in May 1901, and particular attention was called to a low-grade deposit on the northern boundary (the Hampton-Boulder) persuading the directors that an additional 4-stamp battery might be desirable. The erection of the 20-stamp mill was to proceed immediately.<sup>27</sup> A few months later, in a September 1901 circular to shareholders, Hampton Plains Estates Ltd advised that in the light of progress made there was every prospect of the company being in a dividend-paying position within a short period. Furthermore, they were informed that the central mill was being erected, seven miles of light railway were being laid to convey the ore from the various mines to the central mill, and extensions would be made in other directions as additional mines were opened up. A locomotive and 60 trucks had been forwarded to the estate and the various mines were being connected by telephone with the central mill. Lidgey was said to be confident that he could earn large profits from the milling operations, and it appeared probable that 80 stamps could be constantly kept going on payable ore.<sup>28</sup>

At the Queen Mine, the ore was said to be very consistent and would supply a large quantity of stone for the mill and could be worked as an open-cut. Development had disclosed enough ore to keep a 40-stamp mill going for years.<sup>29</sup>

Lidgey reported to his directors that he considered the central mill could process ore at a cost equivalent to 3dwt of gold (about 13 shillings per ton).<sup>30</sup> He also reported a visit the Australian Institute of Mining Engineers where a 'very highly respected' engineer confirmed all his views about the prospects and supported the concept of the central mill and connecting tramways. The directors were, however, concerned that the mill under construction might be much too small, leading them to consider the immediate erection of additional stamps rather than to wait to finance them from profits.<sup>31</sup>

On 5 October 1901, the ebullient Mr Lidgey was confidently stating:

Judging by present appearances, before my three years' engagement is up (31/3/03) you will have, or require, one of the largest mills in Western Australia on the Hampton Plains. The ore is certainly low grade, but by erecting up-to-date plant and working economically the thing can be made to pay very handsomely.<sup>32</sup>

By January 1902, the 20-head battery was approaching completion and the work of connecting the different mines by tramline was making rapid progress. On Block 50 a big lode formation (Hampton-Boulder) was being worked by open-cut. The bulk of the ore supply for the battery was expected to come from this source. Two months later, in March 1902, the 20-head mill was reportedly doing excellent work on stone taken from the Hampton-Boulder. The value of the stone was about 5dwt and with this, the management hoped to more than pay expenses. Furthermore, if the big ore formation retained its favourable appearance they expected an increase in the treatment plant would soon be necessary. Of some concern was progress of the cyanide plant and only in June 1902 was a contract for its completion let to Messrs Tyrrel and Manners.

But the bubble was about to burst. Production figures for April, May and June 1902 revealed the stark truth - the ore grades were not living up to expectation. In July 1902, the directors sent an urgent message to query how the 'Queen' could be made to pay at 3dwt to the ton - a figure previously quoted in September 1901 as the cost of processing.<sup>33</sup> Lidgey's response, that the June batch from the Queen contained a lot of overburden and that it should improve,<sup>34</sup> had an element of desperation about it, for sending barren overburden to the battery along with the ore, thus diluting the ore, would have been an admission of poor mining practice that would hardly have constituted sound mining practice. The end came swiftly for Lidgey. In a circular from the secretary of Hampton Plains Estates Ltd, the directors expressed regret that the information to date was not satisfactory. Following receipt of the August 1902 returns, a number of cable exchanges took place, as reported by the *Kalgoorlie Miner*:<sup>35</sup>

To Mr. Lidgey, September 6: unless you are perfectly certain profitable results, mine must be closed down in order to avoid further loss. What has been the result of your boring. Are anxious to know our opinion.

From Mr. Lidgey, September 6: Merry Hampton, advise you to close down all operations temporarily. Queen Mine, have not yet started boring. Recommend you to run cyanide process for one month before you shut down.

To Mr. Lidgey, September 11: Close Merry Hampton and unless you are perfectly certain profitable results from cyanide process, as stated by you repeatedly, stop all further expenditure. In reference to your letter dated August 8, is cyanide plant completed?

From Mr. Lidgey, September 12: I am not quite certain now of profitable results. Your instructions are being carried out. Will clean up mill boilers. Will take care that all the machinery and stores are safely housed. Materials brought on the surface. Cyanide plant has not been completed.

To Mr. Lidgey, September 13: Cyanide Plant. When do you expect will be completed. Reply to cable immediately.

From Mr. Lidgey, September 15: In reference to your cable of 12<sup>th</sup>, cyanide plant can be completed October 1. Shall I complete according to instructions based on your cable of September 10? All work has been stopped except cleanup.

To Mr. Lidgey, September 21: Please hand over everything to Mr. E. Graham Price. In view of serious position owing to failure on the part of yourself to justify estimates, the greatest economy is necessary. Expressly with you to cancel balance of agreement. Reply by cable immediately.

From Mr. Lidgey, September 26: In reference to your cable of 24<sup>th</sup>, sincerely regret what has happened. Beg to tender my resignation. Consent to cancel agreements from the date of October 1.

From Mr. Graham Price, October 3: Mr. Lidgey handed over. Leaves for London on October 6.

In the midst of all this, HPEL Chairman Mr. Stoneham tried to remain optimistic. In a circular to shareholders he declared that ‘while I am no mining expert, experts agree that Hampton Plains must contain a good reef.’ He went on to express his disappointment about the present results, but expressed his confidence that Lidgey was doing his best to make the Queen Mine profitable. Meanwhile he was sanguine about the Hampton-Boulder. The circular states that HPEL would concentrate on timber, and that shareholders would be pleased that the brickworks and waterworks were doing well.<sup>36</sup>

Not doing so well was the cyanide plant, which was not fully operational until early October 1902<sup>37</sup> and probably worked only intermittently from then until the end of 1904. The mill had been erected on Lidgey’s assurance that the ore would average at least 5dwt,<sup>38</sup> but in fact it had scarcely averaged 3dwt, which barely covered the mill costs. The only hope left was that sufficient ore could be obtained from the Hampton-Boulder mine, on Block 50. Up to 80 tons of ore was being delivered to the battery daily

as late as March 1903, but with the ore averaging only 5dwt, the tramming costs made the operation uneconomic.

Nevertheless, exploration drilling of the Hampton-Boulder lode continued throughout 1903 and early 1904 with reasonably promising results. This, along with occasional rich finds on Hampton properties, kept hopes alive, leading the *Kalgoorlie Miner* to announce under the heading 'Hampton Plains Estate, Marks of Progress, a Brighter Outlook', that 'At no time in the history of the Hampton Plains Estate Ltd has the mining outlook worn such a favourable appearance as at the present moment.'<sup>39</sup> The company, no doubt encouraged by these reports, would have been pleased. The company, no doubt encouraged by these reports, would have been pleased when professor Liveing, a distinguished mining engineer visiting from England, made favourable comments about the prospects for the area and endorsed the strategy of the central mill.<sup>40</sup> The unhappy reality was, however, that 'The Hampton Plains Estate Ltd has not enjoyed the best of luck during its ten year's existence, but the company, with Mr Allen Stoneham as its chief sponsor, has plodded steadily along, waiting, Micawber-like, for something to turn up'<sup>41</sup> - but nothing did.

The last production report, in May 1904, reported the treatment of 1,450 tons of ore from various parts of the estate 'at the company's mills and elsewhere,' resulting in 1,850 ounces of gold.<sup>42</sup> Optimistic to the last, the report included the information that HPEL had sent out a plan showing the northern part of the property, 'where the reefs have been proved by boring',<sup>43</sup> and another showing the Hampton-Boulder, Queen, central mill and tramway. It noted that the reefs lay in a line between Kalgoorlie and Red Hill, and stated that the central mill could deal with 100 tons per day, and that the existing power plant was sufficient to drive 40 stamps.<sup>44</sup>

Whether the plant drove any stamps much beyond mid-1904 is doubtful. By October of that year the development work at the Hampton-Boulder, the battery's sole remaining source of ore, had not fulfilled the promise of the earlier exploration drilling results,<sup>45</sup> turning the attention of HPEL manager, Mr Graham Price, to the much more promising Red Hill Mine (just to the south of the Hampton Block 48), in which HPEL was a major shareholder.<sup>46</sup>

Lidgley, who had left behind 'something nearly approaching chaos',<sup>47</sup> was treated with surprising kindness by the directors of HPEL, who went so far as to state their absolute confidence in his integrity and honour and to record a vote of thanks to him.<sup>48</sup>



Lidgley subsequently proceeded to acquire the Australian patent rights to an ‘electrical mining system’,<sup>49</sup> which involved introducing an electrical current into the ground and measuring the resulting induced electromagnetic field. This had previously been tested with some success in Wales and Cumberland.<sup>50</sup> On returning to Australia with his equipment and two electricians, Lidgley took up residence once again on the Hampton Plains where he was engaged by HPEL to spend one week per month on prospecting.<sup>51</sup> The system, which probably responded well to large, concentrated bodies of minerals, seems to have been defeated by the dispersed nature of the Goldfields ores. Less than a year after returning, it appears he gave up the enterprise and was managing a cyanide plant in Coolgardie.<sup>52</sup> However, his venture almost certainly represented the first attempt to employ geophysical prospecting methods in Western Australia, if not the nation.

**Photo 1:** *Tailings Wheel, Kings Battery.*



Source: G. McGill

So ended the first major Hampton Plains mining venture. Exploitation of the gold deposits on the Plains was not to become an economic reality until the 1980s, when modern methods made it possible to profitably mine grades of ore even lower than those that had defeated Lidgey. The combined reserves of the Hampton-Boulder, Pernatty and Celebration mines on Block 50 were estimated in 1985 to be 5.9 million tons, grading 2.8 grams per ton [1.8dwt/ton]. Underground mining at Hampton Boulder between 1991 and 1997 produced 1 million tons at 6.3 grams per ton [4.0dwt/ton]. Up to June 1997, the New Celebration gold plant had treated 15.8 million tons of ore for an average recovery of 2.51 grams per ton [1.62dwt/ per ton].<sup>53</sup>

*King Battery* was said to have had the capacity to treat 100 tons per day, so working full time it would have treated 36,500 tons in a year. As an indication of the scale of operation necessary to treat low grade gold ores profitably, some 80 years later a modern battery on Block 50 was treating ore at nearly 14-times that rate.<sup>54</sup> As prospector and a miner, Lidgey may have been a man ahead of his time.

What subsequently happened to the battery plant is not at this point known, but it is the common fate of terminated mining operations that the plant is sold, and that anything of value not sold is eventually salvaged by other miners or by farmers. There can be little doubt that HPEL, a company with accumulated losses in 1905 of more than £11,000,<sup>55</sup> would have sold the plant to other mines while it was still in good condition. The 16-metre diameter wooden tailings wheel, purpose-built for *King Battery*, would probably have been of little value elsewhere, and it remained intact for more than half a century until burned down by vandals in the late 1950s.<sup>56</sup> The wheel's beautifully constructed tapering stone pillars [see Photo 1] still stand, however, as a memorial to the enterprise, as do the stone retaining walls of the battery building and the foundations of the cyanide plant.

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## Endnotes

<sup>1</sup> Ernest Lidgey, Presidential address, 'Mining on private property on the goldfields of Western Australia', *Transactions of the Australian Institute of Mining Engineers*, Old Series, 1901, vol. 8-1, p. 2.

<sup>2</sup> John McIlraith, *A Century of Scripping: the history of the first 100 years of Eyres Reed Limited Stockbroker*, Eyres Reed Ltd, Perth, 1996, p.41.

<sup>3</sup> The syndicate had no connection with the syndicate of the same name registered in London in 1895. See, Walter R. Skinner, *The Mining Manual*, London, 1897, p. 169.

- <sup>4</sup>McIlraith, *A Century of Scripping*, p. 41. It is not clear whether this was before or after the syndicate's exploration of the area. The proposal was not in the event proceeded with.
- <sup>5</sup>D. MacKay, 'The early history and formation of the Hampton Plains Estate Limited, including the mining boom of the 1920s and the present nickel find', *Early Days: Royal Western Australian Historical Society Journal and Proceedings*, vol. 6, part 7, 1968, pp. 32-3.
- <sup>6</sup>Lidgey, 'Mining on private property', p. 3.
- <sup>7</sup>*Ibid.*
- <sup>8</sup>F.R. Browne, 'Hampton Plains', *The Golden West*, vol. XV, December 1919, R. Clarke Speare, Perth, p. 23.
- <sup>9</sup>Walter R. Skinner, *The Mining Manual*, p. 169.
- <sup>10</sup>*Ibid.*, 1897 to 1905. Ron Manners (personal communication) has traced more than 40 companies that are offshoots from the original enterprise.
- <sup>11</sup>*Colonial Goldfields Gazette*, v. 8, 1897, p.157.
- <sup>12</sup>McIlwraith, *A Century of Scripping*, p. 45.
- <sup>13</sup>*Ibid.*, pp. 46-7.
- <sup>14</sup>New Hampton Goldfields NL, Annual Report for 1996, Battye Library, Library and Information Service, Perth, Western Australia [hereafter BLIS], p. 9.
- <sup>15</sup>McIlwraith, *A Century of Scripping*, pp. 47-8.
- <sup>16</sup>*Ibid.*, p. 49; Mt Martin Gold Mines NL, Annual Report, 1990, BLIS, p. 5.
- <sup>17</sup>Lidgey, 'Mining on private property'.
- <sup>18</sup>*Colonial Goldfields Gazette*, v. 10, 1901, p. 236.
- <sup>19</sup>Walter R. Skinner, *The Mining Manual*, London, 1902.
- <sup>20</sup>*Ibid.*, 1904.
- <sup>21</sup>*Ibid.*
- <sup>22</sup>The Queen and King mines could not be positively located, though the King is known to have been close to King Battery. There are few historic records associated with these mines, which were on freehold property with mineral rights to the owner. They were thus not covered by leases under the Mining Act and do not feature in Mines Department reports.
- <sup>23</sup>W.G. Jeffrey, 'Fourth Annual Report of the Directors', Hampton Plains Estate Ltd, London, 1901.
- <sup>24</sup>Little is recorded about the design of the plant. An early photograph shows the completed battery. The most complete description is in a single paragraph in the *Kalgoorlie Miner*, 30 March 1903.
- <sup>25</sup>*Ibid.*, 28 October 1901.
- <sup>26</sup>*Kalgoorlie Miner*, 23 February 1901.
- <sup>27</sup>*Colonial Goldfields Gazette*, v. 10, no. 252, p. 328.
- <sup>28</sup>*Kalgoorlie Miner*, 28 October 1901.
- <sup>29</sup>*Ibid.*
- <sup>30</sup>1 troy ounce = 20 pennyweights (dwt) = 31.10 grams; 1dwt = 1.55 grams.
- <sup>31</sup>*Kalgoorlie Miner*, 28 October 1901.
- <sup>32</sup>*Colonial Goldfields Gazette*, v. 11, no. 273, p.222.
- <sup>33</sup>*Ibid.*, v. 13, 1902, pp. 307, 468; *Kalgoorlie Miner*, 18 August 1902.
- <sup>34</sup>*Ibid.*
- <sup>35</sup>*Ibid.*, 22 November 1902.
- <sup>36</sup>*Colonial Goldfields Gazette*, v. 13, 1902, p. 785.
- <sup>37</sup>*Kalgoorlie Miner*, 22 November 1902.
- <sup>38</sup>Lidgey's confidence in the future of the venture was also evident in the quality of his assay laboratory, which according to Browne, 'Hampton Plains', *The Golden West*, pp. 24-5, 'contained the finest collection of glass-stoppered bottles ever got together', and in his provision of tennis courts for his staff, and his importation from England of a papier-mache house. Browne does not cite the source of this information, but he writes close enough in time to the events to perhaps have had direct knowledge of them.
- <sup>39</sup>*Kalgoorlie Miner*, 8 February 1904.
- <sup>40</sup>*Colonial Goldfields Gazette*, v. 14, no. 412, p. 369.
- <sup>41</sup>*Kalgoorlie Miner*, 18 June 1904.
- <sup>42</sup>*Colonial Goldfields Gazette*, v. 14, no. 410, p. 322.
- <sup>43</sup>*Ibid.*, p. 322.
- <sup>44</sup>*Ibid.*
- <sup>45</sup>*Ibid.*, v. 14, no. 431, p. 671.
- <sup>46</sup>*Ibid.*, v. 15, no. 444, p. 19.
- <sup>47</sup>*Kalgoorlie Miner*, 30 March 1903.
- <sup>48</sup>*Colonial Goldfields Gazette*, v. 13, 1902, p. 812.

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<sup>49</sup> *Kalgoorlie Miner*, 17 June 1903.

<sup>50</sup> *Ibid.*; *Western Australian Mining, Building and Engineering Journal*, v. 2, no. 27, 1903, p. 6.

<sup>51</sup> *Kalgoorlie Miner*, 31 July 1903.

<sup>52</sup> *Ibid.*, 14 April 1904.

<sup>53</sup> Scott Wilson, *Historic Trip to the Hampton Plains Blocks 48 and 50*, Amalgamated Prospectors and Leaseholders Association of WA, Kalgoorlie, WA, 1997, pp. 16-17.

<sup>54</sup> *Ibid.*

<sup>55</sup> Walter R. Skinner, *The Mining Manual*, London, 1897, 1905.

<sup>56</sup> W.G. Manners, 1992, *So I Headed West: Ballarat to Broken Hill, to Kanowna, to Kalgoorlie, 1863–1924*, W.G. Manners and Co., Kalgoorlie, and Hesperian Press, Carlisle, WA, 1992, p. 121.