

# The History and Archaeology of the North British Mine Site, Maldon, Victoria

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*In this paper, Christopher Davey who is a Senior Lecturer at the Royal Melbourne Institute of Technology, explains the historical and technological significance of the North British Mine Site and describes the archaeological work undertaken there. The features remaining at the site which represent a range of technologies are discussed, and their history is considered. The site is particularly important for the well preserved series of quartz roasting kilns.*

The excavation of the North British Mine Site at Maldon, Victoria, was conducted over a total of three weeks in 1984 and 1985 by volunteers and by workers employed with Commonwealth Employment Programme funds. Peter McCarthy of Ballarat College of Advanced Education (now of James Askew and Associates) and the author supervised the work. Additional support was given by the Surveying Department of Ballarat College of Advanced Education, which assisted in completing a site survey, and by the Surveying Department of the Royal Melbourne Institute of Technology, which undertook a photogrammetric survey of the kilns.

Work on the site was instigated by the Ballarat Land Management Section of the Lands Department (now Ballarat Region, Department of Conservation, Forests and Lands), who provided good assistance in all the work at the site. The Victoria Archaeological Survey also helped by providing some excavation equipment.

The North British Mine is one of many abandoned mine sites in Victoria but it is distinguished by a considerable list of attributes not matched by any other site in the State. The foundations are fairly complete and there are still timber engine bearers on some of them. The types of foundation also vary, representing a full range of Victorian quartz-mining activities and technologies. The history of the mine spans a seventy-year period, so that the site is representative of the rise and fall of the gold-mining industry in Victoria.

The mine was not owned by a public company, as was normally the case, but by one of Victoria's three eminent mining magnates of the nineteenth century, Robert Dent Oswald. He began mining at Parkins Reef in 1858, soon after it was discovered, and eventually acquired the mine which he named the North British. He exercised personal supervision of the mine for nearly thirty years, until he died partly, it was said, as a result of an accident he had in the battery of the North British Mine. So there is also a personal dimension to the site.

The relics themselves are aesthetically pleasing, being of slate and brick. The site is easily accessible to tourists and is on the outskirts of Maldon, a town of historic significance on the tourist circuit (Fig. 1). Immediately opposite the mine site is Carmen's Tunnel, a mine now open to tourists and where there are mining displays. The North British Mine Site, therefore, is not only an excellent opportunity for historical and archaeological research but also a prime location for the interpretation of such a site for the public.

The methodology adopted at the site has been described elsewhere.<sup>1</sup> The excavators are both mining engineers with Victorian gold-mining experience and the author also possesses archaeological training and experience. As a result, most

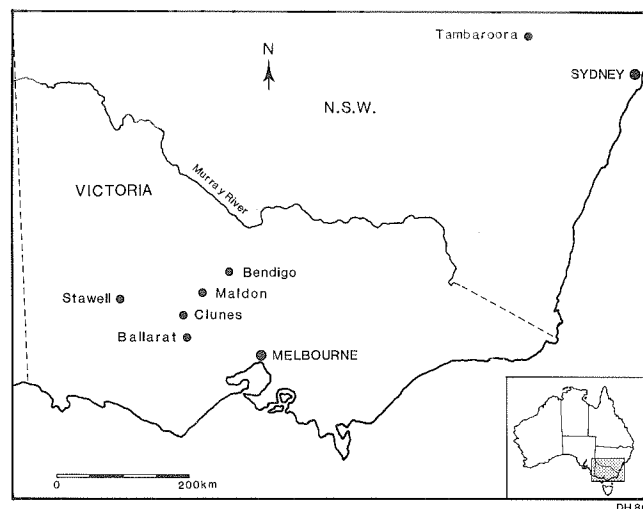


Fig. 1: Location of places mentioned in the text.

features at the site were identified before the start of work. The excavation, therefore, was not so much directed at the investigation of the mining technologies once at the site, as it was focused on the attainment of a coherent set of structures to interpret and an understanding of the changes that occurred at the site during its seventy years of operation.

Historical research was undertaken by consulting Mines Department records, newspapers, company records and the 1929 Sale at Auction Catalogue. These provide a good history of the mine, although there are some significant gaps and some ambiguities which still require elucidation.

## LOCATION AND HISTORY

The mine site is located 2 kilometres south-east of the central Victorian town of Maldon, on the Parkins Reef Road. Parkins Reef, on which the mine was situated, runs south from Mount Tarrangower and was discovered in 1855,<sup>2</sup> two years after the alluvial ground in Maldon was first worked.<sup>3</sup> Maldon did not have outstanding alluvial gold but for a period in the 1860s it rivalled Bendigo for the number of quartz-mining companies.

Parkins Reef had many claims on it and in 1860 they were amalgamated to form two companies. One of these, the Parkins Reef Quartz Mining Association,<sup>4</sup> failed because of insufficient capital after only four years,<sup>5</sup> and was purchased

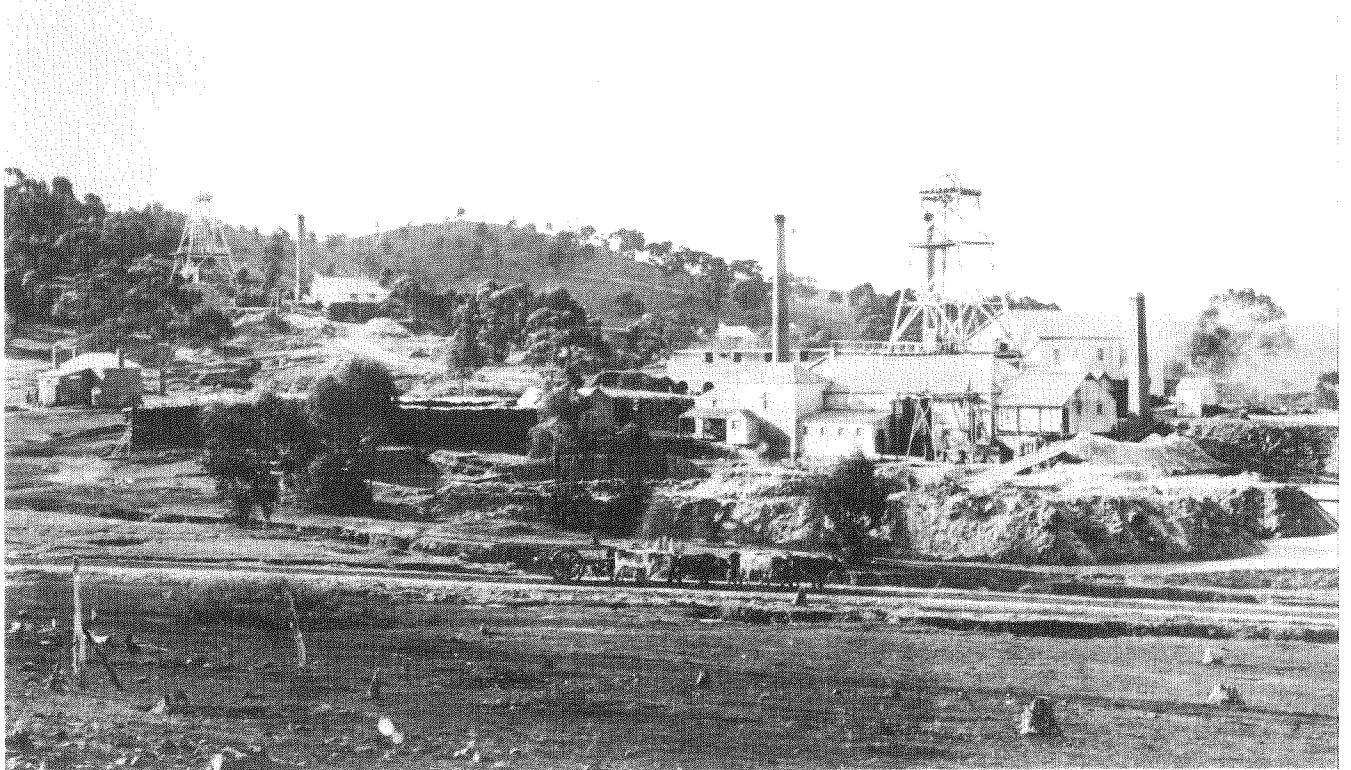


Fig. 2: The North British Mine viewed from the south-west before the fire of 1890. The kilns can be seen in operation behind the centre chimney. The mine in the background is the Independent Mine, also owned by Oswald. (Photograph: Victorian Department of Industry, Technology and Resources.)

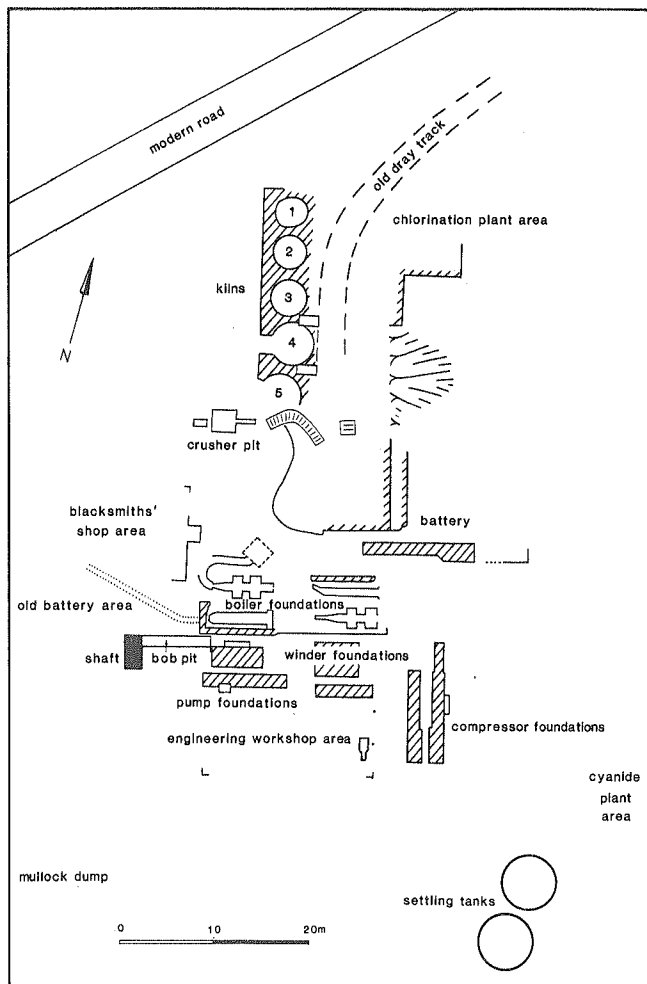


Fig. 3: Sketch plan of the North British Mine Site.

by three men who are now buried next to each other in the Maldon cemetery: James Ward, John Robinson and Robert Dent Oswald.<sup>6</sup> They renamed the mine the North British, presumably because of their Scottish heritage and to distinguish it from the neighbouring Independent Mine, which had strong Cornish connections, and began operating it as a public crushing works for nearby claims,<sup>7</sup> while undertaking exploratory work, often by means of tribute agreements.<sup>8</sup>

Some gold was found near the surface of the mine but Oswald was convinced that the major riches were to be found at depth. At his own expense and that of some tributors, development was taken progressively deeper. However, it was not until about 1875 that he started to be rewarded,<sup>9</sup> and by 1887 the North British Mine was being described as one of the richest mines in the world<sup>10</sup> (Fig. 2). That may have been true at the time, as it was producing about 100 tons of ore per week at an average grade of more than 2 ounces of gold per ton and did so for nearly 5 years. The incomplete records of production indicate that the mine yielded a total of about a quarter of a million ounces (8.3 tonnes) of gold and in Maldon only the South German Mine exceeded that.

The mine's history was not without incident. In 1890 the mine had a fire which destroyed the boiler and winder houses and engineering shop, necessitating the replacement of some of the equipment in them.<sup>11</sup>

Oswald was renowned for his careful treatment of the difficult Maldon refractory ores. He always used the best equipment and processes available and had the most efficient machinery. A new battery was constructed in about 1885 and a chlorination plant in 1890. When Oswald died in November 1891, he was one of the richest men in Victoria and was greatly mourned in Maldon where he had long been an employer of a large body of men.<sup>12</sup>

The mine remained in the estate of R. D. Oswald until May 1913, when it became a public company.<sup>13</sup> Without the

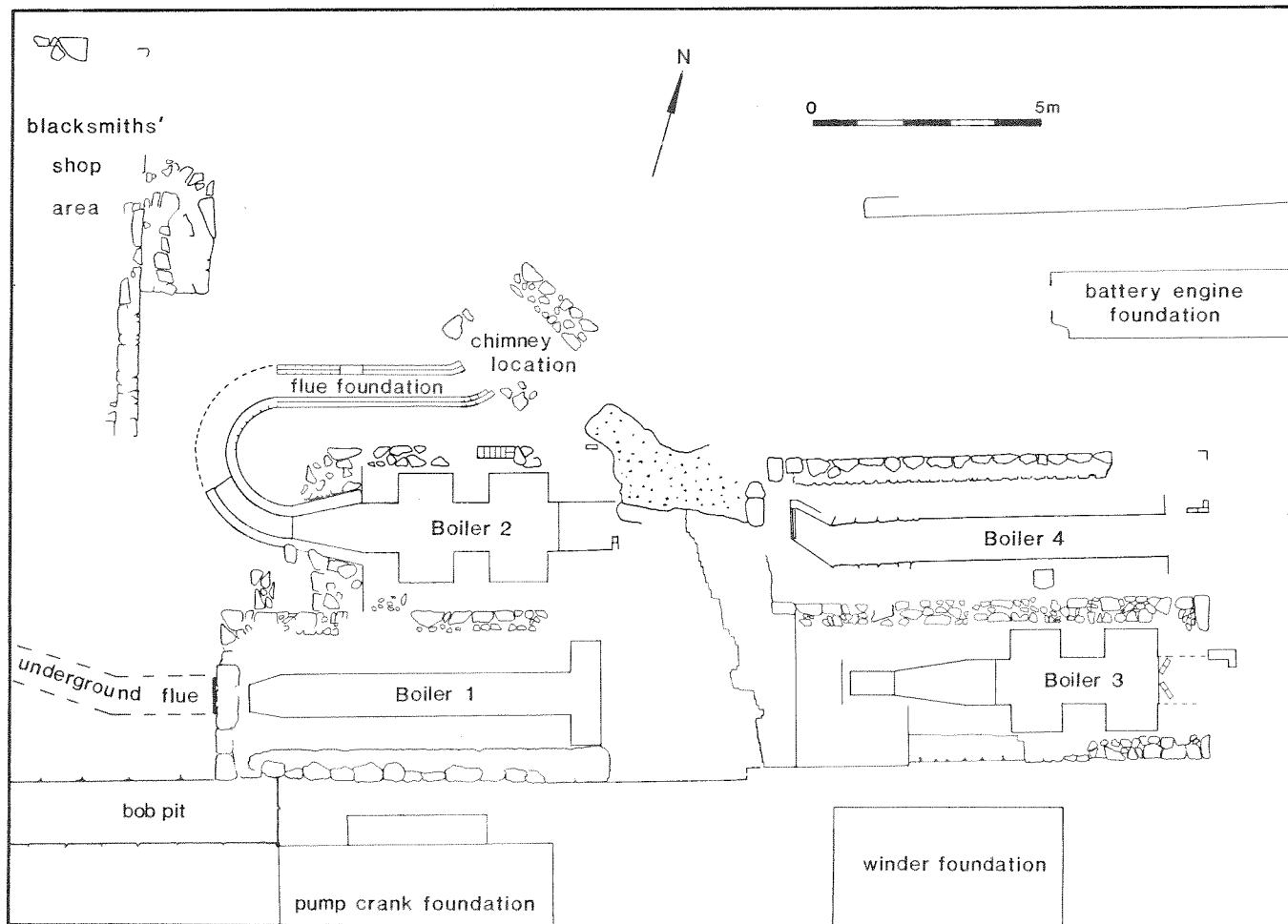


Fig. 4: Plan of the boiler-house area.

personal commitment of the owners, mine development slowed and even the re-formation of the company in 1924 did not halt its decline. It ceased operation in 1928 and was sold up in 1929. Most of the plant went for scrap, although some of the engines and the compressor are said to have been bought by mines in Bendigo. The site itself was bulldozed by the Department of Mines after World War 2, in an attempt to make it safe. The debris spread about the site by this activity forms the bulk of the material, over the foundations, which had to be removed during the excavation recently undertaken.

## THE SITE

The configuration of structures remaining at the site is typical of nineteenth-century gold mines and is shown in Fig. 3. Extending from the shaft on its east side is a pit in which a balance mechanism, the pump bob, was once located. At the end of this are the foundations for the steam engine and the associated flywheel and crank which drove the pumping gear.

Behind the pump-engine foundations, immediately to the east, are the foundations for the winder and the winding engine. Mining law in Victoria required the winder driver to have a direct view of the shaft brace, that is the surface landing platform, and so the winder foundations are higher than those for the pump. One building, the largest at the site, contained the pumping and winding engines. To the north of this was the battery shed, where the foundations of the battery engine remain, as well as the timber foundations of the battery boxes themselves.

Between the two buildings was the boiler house (Fig. 4), strategically placed so that steam had only to be piped a minimum distance to all the major engines. After the introduction of rock drills at the mine in about 1880, a compressor was required and this from 1890, at least, was located

immediately to the east of the winder house. It was also conveniently near the boiler house and being next to the winder could be controlled by the winder driver.

In the period from 1876 to the 1890s, ore was taken from the top brace, which is a landing platform in the headframe, along a tramway to the kilns. From the kilns it was transferred by a hand-truck to the first battery, located to the west of the shaft. The engine to drive this battery was fed by steam raised in boilers installed immediately to the north of that battery. In these locations, the smoke and fumes from the chimneys and the kilns would be carried away from the mine by the prevailing south-westerly wind. On days of north wind, care would have been required not to set fire to the headframe. Later, instead of placing the ore into the kilns, it was tipped from the same tramway into an ore bin which fed a jaw crusher. From there the ore was conveyed to the later battery.

The chlorination plant which was installed in 1890,<sup>14</sup> was located on the north side of the second battery, where it could conveniently receive the concentrates from the battery. The cyanide plant was constructed in about 1901 and was placed to the south-east of the battery, again in a convenient location.

On the north side of the shaft was the blacksmiths' workshop. It was equipped with a large steam hammer and was close to the shaft, so that items such as drill steels could be sharpened or repaired with a minimum of transport from the shaft. On the south side of the winder house was an engineering shop. This contained many machines which were not usually found on mine sites and gave the North British Mine the distinction of being a manufacturing centre for mining equipment, as well as a mine.



Fig. 5: View from the south-west of the kilns during excavation. The entrance to Kiln 2 (see Fig. 3) is uncleared.

Dams were located on the eastern and western sides of the site and the waste rock was taken by tramway from the shaft and dumped to its south. The change house, where the work-force changed clothes, is said by Mr 'Motor' Leach, who worked at the mine between 1916 and 1926, to have been on the south side of the shaft, but there is now no immediate evidence of it. Also without trace is the assay laboratory, which was between the boiler shed and the blacksmiths' shop.

## EXCAVATION AND CLEARANCE

### The kilns

There are the remains of five kilns at the site (Figs 5 & 6) and they have deteriorated rapidly over recent years because of the ease with which access could be gained to their tops by means of the debris piled in front of them. To ascertain the state of the front of the kilns and to remove this access, it was decided to clear the debris from the front of them. In addition, debris inside three of the kilns was bailed out. There was no stratification in the debris and the only artefacts found amongst it were a few discarded boiler bars and some diamond drill core.

The debris in front of the kilns was removed under close supervision in early November 1984, with the aid of a backhoe operated by Alan Lang, a local contractor. One large stump, that of a peppercorn tree, was removed from in front of the southern kiln. Only one ground surface was obvious and this was the one coinciding with the bottom of the kilns. It was formed from compacted quartz chips which no doubt derived from the knapping of burnt quartz, that is its breaking by means of hand tools, as it was taken from the kilns. The foundations of the south wall and the posts of a shed built against the kilns after they ceased to be used, were found and left in place, but the ground level of this shed was not evident. Much of the debris contained slate from the kilns, distinguish-

able by its pink colour. This was sorted out of the debris for possible future use in the stabilization of the kilns.

The southern kiln was largely destroyed in 1913, when the jaw crusher was installed, together with its ore bin and conveyor which transferred the crushed stone to the battery.<sup>15</sup> When clearing the kiln area, jaw crusher blades and toggles, the linkages that operated the crusher blades, were found.

On top of the kilns are the remains of a dray track. The embankment of the track had eroded and this was reconstituted as a matter of conservation and safety. The dray track was used while the site served as a public crushing works in the 1860s and 1870s and before the first headframe with a top brace was built over the shaft in 1877.<sup>16</sup> No evidence of the tramway, which ran from the mine shaft and along the top of the kilns in the 1880s and 1890s, remains.

The three southern kilns for burning quartz were built in about 1864 and the northern two were added later. This sequence of construction may be deduced by comparing the kilns' stonework, in which a vertical break occurs between the southern three kilns and the northern two, and early records.

There are no references to the building of kilns by the Parkins Reef Quartz Mining Association, and the first record is in 1865, one year after Oswald and Company acquired the mine, when three kilns are mentioned.<sup>17</sup> The kilns have the same design as those of the Caledonian Crushing Mills, located in Long Gully, Maldon, and owned and operated by Oswald from about 1859. So the new owners may well have been responsible for the building of the North British Mine kilns.<sup>18</sup>

The burning of quartz was common in Victoria from 1852, but continued longer at Maldon because it was believed to help with the processing of refractory ore.<sup>19</sup> In Maldon the remains of kilns are located at the sites of the Union Mine, Cookman's Mine and the Caledonian Crushing Mills. Kilns were also used in Bendigo, Clunes and Stawell in Victoria and Tambaroora in New South Wales, but the North British kilns are the most complete of those that remain in Victoria.

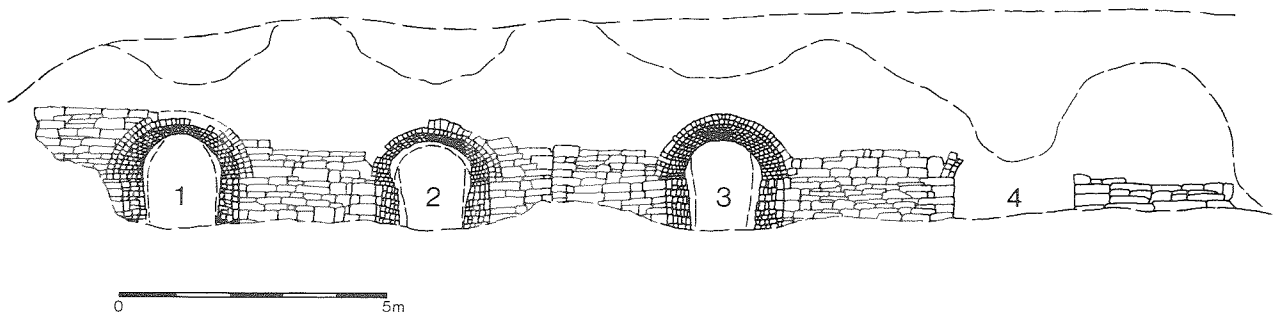
### Boiler foundations

The foundations of the boilers (Figs 4 & 7) were completely covered with debris and were not at all apparent, although an underground flue from the pump foundation area to the site of the western chimney was clear. This debris would probably have been bulldozed over the boiler-house area during one of the Department of Mines' post-World-War-2 visits.

The foundations of Boiler 1 (Fig. 8) were excavated in November 1984, and those of the other three boilers in January 1985. The walls of the boiler house were traced, as were the flues, and the location of the eastern chimney was found. The boiler foundations were of brick and were covered in soot, as were the flue foundations. Asbestos, which was used to insulate the boilers, was also found in some locations.

There are two designs of boiler foundation. The south-west (Boiler 1) and north-east (Boiler 4) foundations are plain in

Fig. 6: Front elevation of the kilns completed by the Department of Surveying, Royal Melbourne Institute of Technology.



section along their entire length and were for Cornish flue boilers, 26 feet (7.9m) long by 6 feet 6 inches (2m) diameter.<sup>20</sup> The other two foundations are shorter and are indented in two places on each side to form the flues. In some cases these were lined with asbestos. These foundations were for high-pressure return-tube boilers, 16 feet (4.9m) long by 7 feet 6 inches (2.3m) diameter.<sup>21</sup>

The bricks forming the south-west boiler foundation were of a local variety, indicating that the foundation was built before the arrival of the railway in 1876. Local bricks were of an inferior quality and were not produced when the better Melbourne bricks became available. The south-west boiler was a Cornish boiler, the only type common before that date and was flued to the western chimney, rather than the eastern one which was next to the boiler house. The plan of the brickwork and stonework (Fig. 4) reveals that the south-west boiler, Boiler 1, was a discrete unit which was built before the others to provide steam for the pump engine and maybe the first winder.

#### **Pump engine and winder foundations**

The pump engine and winder foundations required the removal of vegetation from them which was hastening their disintegration and the removal of debris from around their bases. No archaeological excavation was undertaken next to these structures, although in the future it may be helpful to excavate against the pump foundations to ascertain if there were earlier phases than are evident in the above-ground brickwork and stonework.

The location of the first pump engine at the mine is not known but it appears that in the 1860s, one engine powered both the battery and the mine pumps.<sup>22</sup> With further sinking of the shaft, an independent pump engine would have become necessary and in 1877 it was reported that the first steam winder was constructed at the mine with a new headframe, 50 feet (15m) high.<sup>23</sup> Previously a whim would have been used.

The winding engine was renewed in 1887 with a 32-horsepower unit and a 75 feet (22.9m) high headframe, as the shaft was deepened beyond 600 feet (183m).<sup>24</sup> Both the winder and the pumping equipment were replaced after the fire of 1890.<sup>25</sup> During this time the stonework of the pump engine foundations (Fig. 9), reveals that the pump engine was made more efficient by the addition of a vertical condenser, and in 1891 the replacement engine had a low pressure cylinder, thus making it a compound engine. This machine was made by the Harkness Foundry in Bendigo and served the mine until it closed.<sup>26</sup>

#### **Compressor foundations**

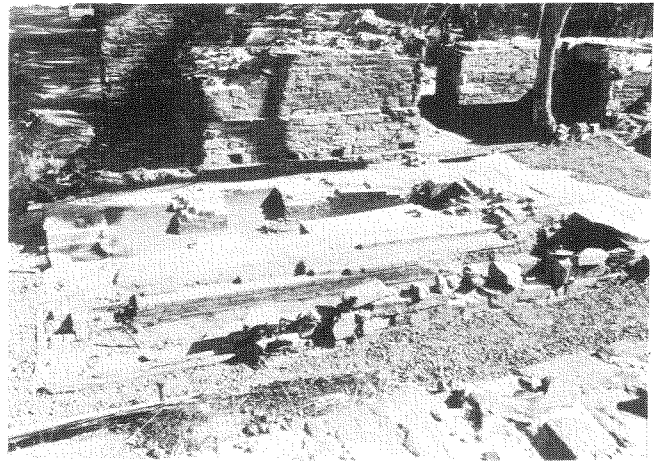
In early December 1984 these were cleared of debris. The backhoe was used to excavate the dirt which had fallen in around the foundations and the drain pipes were cleared. The last compressor located at the mine was a cross-compound two-stage unit, but there had been a number of other compressors used since the introduction of rock drills to the mine in 1880.<sup>27</sup>

#### **Engineering shop**

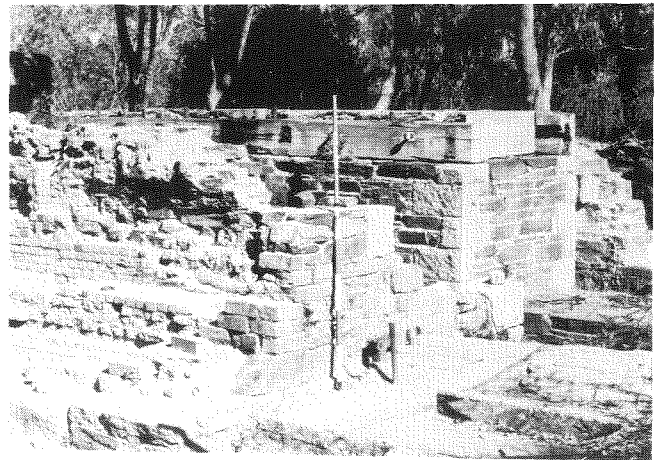
For one week in November 1984 and another in January 1985, the eastern end of the workshop area, where a floor of crushed quartz remained, was carefully excavated. The foundations of the small engine which powered the machinery were cleared, as were the foundations of the heavy planing machine.<sup>28</sup> The excavation yielded large amounts of iron filings, which one would expect under such a machine.

#### **Blacksmiths' shop**

The east wall of the blacksmiths' shop was cleared. There was a hearth in the centre of the wall, which can be seen from photographs to have had a low square chimney over it. The same photographs reveal that the blacksmiths' shop was a stone building of the construction now evident in the east wall foundations. A sounding within the building area produced



*Fig. 7: Boiler Foundations 3 & 4 from the north after excavation. The winder and pump engine foundations are at the rear.*



*Fig. 8: Western end of Boiler Foundation 1 with the pump crank foundations behind. Note the use of granite cornerstones, with slate and brick. Scale in 20cm divisions.*

soot, black sand and many nondescript iron off-cuts, confirming beyond doubt the one-time purpose of the building.

#### **Other areas**

The area west of the shaft has the foundations of the earliest period of the mine and was not touched during the recent work. The old boiler area has many tonnes of debris over it, the western chimney site has a peppercorn tree growing on it, the battery area has been burnt out and has deep holes in it, and the southern part of the battery shed area has a mullock dump over it. As the foundations date from 1860, work in this area would be very interesting but the cost of such work would be many times that which is now necessary to stabilize the exposed structures and until that is done, no further work should be contemplated.

The area of the cyanide plant comes from the last period of the mine. While detailed archaeological work in this area would not be dangerous as cyanide rapidly decomposes, it would be fruitless because of the temporary nature of much of the plant and would not improve our already complete knowledge of cyanidation. Instead it may be preferable to clear the area of unwanted vegetation, to spread something like fine crushed rock to lay the dust and to place interpretive signs about the area.

The chlorination plant has been almost completely removed. Only the foundations of the furnace appear to remain and

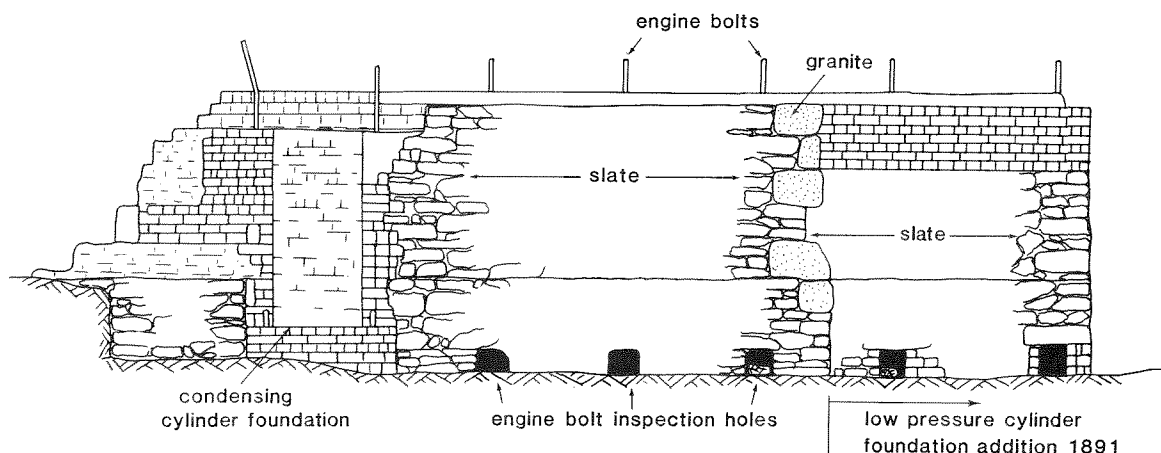


Fig. 9: Sketch elevation of the south side of the pump engine foundations. The modification for the vertical condenser is on the left and the addition for the low pressure cylinder of the 1891 Harkness compound engine is on the right. (After a drawing by P. McCarthy.)

these need only a small amount of clearing to make them presentable. With a few careful soundings it could be established if the foundations of the filter room remain. Plans of the roasting furnace for the chlorination plant still exist.

#### Artefacts

Care was taken to collect all artefacts and record those which were still recognisable and nearly 500 objects were registered. Some of these have been drawn and photographed. The disturbance of the site made object location of little relevance and so objects are retained primarily to illustrate activities performed in the mine. Most items found had been discarded before the closure of the mine, as anything of use was sold or removed from the site when the mine closed. Even the right to excavate the battery area, in the foundations of which gold would have accumulated, was sold.

#### Plans and photographs

A 1:100 plan of the site has been completed, as has also a computerised plot produced with the help of a total station theodolite, operated by staff from Ballarat College of Advanced Education. Some 1:50 infill of this plan has been completed. As mentioned above, the Department of Surveying at Royal Melbourne Institute of Technology has undertaken a terrestrial photogrammetric survey of the kilns (Fig. 6).

### CONSERVATION AND INTERPRETATION OF THE SITE

The responsibility for the maintenance and presentation of the site rests with the Victorian Department of Conservation, Forests and Lands. It is their task to estimate expenditure to conserve the site and present it for public inspection.

The interpretation of the site may involve pamphlets, booklets, videos, and interpretive notices at the site. A static display within Maldon is also a possibility but until the funds are made available for proper conservation of the site it would be counter-productive to draw public attention to it.

On the completion of work, the excavators intended to backfill the site with sand, a comparatively cheap exercise given the vast amount of battery sand adjacent to the site. However, assurances were given that the structures uncovered would be made secure to withstand public inspection. It is hoped that this may yet happen, so that Victorians of the future can visit the site and gain some understanding of the significance of the relics that still litter many of Victoria's goldfields. As mining is still conducted in the vicinity of Maldon, these same visitors may also witness the excitement of that activity. In this way they should gain some impression of the enthusiasm and enterprise, which drove the people of the last century to bring the now lifeless North British Mine into existence.

#### NOTES

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2. Victoria, *Mining surveyors reports*, August 1859: 21.
3. Flett, J. 1979. *A history of gold discovery in Victoria*, Poppet Head Press, Melbourne: 7, 193.
4. *Tarrangower Times* 6/1/1860, 28/9/1860, 12/10/1860.
5. *Tarrangower Times* 30/10/1863.
6. *Tarrangower Times* 22/3/1864.
7. See for example, *Tarrangower Times* 3/3/1869.
8. A tribute agreement is a form of contract between miners and mine owners. *Tarrangower Times* 17/3/1868.
9. *Tarrangower Times* 25/10/1875, 28/4/1877, 27/2/1878, 13/3/1878, 28/2/1885.
10. *Tarrangower Times* 24/5/1887.
11. *Tarrangower Times* 1/10/1890, 24/12/1890, 14 & 21/1/1891.
12. *Tarrangower Times* 11/11/1891.
13. Oswald Gold Mines NL, *Annual report*, 1913.
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15. Oswald Gold Mines NL, *Annual report*, 1913.
16. *Tarrangower Times* 28/4/1877.
17. *Tarrangower Times* 7/2/1864, 7/3/1865.
18. For a drawing of the Caledonian Kilns, see Victoria, *Annual report of the Secretary for Mines and Water Supply*, 1886: 20.
19. For theories, see Victoria, 1874, *Pyrites*, Parliamentary Papers, 1874/96 and Davey, C.J. 1985. Origins of mining technology in Victoria, *International Mining History Conference*, Melbourne: 4 (unpublished conference paper).
20. New Oswald Mines, *Sale at Auction*, 1929: 39, 40.
21. *ibid.*
22. Only one engine is listed in *Tarrangower Times* 7/2/1864, 7/3/1865.
23. *Tarrangower Times* 28/4/1877.
24. Victoria, *The Mining Registrars quarterly reports*, Tarrangower, 1887.
25. *Tarrangower Times* 21/1/1891.
26. *ibid.* and *Sale at Auction*, 1929: 37.
27. *Tarrangower Times* 19/6/1880.
28. *Sale at Auction*, 1929: 41.