

The Wolfram Mine at Wilks Creek, Victoria

By PETER S. EVANS

Tungsten, a hard, steel-grey metal is an important strategic commodity. Historic uses included textile printing and the production of hard alloys for engineering purposes. In the twentieth century it was an essential element in the heavy manufacturing and armaments industry, and was also used in incandescent lamps, radio valves, electric furnaces, and spark plugs. Steels alloyed with tungsten are especially hard and fine-grained and retain their working properties at high temperatures. The principle ores of tungsten are scheelite and wolframite. Scheelite (calcium tungstate, CaWO_4) is a tetragonal crystalline ore named after its discoverer Carl Wilhelm Scheele, a Swedish chemist. Wolframite (a mixture of ferrous tungstate, FeWO_4 ; and manganese tungstate, MnWO_4) has a monoclinic crystal structure and takes its name from the early word for tungsten, wolfram.¹ Both of these minerals occur worldwide but more than 75 per cent of current world production comes from China.²

The existence of tungsten ores in Victoria was well known by 1869. Wolframite was noted in association with gold reefs at Sandhurst (Bendigo), Smythesdale, Tarrengower and in the basin of the River Yarra.³ Contemporary values for the mineral in England were from £5 to £6 per ton 'at grass'. A method of refining the ore was known but, with the mining industry in Victoria largely focussed on gold production, little was done to exploit this resource.⁴ Towards the end of the nineteenth century, industrialised European nations showed an interest in buying Australian ores of tungsten, with well-dressed scheelite fetching £30 or more per ton on the European market. This introduced the intriguing possibility (almost heresy by Victorian standards) that a good tungsten mine might be worth more than a gold mine.⁵ By the early twentieth century, further Victorian deposits had been located. Scheelite had been found at Chiltern, Mount Cudgewa and Boggy Creek. Wolframite was located at Linton, Mount Murphy, near Benambra, at Mount Bendoc, Maldon, Wedderburn, Heathcote and Chiltern [See Appendix 1]. However, one of the more important deposits was the basin of the Upper Yarra.⁶

Discovery

The deposit which would eventually lead to the opening of the Wilks Creek⁷ mine was discovered about 1894 on the southern fall of the Great Dividing Range by Mr Robinson, probably a local. The discovery was in Wolfram Creek, but the name is not shown on modern maps. Four creeks eventually proved to carry alluvial deposits of the ore; Wolfram Creek, Opas Creek, Quartz Creek and Main Creek. These creeks (also unnamed on modern maps) run south-east into Deep Creek, a tributary of the O'Shannassy River which, in turn, runs into the Yarra River. On 24 May 1907, the *Alexandra and Yea Standard* reported that:

A fine deposit of Wolfram has been found in the hills near Marysville and is causing investors to visit the locality ... one claim is to be floated, which will give work to some 30 men or more, and others are being inspected with a view to working also. This mineral is rising rapidly in the markets.⁸

Figure 1: *This rather battered hand-coloured postcard circa 1908 from the State Library of Victoria collection shows a party sluicing for wolfram on Mount Bismarck (renamed Mount Kitchener during the First World War) and is the earliest known image of wolfram mining at Wilks Creek.*

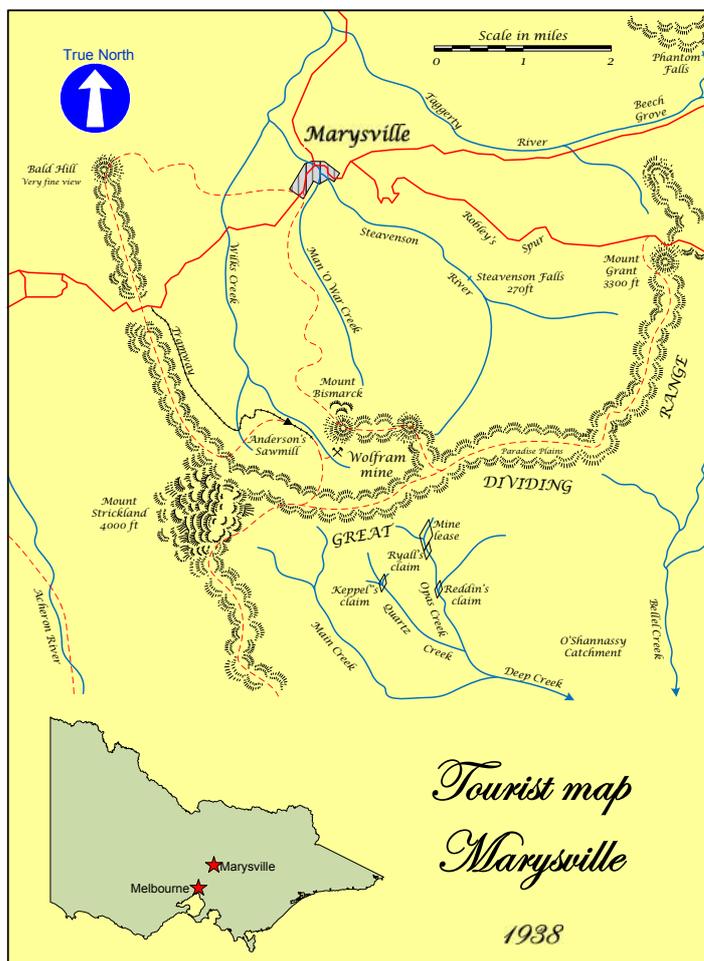


Source: Shirley Jones collection of Victorian postcards, image H96.200/898, State Library of Victoria.

The source of the alluvial ore was discovered to be a narrow quartz vein running north 15° west magnetic in mountainous country. The lode was almost vertical. By February 1908, three claims had been taken up. Ryall's claim was the most northerly on Opas Creek, with Reddin's claim about one mile below that on the same creek [see map 1]. Both claims were worked by alluvial methods and, despite the discovery of the lode, no attempt had been made to sink a shaft on it. Keppel's claim was on the next creek to the west, and was also worked by alluvial methods. This claim was taken up in 1906 by Messrs Robinson, Andrews and Keppel and, by the beginning of 1908, had yielded 22 cwt of ore.⁹ The total yield of ore from all of these claims to this date would be approximately 69½ cwt or 3.475 imperial tons.¹⁰ The deposit, as it stood, was only just worth working due to the low ore values. However, as the value of the ore near the surface and in the creek beds was believed to have been lowered by leaching, it was thought that the prospect would probably improve with depth, meaning the abandonment of alluvial working.¹¹ Perhaps due to this optimistic assessment, The Mount Bismarck Wolfram Mining Company NL was registered in August 1910 with a capital of £2,500 in 500 shares of £5. The company's property and claim were valued at £1,000, and James Mackay was appointed manager. M.D. Keppel was a prominent shareholder.¹² Little further work seems to have been done during peace time but, after

the declaration of war in 1914, tungsten was to assume a more valuable role in the prosecution of the war effort.

Map 1: Location map Wolfram Mine, Wilks Creek, Victoria.



Metals policy, 1914-18

During the pre-war years, Germany had consolidated a large hold on the metals industry in Australia, in particular, buying up large volumes of ore for treatment. At the time, Queensland was mining about half the world's supply of tungsten. Of the 800 tons of wolfram and scheelite exported from Australia in 1913, nearly 600 tons went to Germany. Legislation passed in May 1915 allowed Australian firms to annul otherwise legally binding contracts with firms suspected of being controlled by Germany. The general reluctance of Australian mining companies to take such a step (which crossed commercially accepted boundaries) led Prime Minister Hughes to establish

the Australian Metal Exchange under the direction of Sir John Higgins in September 1915. No metal or metallic ore could be exported without the blessing of the exchange. In addition, the Australian Government acquired by proclamation the whole of the Australian production of wolfram, scheelite and molybdenite for the duration of the war and for six months afterwards. The price was pegged and, under this arrangement, tungsten to the value of £372,500 was sold to Great Britain.¹³ This guaranteed market at an inflated wartime price was bound to encourage the development of even the smallest deposit of tungsten ore.

Anderson, Kirwan and Gates

Early wartime interest was shown in June 1916 by Joshua Thomas Noble Anderson and Andrew James Valentine Kirwan, who applied for a forty-acre mining lease in the headwaters of Wilks Creek. However, they apparently did not proceed far with the project, although the partners may have installed a small water-powered crushing plant (Fig. 2). In May 1917, Sherman Gates and Charles Joseph Kirwan registered a similar claim.¹⁴

Gates had apparently followed the lode in a north-westerly direction and discovered it where it cropped out on Wilks Creek on the northern side of the Great Dividing Range (Map 1). All the machinery had to be hauled to the ridge above the mine by horse teams, and carrier Nichols had 11 horses attached to the boiler alone during the ascent in July 1917. The operation was further hampered by bad weather.¹⁵ Once at the top of the ridge near Mount Bismarck, the machinery had to be sledged down 1,000 ft of steep mountainside to the mine itself. The sledges were restrained by wire ropes snubbed around convenient trees on each side of the track. The ore processing plant consisted of a Jacques crusher, a trommel, two jigs, a three-head battery and a Wilfley table. The plant was powered by a boiler and steam engine, and was valued at £1,214. Labour for erecting the treatment plant and for mining cost £1,311, exclusive of any provision for payment of wages to Gates himself. Two adits were driven on the main line of reef. Two other lines of reef were prospected by short tunnels and by trenching at a cost of £30. The ore produced had to be packed out by horse from the mine as far as the main road where it was consigned to Dalgety & Company. During the war, the price of Wolfram ore was pegged at £2 12s 6d per unit. (0.01 ton).¹⁶

Figure 2: *A small derelict water-powered battery at Wilks Creek during the inter-war years. J. T. Noble Anderson, a noted engineer, had an interest in water power and this may be the remains of a plant installed by himself and partner Andrew Kirwan.*



Source: Rose postcard. Author's collection.

When, in 1919, the price controls were relaxed, the price plummeted to 10s per unit, forcing Gates to abandon the mine. Since there was only a pack track to the mine, the machinery had to be abandoned *in situ*. A bushfire subsequently destroyed part of the plant. Gates later estimated his loss on the venture at £3,000.¹⁷ While the price of tungsten stayed low, the claim lay idle. In 1940, most of the plant was sold to timber merchant C.J. Row & Sons who were part-owners of a nearby sawmill managed by Ted Anderson.¹⁸

Revival: the Second World War

The price for tungsten ores stayed low during the inter-war years, recovering only as far as 12s 6d per unit by 1924.¹⁹ Mines producing tungsten ores were abandoned all over Australia. At first, the declaration of war in September 1939 did little to change this. However, when the Japanese overran much of South-East Asia in 1942, they won control of some of the world's largest deposits of tungsten.²⁰ If Australia, threatened from the north and short of shipping, was to become self-sufficient in this vital metal, any remotely payable tungsten deposits would have to be re-opened. The Department of Supply and Development set about acquiring and developing mines which could supply this need. In accordance with demand, the price for tungsten rose again. In April 1942, the UK and Australian governments reached an agreement whereby the sale of wolframite and scheelite concentrates and the price paid for them were regulated. The agreement was to run for the duration of the war and for six months afterwards.²¹

The Wilks Creek mine was inspected in April 1942 by mining engineer Mr John Cockburn Coldham on behalf of the Federal Controller of Minerals Production, James Malcolm Newman. Only one adit was accessible because of the thick overgrowth but, despite the considerable stoping already done, Coldham reported that the prospects for the mine were good. The No.1 adit had already been driven 300 ft to 400 ft, and was in good condition. Some machinery was still on the site, including a two-head battery, an old vertical boiler and a portable engine. Some of the machinery could be reused, and access to the mine could be made good at little cost. The decision was made to re-open the mine, and the immediate expenditure of £250 was authorised.²² The first step was to engage a manager for the project.

Figure 3: *The No. 3 adit today.*



Source: The author.

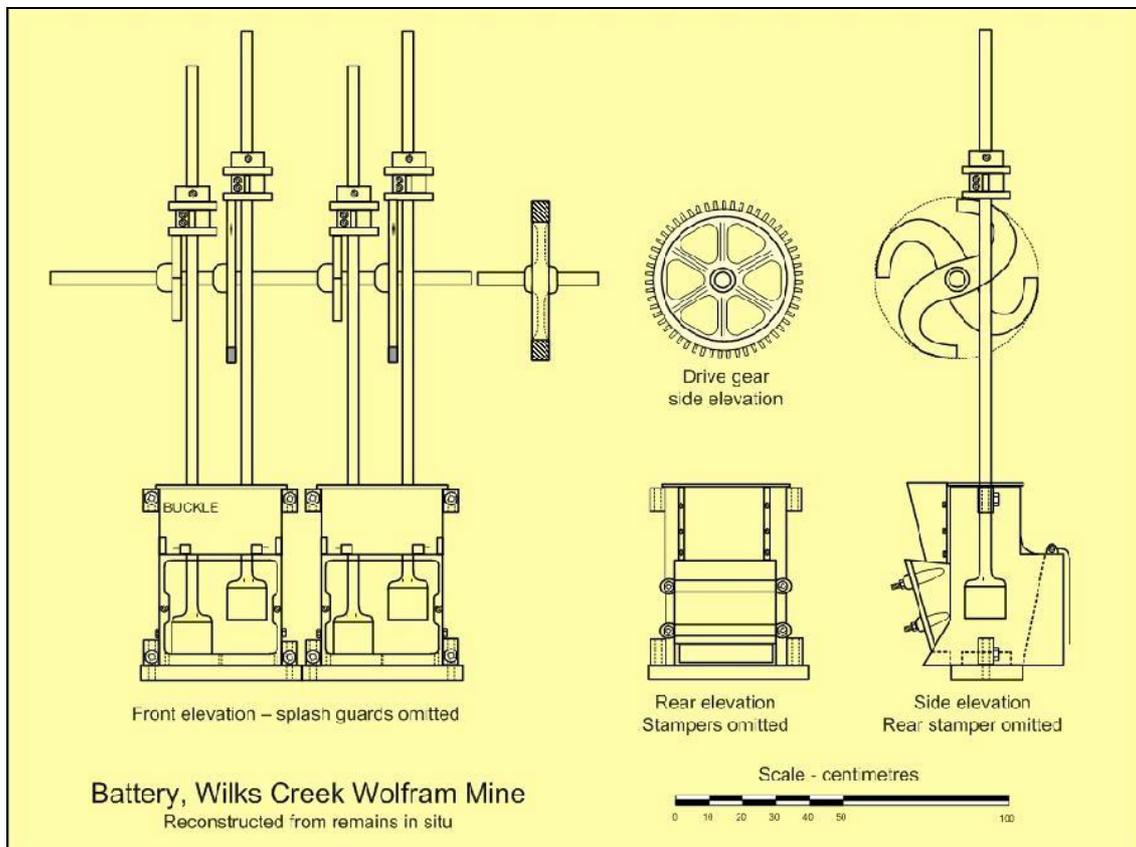
Harbinger.²³ Three of his sons took up mining, and one of his grandsons, Bill Rae, was to be a miner for all of his working life before finally retiring in 1977.²⁴ Acknowledged by his peers as a good practical miner, Bill Rae must have found the paperwork and the government bureaucracy at Wilks Creek tedious, and he was often on the receiving end of a letter chiding him for poor attention to his wages calculations, workers compensation claims and other details. Nevertheless, in the coming years he was to

The man assigned the task of managing the mine was William D.V. Rae. Bill Rae was a third generation miner. His grandfather, James Rae, had migrated from Argyleshire in Scotland to Victoria in 1852. After trying his hand at mining in Ballarat he moved to Woods Point in 1862 where he rose to be the manager of several notable mines including thirty-seven years as manager of the

work a minor miracle with cast-off equipment and a sometimes indifferent standard of labour at his disposal.

Mineral lease No. 3356 at Wilks Creek in the name of Sherman Gates was compulsorily acquired by the Crown on 30 April 1942 under section 109 of the National Security Regulations. This area also encompassed two small claims under miner's rights No. 16688 and No. 16689 recently taken out by brothers A.E. Clay and L. Clay, and included the machinery owned by C.J. Row & Sons. Discussions as to compensation were to be entered into at a later date. By 7 May 1942 it was decided that no compensation was to be paid to any of the lessees as they had carried out little or no work at the mine. Clay brothers claimed that they had been encouraged to abandon their gold-mining claim near Toombon by officers of the Victorian Department of Mines and to take up the old wolfram lease on Wilks Creek. Some machinery had already been shifted from Toombon and, as the price of tungsten was likely to stay high for the duration of the war, Clay brothers stood to potentially make a handsome profit. As a result, they claimed the sum of £61 10s 0d in compensation for work already carried out and £8,000 for loss of profits.²⁵ For its part, the Department of Supply and Development took the position that Clay Brothers had got wind of the Department's intention to re-open the mine and had pegged ahead of it. It recommended that the claim for compensation be 'treated with the utmost rigour'. The claim was rejected and only an *ex-gratia* payment of £20 was offered.²⁶

Figure 4: Battery at Wilks Creek Wolfram Mine, Reconstructed from remains in situ.



Source: The author.

Preparation for production

Temporary accommodation at the mine was intended to be in tents obtained from the Victorian Department of Mines. However, due to the altitude of the mine at the snow line and the onset of winter, arrangements were made for Bill Rae and the first three employees, miners John F. Foster, K.O. McCabe and Gordon Charles Bennett to stay at Mrs White's boarding house at Anderson's sawmill. Initial rates of pay for the miners were £4 18s 0d per week or 19s 7d per shift. Until permanent accommodation could be erected at the mine, Rae proposed erecting some log huts roofed with Asphaloid as refuges to cook meals and dry the men's' clothing.²⁷

Machinery and tools began arriving in June 1942 and a fourth employee, Arthur James Prosser, was added to the workforce. Access to the mine to get machinery in and ore out was the next item to receive consideration. One possibility was to extend one of sawmillers Row & Anderson's logging tramways to the mine. The cost for 120 chains of new tramway laid with 4 inch by 3 inch wooden rails was estimated to be £630 12s 0d.²⁸ This plan was soon abandoned in favour of a sledge track cut from the end of the existing tramway to the mine. Once the ground dried out, it was hoped the track could be negotiated by a light motor truck. Deliveries to the end of the tramway system were made on Saturdays to minimise disruption to the mill's log supply, but it was intended to also modify the tramway so that it could be traversed by light motor trucks. The horses used on the tramway were supplied from the mill at no charge.

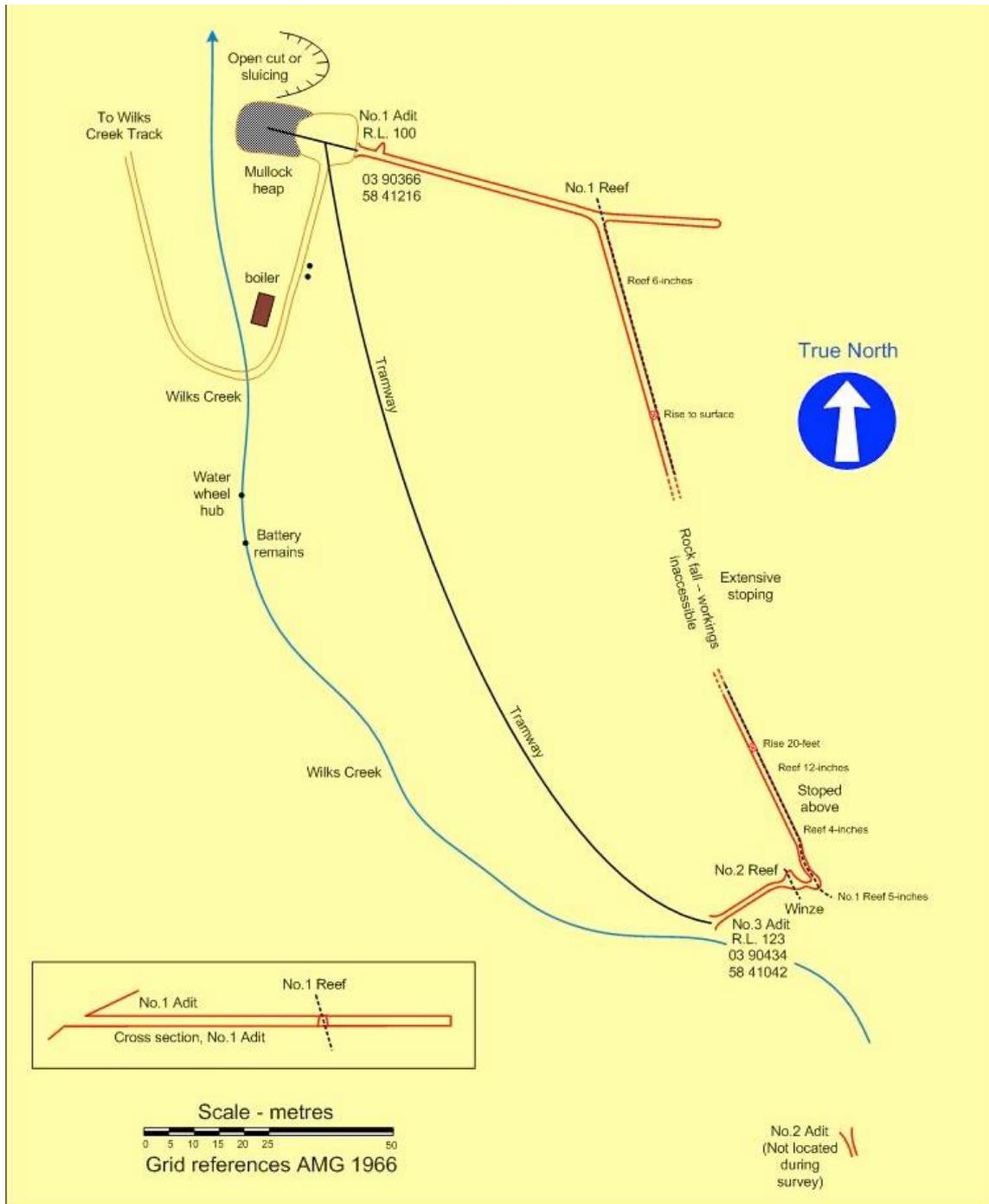
An inventory of the existing equipment at the mine showed the following items were available:

- One marine-type [sic] boiler 8 ft 6 in long by 4 ft 6 in diameter (useless).
- One horizontal feed pump (out of order).
- One vertical steam engine, Tangye, 8 in bore and 8 in stroke.
- One three-head Gringwood & Carter [sic] battery with 6 in channel-iron frame and wooden guides. (Each 550 - 600 lb head housed in a separate box).
- One Jacques stone-breaker with 12 in jaws (worn)
- Two jigs, one mechanically useable, but both with rotten woodwork.
- One No.5 Wilfley concentrator with rotten woodwork (but capable of being reconditioned).
- A single mining truck of 8 cwt capacity but missing its wheels and bearings.
- One sheet of iron 5 ft 6 in by 3 ft and ¼ in thick.
- A fair quantity of 1 in, 1¼ in, and 2 in piping, some of it buried in a race.
- A fair quantity of bolts, shafting, shaft collars, Plummer blocks and various pulleys.²⁹

Rails were re-laid in the mouth of the main adit and, when new mining trucks arrived from machinery merchants Miller & Company, work started on clearing some fallen ground 300 ft from the mouth of the adit. Sleepers for the underground tramways and slabs to re-timber the mine were being split nearby. Wolframite was in sight in both adits and even at the entrance of a nearby wombat burrow. Two shafts had been uncovered, one 20 ft deep and the other 70 ft deep. (The latter had been driven as an ore chute).³⁰

The sum of £3,000 which had been originally allocated to purchase new machinery and to develop the mine was now almost expended but, by this time, the track to the mine site was almost complete. Two 12 ft by 12 ft log cabins had been completed, each with a fireplace, and capable of housing three men. Four more cabins of the same size and one 18 ft by 12 ft were still to be built. Each building cost approximately £25. A stable had also been built to house the sledge horse and a blacksmiths shop erected.³¹

Figure 5: Plan of workings No.1 Reef, Wilks Creek Wolfram Mine.



Source: *Mining and Geological Journal*, vol. 7, no. 1, 1971, with additions of surface features by the author.

Mining commences

By September 1942, hewn wooden rails had been laid for a distance of 400 ft in the main or No.1 adit [refer Fig. 5]. Stopable stone was available 90 ft above and 180 ft below the level of the drive. The reef had been traced on the surface for a distance of some 1,400 ft. The reef in the face of the drive was from 8 ins to 10 ins wide, and carried payable ore. One of the old stopes from 208 ft to 250 ft had collapsed and run to the surface. Further driving in the No.1 adit was through hard ground and would require compressed air. A Holman compressor driven by a Dorman diesel engine (and the necessary piping) were ordered to facilitate this work. The No.2 adit was found to have been abandoned by Sherman Gates at a fault plane, but an additional 50 ft of drive had uncovered ore of patchy quality. The ground here was soft and could be driven by hand. A new adit, No.4, was to be started from the creek towards the main drive as soon as the additional housing permitted the employment of more men.³²

Driving on Nos. 1, 2 and 3 adits was to be carried out in two shifts. A crosscut was to be driven from the No.1 adit to the No.2 reef, and a winze sunk to open up the ground below the main adit. Two tons of 14 lb/yd rails were obtained from Bendigo to assist with laying tram tracks at the mine. Engineer John Coldham commended the cheerful attitude of the men whose efforts at re-opening the mine under the difficult winter conditions was described as 'most praiseworthy'.³³

Following the developmental work, it was conservatively estimated that a total of 2,000 tons of ore of 1 per cent value was obtainable from the mine, producing 20 tons of tungsten. At the ruling price of £550 per ton this would realise £11,000. Mining costs for this quantity of ore were estimated to be £4,200 at £2 2s 0d per ton. When capital and development costs were taken into account the cost to the government would be £13,800.³⁴ The deficiency of £2,800 could be made-up by the sale of the plant when the mine eventually closed. On these figures the mine was a break-even proposition, and a further expenditure of £4,000 was authorised to take the total amount available to £7,000.³⁵ With a fresh supply of capital assured, Foreman Ron Campbell arrived at the mine in October 1942 to complete the installation and refurbishment of the processing plant.³⁶ The equipment available included a jackhammer and some belting and shafting which had been removed from the Sir John Franklin mine at Woods Point.³⁷ It was anticipated that the eventual workforce at the Wilks Creek mine would expand from the ten men at present working there to a total of 22 when full production was expected to be reached in February 1943.

Production begins

Work at the mine had been slowed by lack of manpower and difficulty in procuring machinery but, by the end of April 1943, the plant was finally completed. Initial tests confirmed that the first batch of ore obtained was 2 per cent WO_3 and would probably average $1\frac{1}{2}$ per cent, very satisfactory from the point of view of prior estimates. The mine was developing well, with an expectation that the ore continued for some 400 ft below the No.1 and No.3 adits. A shaft of 50 ft had already been sunk. The estimate of the ore obtainable had risen from 2,000 tons to 2,500 tons. The Assisting Minister for

Mines, Senator J.M. Fraser, was now asked to approve a further £8,000 to finance the production of three tons of ore concentrate per month. The request for the additional money received formal consent on 18 May 1943.³⁸

Crushing started around the beginning of July 1943. Problems were encountered with the 20 mesh screen on the larger jig constantly breaking. Bill Rae proposed reconditioning the small single-compartment jig and installing it near the spitz-box. The smaller jig could be driven off the Wilfley table counter-shaft and used to re-treat second-grade ore through a 20 mesh screen. The jig could be reconditioned using timber from old gelignite cases. Ventilation in the mine had improved markedly once the rise and the cut had been connected, and it was expected that ore production would now increase.³⁹

The treatment plant at the Wilks Creek mine was operated under the supervision of Battery Foreman Mr J. Hall, and the first dispatch of ore concentrates was made on July 31, 1943, a little over a year after work had resumed at the mine. Each ton of ore produced, on average, 20.16 lb of 'Firsts' and 14.66 lb of 'Seconds'. An average of 0.7 tons of ore could be processed per hour: more if things went well, but less if problems such as bent rolls, worn pistons in the jig or blocked screens at the battery were encountered.

Samples from each stage of the concentrating process were assayed at the Melbourne University ore dressing laboratory. The main impurities in the ore were found to be arsenic, tin, bismuth and a little copper. These assays also revealed that the tailings from the process contained less than 0.05 per cent WO₃, confirming the relative efficiency of the collection of second-hand processing equipment at the mine.⁴⁰ The concentrates were packed into bags weighing approximately one cwt each. Each bag was enclosed in a second bag to prevent loss of the valuable concentrates. The bags were taken by road to Healesville railway station. Here, they were loaded into rail trucks and despatched to the Minerals Production Division of the Department of Supply in Sydney. The agent for the shipments was O.T. Lempriere & Company Pty Ltd of 409 Collins Street, Melbourne, who charged a handling fee of £2 per ton. The sacks were railed to the Sydney firm's office and for identification were branded

O.T.L.
W. J.
S

for jig concentrates and

O.T.L.
W.T.
S

for table concentrates.⁴¹

'Firsts' were shipped once an economically viable quantity had been accumulated. 'Seconds' were held in reserve at the mine so as to maintain continuity of supply if there were production problems. The mine earned its first money from the sale of concentrates in October 1943. The production figures available for 'Firsts' for 1943-1944 covering the total production of the mine are summarised in the table below.

A total of 59 cwt of ‘Seconds’ was produced. This assayed at 35.12 per cent WO₃, but contained a large percentage of iron pyrite that could not be separated using the treatment plant at the mine. The ‘Seconds’ were saved in case the iron pyrites could be separated by flotation, and simply stacked at the end of the No.1 concentrator.⁴²

Table 1: Production of Wolfram ‘Firsts’, Wilks Creek Mine, 1943-1944.

Date despatched (dd-mm-yy)	Rail Cost (£-s-d)	Assay WO ₃ (%)	Weight (cwt-qtr-lb)	Cost in Sydney (£-s-d)
6-10-1943	£5 10s 4d	74.4%	8-03-26	£182 14s 6d
6-10-1943	£4 05s 1d	66.6%	10-03-13	£197 19s 3d
29-10-1943	£3 05s 1d	73.5%	8-03-22	£179 15s 7d
29-10-1943	£4 13s 8d	60.5%	12-03-12	£210 02s 7d
12-11-1943	£4 12s 7d	69.1%	14-03-10	£280 18s 8d
12-11-1943	£3 11s 9d	68.6%	9-03-12	£184 18s 1d
13-01-1944	£6 00s 4d	67.6%	12-03-01	£236 02s 9d
9-03-1944	£5 11s 0d	70.5%	15-03-27	£154 10s 7d
Totals 1943-44	£37-09s-10d	68.9% Av	98-00-11	£1627-02s-0d

Source: A 1146/1; N15/52. Wilks Creek Production and Assay file, Australian Archives, ACT.

Life at the mine

The original staff at the mine had consisted of Mine Manager Bill Rae and miners John F. Foster, K.O. McCabe, Gordon Charles Bennett and Arthur James Prosser. By the end of August 1942, Malcolm McFarlane, Leslie Gordon Christie, T. Hobbs, J. Veivers, R.C. Bayne, Eric James Hannibal and Norman Victor Munro were added to the mine's small workforce. One of the original miners, John Foster, left to join the AIF at the end of October 1942 but, by December, H. Catterson, Albert Edward Masson, David John Dewhurst, James Lindsay, Gordon Dillon, Kenneth Warburton Green, William Henry Davis and John Thomas Mulvihill had joined the roster. Carpenter Arthur Felton was added to the workforce in January 1943, and miner James Campbell Mayberry arrived in March 1943. Mr E. Roberts, an engine driver, also worked at the mine for a short time before seeking release on medical grounds. Arthur Prosser was also reluctantly let go on medical grounds when he was advised to seek a warmer climate than that at Wilks Creek.⁴³ Donald Marshall Luttet held the position of Staff Foreman at the mine for six weeks before absconding without permission in May 1943.⁴⁴ F. McCann was a member of the workforce at around this time, and J. MacNamara and L. Esposito were transferred to Wilks Creek from Costerfield in June 1943.⁴⁵ The number of miners seems to have fluctuated somewhat, and it has not been possible to capture every change of personnel.

The men were expected to supply their own blankets. When they joined the workforce, the miners had been promised a 14 shillings per week camping allowance which took some time to materialise. One wonders if the excuse offered by the Minerals Production Manpower Officer that ‘The amount owing will be paid when the interlocking system through which these matters reach finality has its respective parts

working in harmony⁴⁶ was any consolation for the non-payment of the camping allowance!

Everything was in short supply at the isolated site: tyres for the mine's producer-gas burning utility and the worker's cars used to replace it if it broke down; coke for the blacksmiths forge and oats for the sledge horse; and the tobacco ration supplied through local storekeepers Barton Brothers. A total of three boxes of cigarettes and twelve pounds of tobacco were allowed to cover the needs of the men working at the mine.⁴⁷ As a special luxury, Barton Brothers were able to obtain six dozen 6 lb tins of peaches for those living at the mine in May 1943.⁴⁸ Injuries to the miners were treated by Doctor S. Henry Phillips of Healesville. Minor injuries were common, with Foster, McFarlane, Bayne, Lindsay and Christie all claiming amounts in compensation.⁴⁹ Most of the men preferred to work enough overtime Monday to Friday to complete their required 44 hours so they could go home on the weekend to see their families, always, of course, provided sufficient petrol ration coupons were available. Those whose families lived in Bendigo or Chewton were also prone to be late back and miss Monday as well. As this practice was deemed to be inefficient it was stopped on the orders of the Controller of Mineral Production and the men told they must work Saturdays. Most of the men at the mine were members of the Australian Workers Union and McFarlane acted as the union representative.⁵⁰

There was little recreation available to the miners except gambling in their huts at night. A Red Cross sports meeting was held at Marysville December 1942 in which Bill Rae entered for two woodchop events.⁵¹ Only one of the miner's wives seems to have been prepared to live at the mine and Catherine Louise Davis, aged 40 years and wife of miner William Davis, was engaged as a cook for the mine workforce in January 1943. The AWU rate of pay for a male cook was £6 6s 0d for a 44 hour week, but Mrs Davis was offered only £6 for a 52 hour week over seven days with no overtime to be paid. The calculation of her wage was based on the fact that the rate for a female cook in the hotel industry was approximately £2 per week less than that paid to a male cook.⁵²

Closure

A meeting to review the operation of the mine was held in Canberra on 7 October 1943. It had become apparent that the mine was not going to pay its way. The reasons given were several. At the 50 ft level the reef had run into a narrow zone where mining was difficult. The cost of stoping was heavily dependent on the ore breaking cleanly from the mullock. On this reef the footwall mullock broke roughly due to drag folding and the cost of stoping increased accordingly. There had been a continual shortage of labour at the mine and, due to this shortage, it was impossible to develop the south end of the main reef across the creek or the No.2 reef. The fact that mining had to be concentrated on faces opening off the No.1 adit left the mine with only one working face and no way to increase the output to a payable level. Despite the fact that the grade of the ore was fair and the metallurgical treatment efficient, ore volumes could only be increased by abandoning development work, and this method of working could not be sustained for long. As a result, the workforce at the mine had been reduced to nine to stope some of

the easily obtained ore and, when that was obtained, the mine would be closed and the machinery dispersed to more worthwhile and urgent projects.⁵³ By 10 December 1943, Bill Rae was ordered to begin stripping the mine. Charles Cameron was appointed to the position of caretaker but was relieved shortly afterwards by G. Bennett(s). The Holman air-compressor and Dorman engine were despatched to Coimadai for further use.⁵⁴

The mine had been a financial failure. It had cost the Minerals Production Division £17,933 and realised only a little over £1,627 in ore sales, a massive loss mitigated only slightly by the sale of some of the equipment at the mine.⁵⁵ What the small amount of tungsten produced did for the war effort it is not possible to say. As for the second-quality concentrates left stacked at the mine, once the roof was removed from the treatment plant it was probably washed into the creek and lost. Sherman Gates, who had done so much early work on the mine and had provided details of the mine layout and recovery process used, applied to the Department of Supply and Shipping for compensation for his efforts. His is the last letter in the official file on the mine and there is no sign that any such compensation was ever offered.⁵⁶

Post-war reassessment

The mine was further re-evaluated in the 1960s. It was believed that some 2,800 tons of ore remained to be stoped which, at a recovery of 0.7 per cent WO₃, would be economically viable as long as the price for tungsten concentrates remained above \$36 per unit of 22.4 lbs. In March 1966, the price had been \$42 per unit. However, the mine would have to be de-watered and extensive rock falls along the drive cleared before the reserves of ore could be proved, and nothing more was done at that time.⁵⁷

Around 1969 former mine manager Bill Rae introduced John Kennedy to the mine site. John Kennedy had a background in stockbroking and mining, and became interested in the prospect. With a small amount of capital and a few friends, Kennedy re-opened the mine. The plant was fairly basic – an Ingersoll-Rand air compressor, a few rock drills, some mine trucks from the antimony mine at Hoddles Creek, a battery brought from the Golden Bower mine near Cumberland Junction, and a home-made shaker table similar to a Wilfley table. The plant was powered by a second-hand 9 hp Ronaldson & Tippett petrol/kerosene engine. A water race following the tramway from near the No.2 adit was cleaned out and this provided sufficient water for the battery. (An attempt was also made to provide light at the mine using a small Pelton wheel which was to be driven by the waste water issuing from the No.1 adit, but this was not a success). A few hundredweight of ore were put through the battery and coarse wolframite was obtained. This was enough to prove that the system worked, an option over the mine was then sold to Colortone Holdings, and Kennedy's syndicate retired to the Narbethong pub to await the riches which would undoubtedly flow when the option was exercised. Colortone's shares briefly rose on the announcement of the option, and then the Company faded away. A further option over the mine was later sold to Hawk Resources with a similarly disappointing result.⁵⁸

A new report in 1980 noted that the mine remained an attractive proposition because of the closeness of infrastructure such as the town of Marysville, roads schools,

power and abundant water. It also noted that any form of open-cut operation would likely meet with local resistance on account of the scenic beauty of the area, and that anything other than an underground mine would probably not be accepted. The method recommended was to drive an inclined shaft with a grade of 1 in 10 to reach the mineralisation zone 200 m below the surface. A suitable location for a treatment plant was available at Row & Anderson's former No.1 mill site.⁵⁹ A bore was driven through the mineralised zone in 1982⁶⁰ but, since that time, only sporadic interest has been shown in re-developing the mine. Even if no further mining takes place at the site, that is not to say that it does not retain any economic value. Tourism is the economic mainstay of the town of Marysville, and the mine has the potential to provide visitors with a rewarding and educational experience in the setting of a lush regrowth mountain forest should sufficient funds be made available to improve access.

The mine site today

Only two items of machinery remain at the site today. The first of these is a Cowley internally-fired 'dry-back' boiler (Fig. 6). The return tubes, 11 on each side of the furnace tube, have an outside diameter of 75mm. The boiler has an overall length of 2,550mm of which the pressure vessel itself takes up 1,750mm. The boiler is constructed of two overlapping strakes. The strake on the furnace end is surmounted by a large steam dome while the manhole is situated on the top of the second strake. The boiler is 1,400mm in diameter. A large dent in the side of the boiler suggests it was moved to its present position by a bulldozer, and a grouser plate from the tracks suggests that both items of machinery may have suffered in the move. Large numbers of beer bottles surround the boiler site.

Figure 6: *Cowley internally fired 'dry back' boiler, Wilks Creek.*



Source: Photo by the author.

The second item is located almost in the creek some 34m upstream of the creek crossing, and is partially crushed by a large fallen tree. It is a small battery of four heads in two boxes (see Fig. 4). Enough remains of the battery to enable its dimensions to be reconstructed. The maker is unknown, although the word BUCKLE can be faintly made out in white paint on front of one of the boxes. The main section of each battery box is a single casting, with the ore chute a separate casting bolted to the back. The screens are missing from the front of the boxes. Close by is what appears to be the hub casting from a small waterwheel, which may have been associated with the battery.⁶¹

A third item, a small Pelton wheel (probably that used in the 1970s in an attempt to provide electrical power), was removed from the foot of the mullock heap in September 1988 by a Belgrave machinery collector. The centre of the wheel was one solid casting with six spokes incorporating reverse curves. The cast-iron buckets bolted directly to the rim of the wheel and were twenty in number. The whole was enclosed in a tightly-fitting casing constructed of sheet iron and angle iron. No maker's name could be discerned.⁶²

In 1989 the Wilks Creek Wolfram Mine was assessed as being of regional significance due to its range of intact features in combination with the relative rarity of mines producing ores of tungsten.⁶³

APPENDIX 1: wolframite concentrate production in Victoria.

Year	Mt Murphy (tons)	Bendoc (tons)	Koetong (tons)	Wilks Ck (tons)	Womobi (tons)	Misc. (tons)	Total (tons)
1908	3.00			?			3.00
1909	14.00						14.00
1910	18.50	0.50		0.5		0.10	19.60
1911	17.25	0.80					18.05
1912	5.05	1.20					6.25
1913	0.60					0.15	0.75
1914							
1915	5.00	0.20	0.25				5.45
1916		0.60					0.60
1917	20.25		2.35			0.08	22.68
1918	1.10	0.15	0.35	2.50		0.20	4.30
1919				1.25	0.45	0.45	2.15
1920	3.30					4.00	7.30
1921-40							
1941		0.25					0.25
1942					1.90	0.22	2.12
1943				3.2	9.60	1.30	14.10
1944	1.00				2.00		3.00
1945-48							
Totals	89.05	3.70	2.05	7.45	13.95	6.50	123.60

Source: N.H. Fisher and C.W. Ball, *Mineral Resources of Australia; Summary Report No. 16: Tungsten*, Department of Supply and Development, Commonwealth of Australia, 1949.

Endnotes

- ¹ N.H. Fisher and C.W. Ball, *Mineral Resources of Australia; Summary Report No. 16: Tungsten*, Department of Supply and Development, Commonwealth of Australia, 1949, p. 1.
- ² World Tungsten Report, November 2013,
http://www.argusmedia.com/~media/Files/PDFs/Samples/WorldTungsten_201311.pdf?la=en, accessed 13 July 2015.
- ³ R. Brough Smyth, *The Goldfields and Mineral Districts of Victoria*, 1869, facsimile edition Queensberry Hill Press, Carlton, reprinted 1979, p. 434.
- ⁴ *Ibid.*, p. 435.
- ⁵ *Gippsland Miners' Standard*, 28 March 1899.
- ⁶ Department of Mines, *Prospector's Guide (Fourth edition)*. Department of Mines, Victoria, 1958, p. 79.
- ⁷ Wilks Creek was named for Clement Wilks, a road engineer at Marysville in the late 1860s. Mistakenly spelt as 'Wilkes' on modern maps. Historically, the site has always been known as the 'Wolfram Mine'.
- ⁸ *Alexandra and Yea Standard Gobur, Thornton and Acheron Express*, Friday 2 May 1907, p. 2.
- ⁹ Conversion Units used in this paper: 1 inch (in) = 25.40 millimetres (mm); 12 ins = 1 foot = 0.305 metres (m); 1 acre = 0.405 hectares; 1 pound (lb) = 0.454 kilograms; 28lbs = 1 hundredweight (cwt); 20cwt = 1 imperial ton = 1.01 tonnes; 12 pence (d) = 1 shilling (s); 20 shillings = 1 pound (£).
- ¹⁰ E.J. Dunn, *Wolfram Deposits near Marysville*, in *Records of the Geological Survey of Victoria*, vol. III, part 3. Geological Survey of Victoria, 1908.
- ¹¹ *Ibid.*
- ¹² *Victorian Government Gazette*, Gazette 101, Wednesday, 3 August 1910, p. 3,753.
- ¹³ 'Metals', E. Scott, *Official History of Australia During the War of 1914-18*, vol. XI: *Australia During the War*, Angus and Robertson Ltd, Sydney, 1936, Ch. XV, pp. 553-570; See also R.S. Kerr, *The German Demand for Wolfram, Tin and Copper from North Queensland*. A paper presented to the International Mining History Conference, University of Melbourne, August 1985.
- ¹⁴ Alexandra mining warden claim registrations - 6 volumes, Unit 3, serials 434, 435, 436 and 438, PRO, VPRS 8524/P1.
- ¹⁵ *Healesville Guardian*, 12 July 1919.
- ¹⁶ One unit = $\frac{1}{100}$ ton or 22.4 lbs.
- ¹⁷ Wilks Creek Wolfram Mine file, part 2, A 1146/1; N15/13, Parts 1 & 2, Australian Archives, ACT [hereafter NAA].
- ¹⁸ A. Thomas, *The Last of the Yarra Track Stopping Places*, published by the author, 1980, p. 46.
- ¹⁹ *Industrial Australian and Mining Standard*, 11 September 1924.
- ²⁰ Geoffrey Blainey, *The Rush that Never Ended: A History of Australian Mining*, MUP, 1963, p. 335.
- ²¹ Fisher and Ball, *Mineral Resources of Australia...*, p. 10.
- ²² Telegram, J.C. Coldham to J.M. Newman (controller of Mineral Production), 20 April 1942, Wilks Creek Production and Assay file, Series A1146, Control symbol N15/52, barcode 198872, NAA.
- ²³ *Gippsland Miners' Standard*, 12 June 1900.
- ²⁴ O. Tomlin, M. Bosa and P. Chamberlain, *Gold for the Finding: A Pictorial History of Gippsland's Jordan Goldfield*, Hill of Content, Melbourne, 1979, p. 84.
- ²⁵ Minute paper, J.M. Newman, 7 May 1942; letter J.C. Coldham to Legal Officer, Department of Munitions, 8 May 1942; letter A. Wainwright LL.B (solicitor for Clay Bros.) to J.M. Newman, 8 May 1942; letter A. Wainwright to J.C. Coldham, 10 August 1942, Wilks Creek Production and Assay file. N, Series A1146, Control symbol N15/52, barcode 198872, NAA.
- ²⁶ *Ibid.*, minute paper and draft letter, J.C. Coldham to A. Wainwright, 4 September 1942.
- ²⁷ *Ibid.*, letter W. Rae to J.C. Coldham, 7 May 1942.
- ²⁸ *Ibid.*, 20 May 1942.
- ²⁹ *Ibid.*, 3 July 1942.
- ³⁰ *Ibid.*, 5 June 1942.
- ³¹ *Ibid.*, Financial Statement Wilks Creek Wolfram mine, 31 August 1942; J.C. Coldham summary of work completed, 9 September 1942.
- ³² *Ibid.*, J.C. Coldham summary of work completed, 9 September 1942.
- ³³ *Ibid.*
- ³⁴ *Ibid.*
- ³⁵ *Ibid.*, letter J.C. Coldham to J.M. Newman, 22 October 1942.
- ³⁶ *Ibid.*, telegram 'SupDev' to W. Rae, 2 October 1942.
- ³⁷ *Ibid.*, memo J.C. Coldham to W. Rae, 4 January 1943; letter W. Rae to J.C. Coldham, 13 January 1943.
- ³⁸ *Ibid.*, Minute paper, J.M. Newman to Minister of Mines, 4 November 1942; authorisation, minerals production trust account, 18 May 1943.

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- ³⁹ *Ibid.*, letter W. Rae to J.C. Coldham, 8 July 1943.
- ⁴⁰ *Ibid.*, assay report dated 4 May 1943; letter W. Rae to J.C. Coldham, 8 July 1943.
- ⁴¹ *Ibid.*, memo, Controller of Minerals Production to W. Rae, 31 July 1943.
- ⁴² *Ibid.*, letter W. Rae to P.J. Scanlon, Department of Supply and Shipping, 29 June 1944.
- ⁴³ *Ibid.*, pay rate sheet Wilks Creek mine dated 9 December 1942; staff list dated 7 January 1943; letter W. Rae to J.C. Coldham 14 January 1943; letters F.C.L. Smith (Minerals Production Manpower) to H.J. Henkel (National Service Officer) dated 1 March 1943 and 26 April 1943.
- ⁴⁴ *Ibid.*, Letter H.J. Henkel (National Service Officer) to D.M. Luttet, 15 May 1942.
- ⁴⁵ *Ibid.*, letter R.J. Campbell (Costerfield mine) to P.J. Scanlon, 1 June 1943.
- ⁴⁶ *Ibid.*, Memo from F.C.L. Smith (Minerals Production Manpower) to H.J. Henkel (National Service Officer), 20 May 1943.
- ⁴⁷ *Ibid.*, letters from W. Rae to J.C. Coldham 10 June and 20 September 1943; letter from H.S. Warren, (Tobacco Distribution Committee) to Barton Bros (Storekeepers, Marysville), 19 November 1942.
- ⁴⁸ *Ibid.*, letter from P.J. Scanlon to Controller of Emergency Foodstuffs, 1 June 1943.
- ⁴⁹ *Ibid.*, invoice from Dr S. Henry Phillips (Healesville) to Minerals Production Department, 9 November 1942.
- ⁵⁰ *Ibid.*, letter W. Rae to J.C. Coldham, 30 November 1942.
- ⁵¹ *Ibid.*, 30 November 1942 and 11 May 1943.
- ⁵² *Ibid.*, letter W. Rae to P.J. Scanlon, 12 January 1943; letter J.C. Coldham to W. Rae, 26 January 1943.
- ⁵³ *Ibid.*, memo J. C. Coldham to the Controller of Mineral Production, 23 November 1943.
- ⁵⁴ *Ibid.*, letter J.C. Coldham to W. Rae, 10 December 1943; telegram SupDev to W. Rae, 5 January 1944; letter W. Rae to J.C. Coldham, 10 January 1944; telegram J.C. Coldham to W. Rae (undated).
- ⁵⁵ *Ibid.*, Minerals Production Division: Marysville Wolfram mine statement of expenditure and receipts to 31 August 1944.
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- ⁵⁷ K.G. Bowen, 'Wilks Creek Wolfram Mine, Marysville', in *Geological and Mining Journal*, vol. 7, no. 1, Mines Department, Victoria, 1971.
- ⁵⁸ Personal communication, John Kennedy, 8 February 2010, regarding his introduction to the mine and his involvement with work at the mine while he held the lease.
- ⁵⁹ A.G. Rossiter, *A Preliminary Geological and Geochemical Investigation of the Wilks Creek Tungsten Prospect, Central Victoria*, Unpublished report on Search Licence 1359, June 1970, Mines Department, Victoria, 1970.
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- ⁶³ R. Supple, G. Perham and T. Griffiths. *Historic Sites in the Melbourne East Study Area*, Land Conservation Council of Victoria, 1989, vol. 2 of 2, part A, site M48. Field report by Peter Evans.