

## HERITAGE ASSESSMENT REPORT

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**NAME:** Former Callington Smelting Works

**PLACE:** 26515

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**ADDRESS:** Peramangk Country  
22 Callington Road, Callington

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This heritage assessment considers that the place meets criteria (b) and (c). Refer to Summary of State Heritage Place for final approved wording, including criteria statements.



**Former Callington Smelting Works, showing Smelter A and working floor, March 2022**

Source: DEW Files, 1 March 2022

## ASSESSMENT OF HERITAGE SIGNIFICANCE

### Statement of Heritage Significance

The former Callington Smelting Works is a rare surviving example of a nineteenth century smelting works. The copper industry was significant to the industrial, economic and social development of South Australia in the nineteenth century and smelting played a crucial role in the industry's economic viability. Nineteenth century copper smelting employed the dominant Welsh Process, a multi-stage smelting operation that called for specialised masonry reverberatory furnaces at each stage.

The former Callington Smelting Works is the only surviving smelting works known to demonstrate more than one stage of the Welsh Process through its extant physical fabric. The former Callington Smelting Works is also one of three known sites in South Australia with intact Welsh reverberatory furnaces, namely two calciners and two

smelting furnaces. The reverberatory smelting furnaces at Callington are the only known to remain in South Australia.

## **Relevant South Australian Historical Themes**

Callington Smelting Works demonstrates the following themes and subthemes in *Historic Themes for South Australia* (Draft 29 May 2020):

### **5. Developing South Australia's economies**

#### **5.2 Mining (copper mining)**

## **Comparability / Rarity / Representation:**

### **Nineteenth century smelting works**

Smelting is the process of extracting metal from ore through the application of heat. Metals smelted in South Australia during the nineteenth century include copper, lead and silver. In South Australia, copper was the most smelted metal with at least 24 copper smelting works built prior to 1900,<sup>1</sup> typically employing the dominant 'Welsh Process'. Smelting took place primarily near large mines at Kapunda and Burra and later adjacent to export facilities at Port Adelaide.

The typical elements of a nineteenth century smelting works are:

- reverberatory furnaces, flues, chimneys and paved working floors, employed in the smelting of ore into metal;
- slag heaps, resulting from the waste products of smelting; and
- ancillary structures such as stores, assaying offices, blacksmith's shops and lime and brick kilns.

Other structures that may be present are:

- crusher- and enginehouses, stamps and dressing sheds, all associated with processing the ore between mining and smelting, typically present when the smelting works is adjacent to the mine; and
- condensing chambers or labyrinths that were occasionally used to trap arsenic and sulphur from the fumes of smelting exhaust.

Reverberatory furnaces and their associated flues and chimneys are the essential structures of a nineteenth century smelting works, with specialised reverberatory furnace variations adapted for different stages of the smelting process. These variations include calcining, smelting (or melting), roasting and refining furnaces. The most sophisticated smelting operations employed several varieties of reverberatory furnace side by side. Calcining and smelting furnaces were once common at South Australian copper smelting works, while refining furnaces, which processed metal to near-purity, were more unusual.

There are at least 15 known places associated with nineteenth century smelting works on the South Australian Heritage Register (the Register), including:

- Burra Smelts Historic Site, 1848, Smelts Road, Burra (SHP 10989, listed 1984), former copper smelter, remaining features include low brick and masonry walls, paving and residual slag heaps,<sup>2</sup>
- Talisker Silver Lead Mine, 1862, Talisker Road, Cape Jervis (SHP 12552, listed 1984), features include ruins of reverberatory calcining furnace, slate working floor, flue, chimney base and limited remains of smelting furnace,<sup>3</sup>
- Aclare Mine Historic Site, 1859, Samuels Road, St Ives (SHP 12371, listed 1983), silver-former lead mine and smelter, reverberatory furnace constructed 1895,<sup>4</sup> features include lower section of Molesworth reverberatory calcining furnace and rectangular chimney,<sup>5</sup>
- Prince Alfred Copper Mine Precinct (designated place of archaeological significance), 1869-1875 and 1889-1909, Prince Alfred Road, Cradock, criteria (a), (b) and (c) (SHP 26450, listed 2016), features include piles of fire bricks at the smelter site and associated slag heaps,<sup>6</sup>
- Bolla Bollana Brick Kiln and Copper Smelter Ruins, 1873, Balcanoona Station, Leigh Creek (SHP 10317, listed 1981), copper smelter, features include ruins of two reverberatory furnaces, a dust chamber, flue with collapsed roof, chimney base and slate floors,<sup>7</sup>
- Wallaroo Smelter Site, 1861-1926, Wallaroo, (SHP 10137, listed 1986), copper smelter, features include retaining wall, Hughes' Stack (chimney), remains of reverberatory furnaces comprised of numerous, below-ground, brick-lined cavities spread over an area of about two hectares;<sup>8</sup> the full extent and layout of underground structures is unknown and represents 'an enormous task' to investigate archaeologically,<sup>9</sup>
- Arsenic Labyrinth (former Wheal Ellen Mine), 1860 and 1862, Highland Valley Road, Strathalbyn (SHP 12773, listed 1985), silver-lead mine and smelter, features include calciner (current condition unknown), flue, arsenic labyrinth and slag heap,
- Mining Site - Sliding Rock Mine and Cadnia Township, 1870, Cadnia (SHP 13889, listed 1989), features include square stone chimney, remains of collapsed flue, furnace ruins.<sup>10</sup>

All known surviving nineteenth century reverberatory furnaces in South Australia are in ruins. Prior to the excavation of the former Callington Smelting Works, the calcining furnace at Talisker Silver Lead Mine (SHP 12552) was the most intact Welsh-style reverberatory furnace in South Australia,<sup>11</sup> with hearth, cooling or quenching vaults, firebox, tie rods and an iron hopper intact. The calcining furnace at Aclare Mine Historic Site (SHP 12371) is also highly intact. The Aclare Mine Molesworth calciner is understood to be a unique South Australian design developed at the South Australian School of Mines.<sup>12</sup>

While the Wallaroo Smelter Site (SHP 10137) is likely to contain remains of numerous reverberatory furnaces, the extent and integrity of these remains is yet to be determined.<sup>13</sup> The current condition of the Wheal Ellen site is unknown.



The Callington Smelting Works is arguably the most intact and readily interpretable smelting works complex in South Australia. Smelters A, B and Calciner 1 at the former Callington Smelting Works display a similar degree of intactness to the calciner at Talisker. The former Callington Smelting Works is also the only place in South Australia where more than one stage of the Welsh Process is effectively demonstrated by physical fabric within a single site. The former Callington Smelting Works features extensive paved working floors across the site, slag heaps and an outbuilding. Other unknown structures are most likely to remain underground.



**Talisker Silver Lead Mine  
(SHP 12552), ruins of Welsh calciner, 2020**

Source: denisbin <https://www.flickr.com/>



**Wallaroo Smelter Site (SHP 10137), site  
overview, 2005**

Source: DEW files



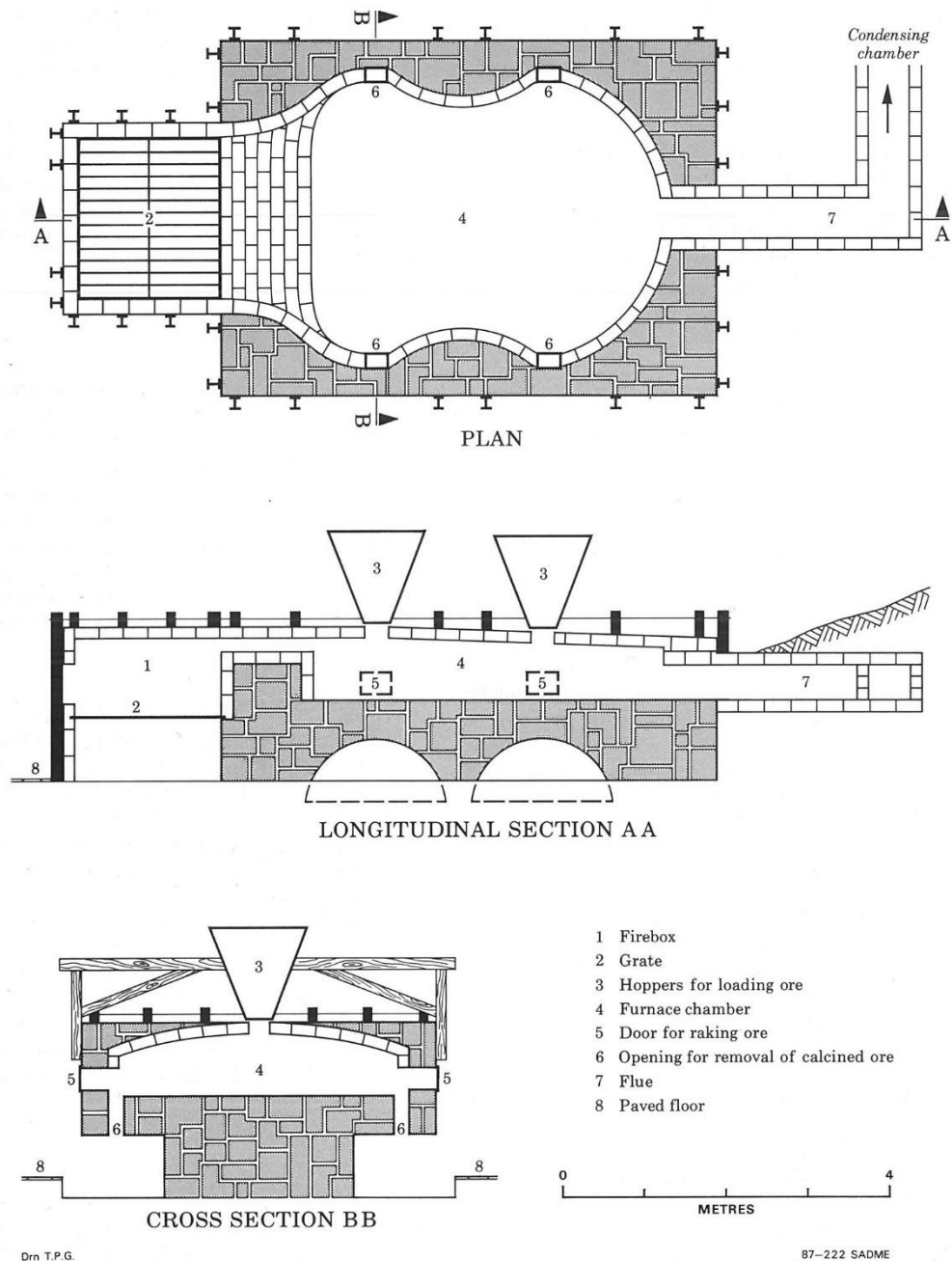
**Aclare Mine Historic Site (SHP 12552), ruins  
of Molesworth calciner, c.1980**

Source: DEW files



**Bolla Bollana Brick Kiln and Copper Smelter  
Ruins (SHP 10317), ruins of Welsh furnaces,  
2009**

Source: DEW files



### Diagram of calciner at Talisker Silver Lead Mine (SHP 12552)

Source: Greg Drew, "Talisker Mine, 1862-1872: its history and heritage" p. 52

**Assessment against Criteria under Section 16 of the *Heritage Places Act 1993*.  
All Criteria have been assessed using the 2020 Guidelines.**

**(a) it demonstrates important aspects of the evolution or pattern of the State's history.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should be closely associated with events, developments or cultural phases which have played a significant part in South Australian history. Ideally it should demonstrate those associations in its fabric.*

*Places will not normally be considered under this criterion if they are of a class of things that are commonplace, or frequently replicated across the State, places associated with events of interest only to a small number of people, places associated with developments of little significance, or places only reputed to have been the scene of an event which has left no trace or which lacks substantial evidence.*

Callington Smelting Works is associated with nineteenth century copper mining.

Copper mining brought about the beginning of industrialisation in South Australia, triggered waves of Welsh and Cornish migration, and reputedly saved the colony from bankruptcy in the mid-1840s. Local copper smelting works played an essential role in the economic viability of the copper mining industry by reducing the weight of ore that had previously been exported to Wales for refining.

The most significant South Australian copper mines were at Burra (1845-1877), known as the 'Monster Mine' and Moonta and Wallaroo (1859-1923), located in a region that became known as the 'Copper Triangle.' Large, centralised copper smelters were built adjacent to the Burra Burra Mine (1848) and close to export facilities at Port Adelaide (1861) and Wallaroo (1861, SHP 10137). Notably, the Burra Smelts (SHP 10989) was the largest copper smelter outside Wales until 1861.

Numerous copper mines existed in the Callington-Kanmantoo district. While these mines were important to local industrial, social and economic development, they were less significant to South Australia's overall development than the mines at Burra, Moonta and Wallaroo. Six smelters were constructed to smelt ore from mines in the Callington-Kanmantoo district, of which the Callington Smelting Works was the most successful.

The Callington Smelting Works is one of many small, local smelting works built during the nineteenth century. It was not the first, nor was it as significant to South Australia's development as the large, centralised smelters at Burra, Port Adelaide and Wallaroo.

It is recommended that the nominated place **does not fulfil** criterion (a).

**(b) it has rare, uncommon or endangered qualities that are of cultural significance.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should demonstrate a way of life, social custom, industrial process or land use which is no longer practised, is in danger of being lost, or is of exceptional interest. This encompasses both places which were always rare, and places which have become scarce through subsequent loss or destruction.*

*Places will not normally be considered under this criterion if their rarity is merely local, or if they appear rare only because research has not been done elsewhere, or if their distinguishing characteristics have been degraded or compromised, or if they are at present common and simply believed to be in danger of becoming rare in the future.*

The former Callington Smelting Works is a rare surviving example of a nineteenth century smelting works.

The copper industry played a significant role in the industrial, economic and social development of nineteenth century South Australia. At least 24 copper smelting works existed in South Australia during the nineteenth century. The dominant 'Welsh Process' of copper smelting was accomplished in several stages. Local smelters carried out early stages such as calcining, smelting and roasting, employing specialised reverberatory furnaces to accomplish each stage. Regulus and blistered copper, the products of smelting and roasting, were typically exported to Wales for final refining. Smelting played a crucial role in the nineteenth century copper industry by reducing the weight of ore exported to Wales, thus increasing the industry's profitability.

Welsh reverberatory furnaces and their associated flues and chimneys are the essential structures of a nineteenth century smelting works. The former Callington Smelting Works is one of three known sites in South Australia with intact Welsh reverberatory furnaces and the only known site where more than one stage of the Welsh Process is demonstrated through extant physical fabric. The two reverberatory smelting furnaces at the Callington Smelting Works are also the only examples known to remain in South Australia.

All remaining nineteenth century smelting works in South Australia survive in a ruined condition, including the former Callington Smelting Works. However, the Callington Smelting Works displays a comparable or better degree of intactness when compared with all other known nineteenth century smelting works that survive in South Australia.

It is recommended that the nominated place **fulfils** criterion (b).

**(c) it may yield information that will contribute to an understanding of the State's history, including its natural history.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should provide, or demonstrate a likelihood of providing, information that will contribute significantly to our knowledge of the past. The information should be inherent in the*

*fabric of the place. The place may be a standing structure, an archaeological deposit or a geological site.*

*Places will not normally be considered under this criterion simply because they are believed to contain archaeological or palaeontological deposits. There must be good reasons to suppose the site is of value for research, and that useful information will emerge. A place that will yield the same information as many other places, or information that could be obtained as readily from documentary sources, may not be eligible.*

The extraction, processing and export of copper played a significant role in South Australian history, and in turn copper smelting, by reducing the weight of ore and thereby the cost of export, played a crucial role in the economic viability of the copper industry.

Detailed archaeological investigation of the former Callington Smelting Works site during 2016-2019 revealed intact remains of a nineteenth century Welsh-style smelting works complete with the footings and lower structures of reverberatory furnaces. The known extent of underground remains has been only partially excavated to date. Historical aerial photography indicates that underground remains of unexcavated structures associated with the former Smelting Works are most likely to exist on the site.

Information on nineteenth-century smelting in South Australia is fragmentary due to an absence of both historical evidence and physical fabric. The nineteenth century Welsh smelting industry was secretive, and practical knowledge of smelting was transmitted by apprenticeship and through family relationships, meaning that thorough descriptions of smelting practice were seldom recorded.

Only three known Welsh-style reverberatory furnaces exist outside of the Callington Smelting Works in South Australia. The two smelting furnaces at the Callington Smelting Works are the only examples confirmed to survive in South Australia. Physical evidence is also rare nationally and internationally. In particular the 1960s redevelopment of the Lower Swansea Valley UK, where the Welsh smelting industry was focused in the nineteenth century, has resulted in a paucity of archaeological evidence associated with Welsh smelting in the region where the technology originated.

Open paddocks have covered the majority of the site since the closure of the Smelting Works in the 1870s, suggesting that minimal disturbance of underground evidence has occurred since then. Unexcavated structures of the former Callington Smelting Works are thus likely to be intact and retain a similarly high level of integrity to the structures already excavated.

Further detailed archaeological investigation of the former Callington Smelting Works is highly likely to contribute meaningfully towards furthering an understanding of South Australia's cultural history, in particular the history and practice of nineteenth century copper smelting.

It is recommended that the nominated place **fulfils** criterion (c).



**(d) it is an outstanding representative of a particular class of places of cultural significance.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should be capable of providing understanding of the category of places which it represents. It should be typical of a wider range of such places, and in a good state of integrity, that is, still faithfully presenting its historical message.*

*Places will not be considered simply because they are members of a class, they must be both notable examples and well-preserved. Places will be excluded if their characteristics do not clearly typify the class, or if they were very like many other places, or if their representative qualities had been degraded or lost. However, places will not be excluded from the Register merely because other similar places are included.*

The former Callington Smelting Works is an example of the class of place known as nineteenth century smelting works.

Copper was discovered in South Australia in 1845 and the copper mining industry subsequently played a significant role in the economic development of the state. During the mid-nineteenth century most of the world's copper was smelted in Wales. High export costs led to the establishment of local smelters, which made export of copper ore more economical by lowering transport costs, since the products of smelting contained a greater concentration of copper by weight than ore. Smelting was thus an integral part of the South Australian copper mining industry and essential to its economic success.

The 'Welsh Process' of copper smelting was a long and tedious activity accomplished in several stages. Local smelters carried out the early stages of the process such as calcining, smelting and roasting while regulus and blistered copper, the products of smelting and roasting, were usually exported to Wales for refining.

The former Callington Smelting Works demonstrates remains of a number of the principal characteristics of nineteenth century smelting works using the Welsh Process, including specialised reverberatory furnaces, their associated chimneys, the footings of an ancillary building and a large slag heap.

Although the remains of the calciners and reverberatory furnaces at the former Callington Smelting Works retain a high level of integrity, their ruined state reduces their level of intactness. Similarly, only the footings are likely to remain of the ancillary building and chimneys, while the slag heap has been "mined" for road building, destroying many of the cast blocks of slag. The loss of key structures and the ruined condition of others means that the former Callington Smelting Works cannot be considered to be an outstanding example of a nineteenth century smelting works.

It is recommended that the nominated place **does not fulfil** criterion (d).

**(e) it demonstrates a high degree of creative, aesthetic or technical accomplishment or is an outstanding representative of particular construction techniques or design characteristics.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should show qualities of innovation or departure, beauty or formal design, or represent a new achievement of its times. Breakthroughs in technology or new developments in design would qualify, if the place clearly shows them. A high standard of design skill and originality is expected.*

*Places would not normally be considered under this criterion if their degree of achievement could not be demonstrated, or where their integrity was diminished so that the achievement, while documented, was no longer apparent in the place, or simply because they were the work of a designer who demonstrated innovation elsewhere.*

While built by skilled stonemasons and bricklayers with an expert knowledge of the demands placed upon brick and stone masonry by copper smelting, Callington Smelting Works no longer demonstrates a high degree of technical accomplishment through its construction techniques because the structures on the site survive only as ruins. The structures built at the former Callington Smelting Works were intended to be strictly utilitarian, with no pretensions to formal architectural design, so neither do they demonstrate a high degree of aesthetic accomplishment.

The former Callington Smelting Works may demonstrate technological breakthroughs in nineteenth-century copper smelting through the surviving fabric of Calciner 2, possibly built in 1872. Calciner 2 exhibits unusual design elements, such as its central paved channel and two features interpreted as paired fireboxes.

However, there is insufficient documentary, physical and archaeological evidence to adequately explain the purpose of the unusual design elements of Calciner 2, or how they functioned in practice. There is also no documentary or physical evidence available, including internationally, to indicate that Calciner 2 represented a breakthrough in calcining technology or was critically recognised as such at the time of its construction.

As such, while elements of the site exhibit unusual features which have been interpreted as possible evidence of technological development, there is currently insufficient evidence to prove that the Callington Smelting Works demonstrates a high degree of technical accomplishment.

It is recommended that the nominated place **does not fulfil** criterion (e).

**(f) it has strong cultural or spiritual association for the community or a group within it.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place should be one which the community or a significant cultural group have held in high regard for an extended period. This must be much stronger than people's normal*

*attachment to their surroundings. The association may in some instances be in folklore rather than in reality.*

*Places will not be considered if their associations are commonplace by nature, or of recent origin, or recognised by a small number of people, or not held very strongly, or held by a group not widely recognised, or cannot be demonstrated satisfactorily to others.*

The former Callington Smelting Works has cultural associations for the Callington Recreation Park Incorporated, an organisation that funded archaeological excavation of the site and intends to preserve the former Smelting Works site in the future as a cultural tourist attraction. While the former Callington Smelting Works is important to the Callington Recreation Park Incorporated and the community in Callington more broadly, it is unlikely these specific associations would resonate beyond the local community.

The former Callington Smelting works also has cultural associations for the South Australian Mining History Association (SAMHA). However, the Callington Smelting Works is one of a number of sites in the town of Callington, one of many sites in Callington-Kanmantoo district, and one of many sites across South Australia with the same cultural associations for the SAMHA. While SAMHA is particularly interested in the former Callington Smelting Works because of its intactness and rarity, this has only been evident over the past five years, a relatively short period of time. It is also unlikely these specific associations would resonate with the broader South Australian community.

While the former Callington Smelting Works was constructed by Cornish immigrants, smelting in South Australia is primarily associated with the Welsh community who brought the technology from Wales to South Australia in the nineteenth century. As such, some members of the South Australian Welsh community may hold the former Callington Smelting Works in high regard.

However, the smelting works at Burra, Wallaroo and Port Adelaide employed considerably larger numbers of Welsh immigrants, and notably at the Burra Smelts, a Welsh-named township, named Llchwyr, was built by the English & Australian Copper Company to house Welsh smelters and their families. It is more likely that any widespread regard held by the South Australian Welsh community is for Burra than Callington.

It is recommended that the nominated place **does not fulfil** criterion (f).

**(g) it has a special association with the life or work of a person or organisation or an event of historical importance.**

Criterion arguments have considered the *Guidelines for State Heritage Places*:

*The place must have a close association with a person or group which played a significant part in past events, and that association should be demonstrated in the fabric of the place.*  
*The product of a creative person, or the workplace of a person whose contribution was in industry, would be more closely associated with the person's work than would his or her*

*home. Most people are associated with many places in their lifetime, and it must be demonstrated why one place is more significant than others.*

*Places will not generally be considered under this criterion if they have only brief, incidental or distant association, or if they are associated with persons or groups of little significance, or if they are associated with an event which has left no trace, or if a similar association could be claimed for many places, or if the association cannot be demonstrated. Generally the home or the grave of a notable person will not be entered in the Register unless it has some distinctive attribute, or there is no other physical evidence of the person's life or career in existence.*

The former Callington Smelting Works is associated with brothers Mauris Thomas Jnr and Charles Thomas, who played a minor role in establishing the Bremer Smelting Works, South Australia's first commercially successful smelting works.

It was Mauris Jnr and Charles' father, Mauris Thomas Snr and their uncle John Thomas who were South Australia's first experienced smelters and who built and operated the Bremer Smelting Works. Mauris Jnr and Charles were learning the smelting trade from their father and uncle at this time, and so their contribution to the commercial success of the Bremer Smelting Works is considered to be minor.

After the Thomas family lost ownership of the Bremer Smelting Works as a result of legal action, Charles and Mauris Thomas Jnr built and managed the Callington Smelting Works. However, the brothers resigned as managers of the Callington Smelting Works and left South Australia shortly before the Works was completed in 1863 and did not work in South Australia again. Charles and Mauris Thomas Jnr later made important contributions to the broader Australian smelting industry through their work interstate, notably Mauris, who subsequently built and managed three additional smelting works in New South Wales and Queensland.

While the brothers played a notable role in the national smelting industry, they cannot be said to have played a significant role in South Australian history, since while the Callington Smelting works was the most successful smelter to operate in the Callington-Kanmantoo district, it was just one of many successful smelting works to operate in South Australia during the nineteenth century. It was not the largest smelting works in nineteenth-century South Australia, nor the longest-lived smelting works.

As the place has failed to meet the first threshold test, no further tests are considered under criterion (g).

It is recommended that the nominated place **does not fulfil** criterion (g).

## PHYSICAL DESCRIPTION



**Indicative site plan showing key features**

Source: ENVMaps

1. Slag heap (approximate extent shaded blue)
2. Hollow in slag heap mined for road fill
3. Calciner 1
4. Smelter A
5. Smelter B
6. Calciner 2
7. Outbuilding footings

The former Callington Smelting Works is comprised of the ruins of four nineteenth century Welsh reverberatory furnaces, arranged in parallel and positioned along an axis running roughly south-east, with a large slag heap fanning out from the ruins on the north-eastern side. Local shale foundations of a long outbuilding are located to the east of the furnaces. Numerous paved working floors are located on the site adjoining and surrounding the furnaces.

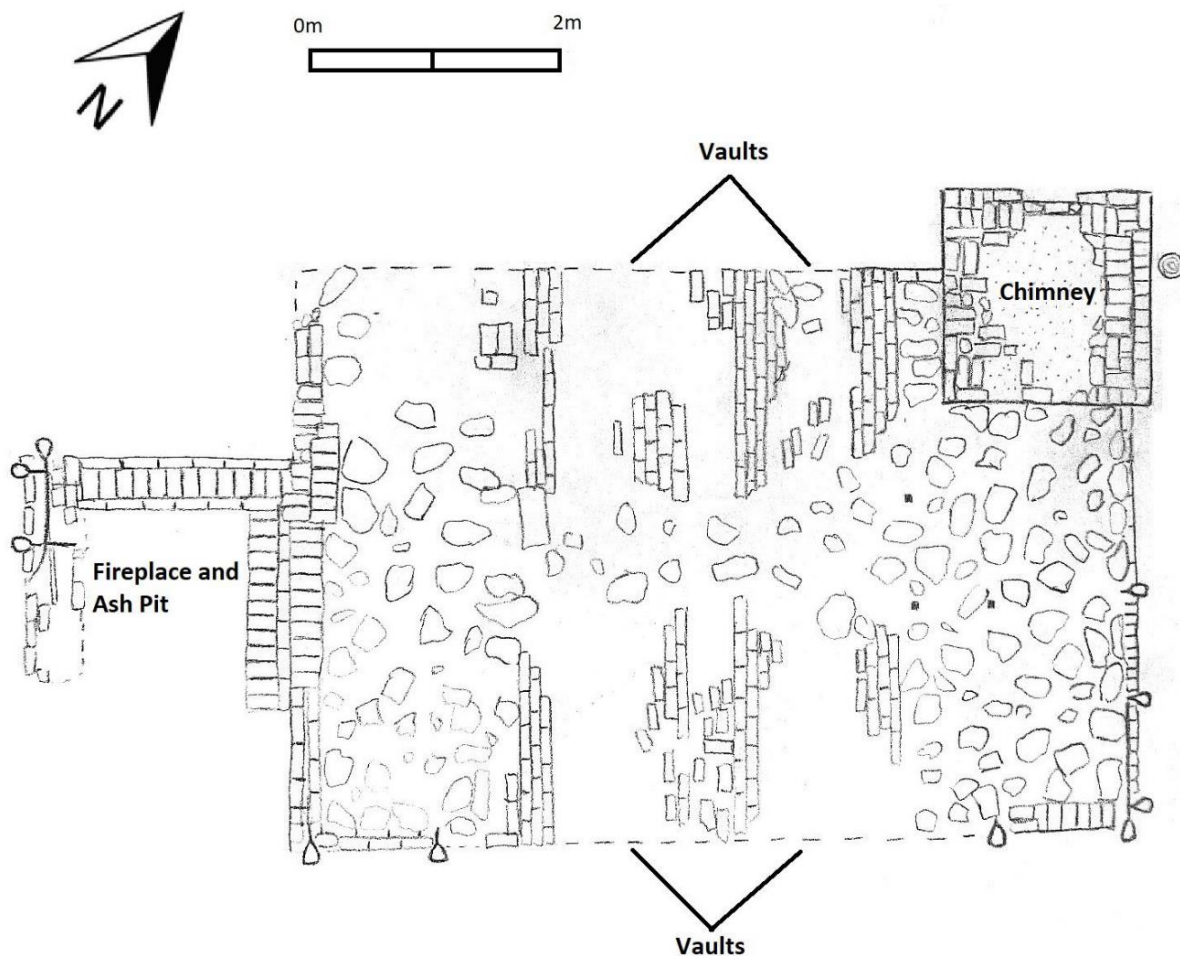
The furnace ruins, from north to south, are known as Calciner 1, Smelter A, Smelter B and Calciner 2. A gravel track skirts the southern side of the slag heap and runs towards the road on the western side of the site, passing close to Calciner 2 and between the furnaces and the outbuilding foundations. Numerous Brazilian pepper trees (*Schinus terebinthifolius*) grow across the site. Star post and wire fences run along the southern and western sides of the site passing close to the furnace ruins.



## Calciner 1

Calciner 1 is comprised of footings and the remains of its lower structure, a chimney base; remains of four partially-collapsed, rubble-filled cooling vaults; and an ash pit. The chimney base is positioned on the northern corner of the structure. The ash pit is located at the opposite end of the structure to the chimney.

The top of the remaining structure of Calciner 1 stands at about natural ground level and is surrounded by a recently-excavated trench around its perimeter. The body of the lower structure of the furnace is retained by handmade red brick walls with a local shale masonry core. The looped ends of forged iron tie rods emerge from the masonry at intervals around the perimeter.

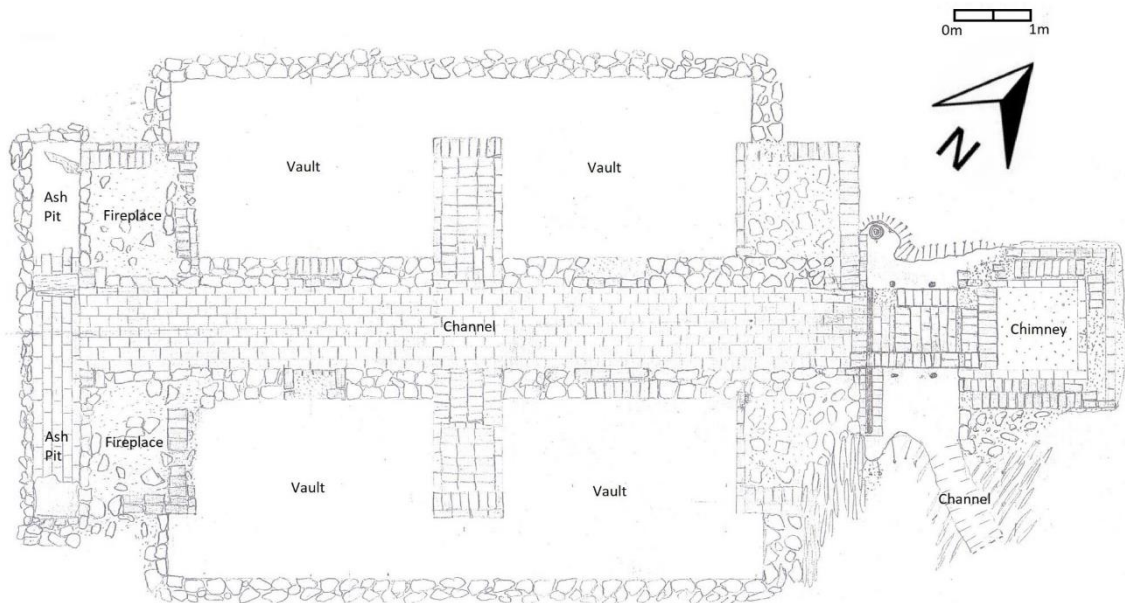


**Diagram of Calciner 1 following excavation**

Source: Nicolas Grguric, "Annex 1 to Callington Smelting Works Archaeological Report" (2020) p. 12

## Calciner 2

Calciner 2 is comprised of footings for features interpreted as cooling vaults, paired fireplaces, a detached chimney, and ash pit. A brick-paved paved channel runs down the centre of the structure, and a rough-hewn channel through the local shale bedrock runs away to the east. The former vaults are enclosed by shale retaining walls.



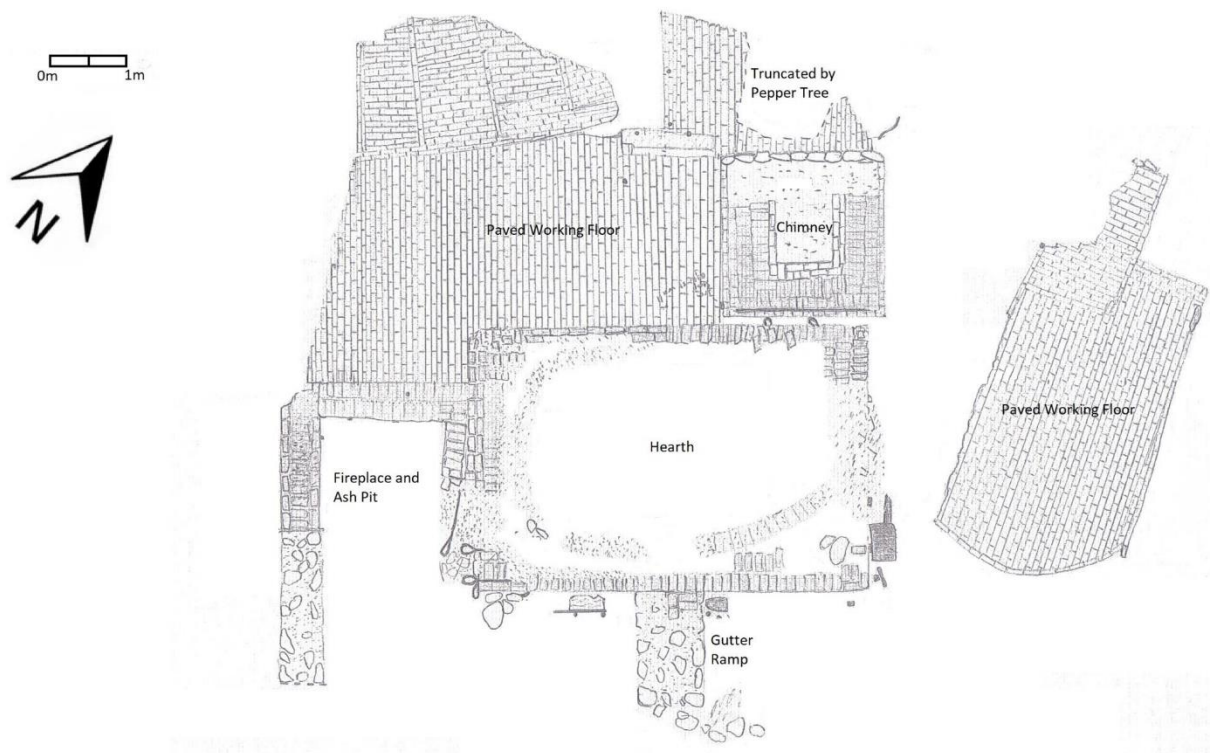
**Diagram of Calciner 2 following excavation**

Source: Nicolas Grguric, "Callington Smelting Works Archaeological Report" (2018) p. 53

## Smelters A and B

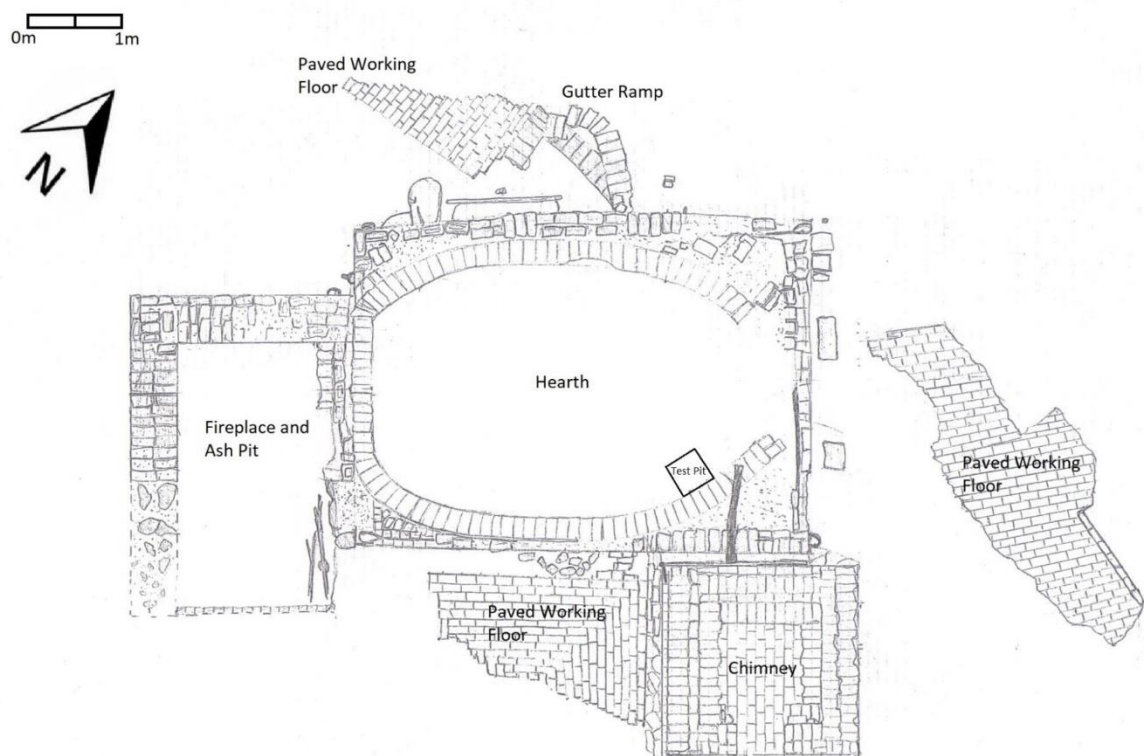
Smelters A and B are comprised of the remains of hearths, the remains of square detached chimneys, ash pits, the remains of gutter ramps and the remains of iron tie rods and buckstays. The ash pits are positioned at the opposite ends of the Smelters and both ash pits face south-east.

The hearths of Smelters A and B are composed of loose refractory sand, retained by hand-made red brick and lime mortar masonry and stand a few courses above the natural ground level. The hearth of Smelter B is additionally retained by an elliptical band of firebricks, which rises several courses high in the eastern corner. The looped ends of forged iron tie rods emerge from the masonry at intervals around the perimeter of the hearths of both Smelters.



**Diagram of Smelter A following excavation**

Source: Nicolas Grguric, "Callington Smelting Works Archaeological Report" (2018) p. 35



**Diagram of Smelter B following excavation**

Source: Nicolas Grguric, "Callington Smelting Works Archaeological Report" (2018) p. 48

### *Slag heap*

The slag heap is roughly crescent-shaped, sloping upwards from the south-west with a flat top. The centre of the heap has been quarried from the south-west. The slag heap is comprised of mainly irregular lumps of slag, with some deliberately cast, roughly rectangular blocks measuring about 600 x 500 x 150 mm, with a rough sprue on opposite ends. Some of these blocks bear the impressions of hobnail boot marks standing in relief.

### *Present condition*

The brick and lime mortar ruins of the Smelting Works are fragile and since being exposed by excavation, damage has occurred through members of the public walking over the ruins, rabbits burrowing into the ruins, through vegetation growth and through weathering. Isolated sections of star post and ring lock field fencing enclose parts of the ruins in an effort to discourage foot traffic. In-situ iron tie rods were also stolen from the site, further damaging the ruins, leading up to and during February 2022.<sup>14</sup>

### **Elements of Significance:**

Elements of heritage significance include (but are not necessarily limited to):

- Ruins of smelting works comprising remains of four reverberatory furnaces and footings of outbuildings,
- Slag heap,
- Underground remains of smelting works (extent unknown)

Elements not considered to contribute to significance of place include (but are not necessarily limited to):

- Star post and wire fences, gravel roads, trees and other vegetation

## HISTORY

### Nineteenth century copper smelting technology

Smelting is a process of extracting metal from ore through the application of heat.<sup>15</sup> During South Australia's nineteenth century copper mining boom beginning in the mid-1840s, Cornish capitalists monopolised the smelting industry<sup>16</sup> and controlled most of the world's copper smelting facilities around the Lower Swansea Valley in Wales, close to supplies of high-grade anthracite coal that fueled the smelting furnaces.

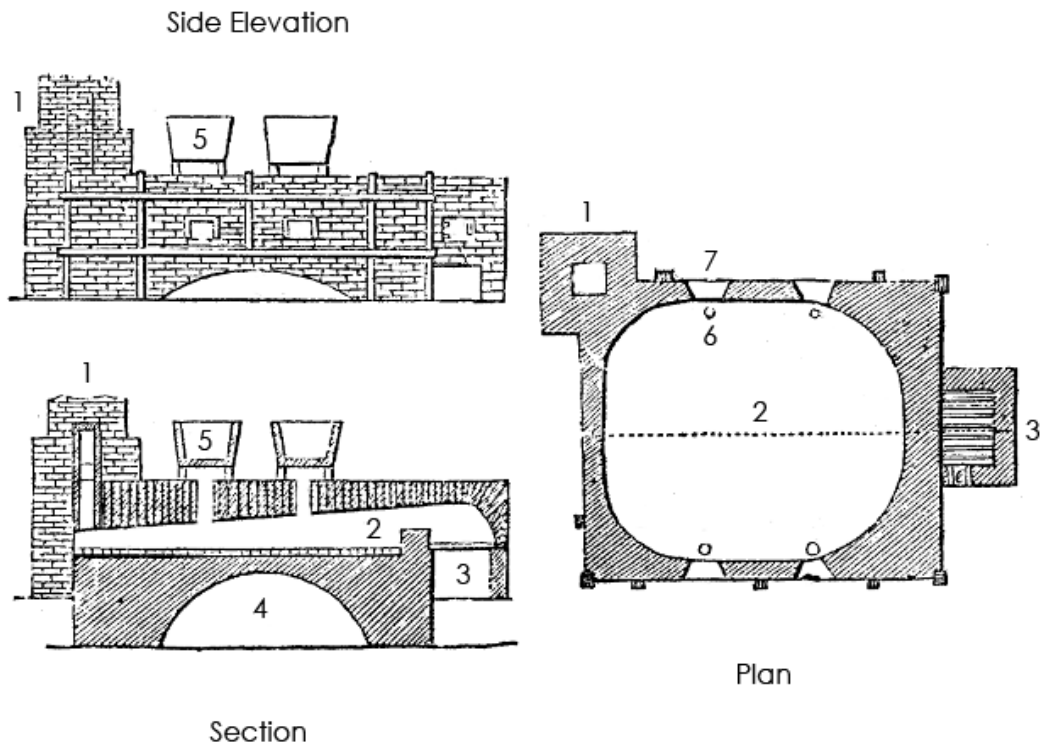
The Welsh developed a smelting technology and practice known as the Welsh Process.<sup>17</sup> The Welsh Process involved a 'long, costly and tedious' smelting operation accomplished in up to nine stages,<sup>18</sup> which varied according to the quality of the extracted ore. The Welsh Process employed firebrick 'reverberatory' furnaces, in which the copper ore, known as the 'charge,' was heated on a hearth of fire brick or refractory (infusible) sand through a combination of hot air drawn from a firebox<sup>19</sup> and heat reverberated (reflected) from a vaulted firebrick roof.<sup>20</sup>

Four key stages, namely calcining, smelting, roasting and refining,<sup>21</sup> were typically repeated with variations<sup>22</sup> to progressively eliminate impurities, resulting in the transformation of copper ore into pure copper, or as pure as was possible given the technological limitations of the time.<sup>23</sup> Each phase was achieved using specialised reverberatory furnaces.

Prior to smelting, copper ore was typically crushed, to create particles of a uniform size, then concentrated by eliminating waste rock.<sup>24</sup> Calcining was the first phase of the Welsh Process and was achieved in a calcining furnace or calciner. The charge was placed in the calciner through hoppers in the vaulted roof of the furnace and heated to just below the melting point of copper (1085 °C) to eliminate volatile impurities such as sulphur and arsenic, which were converted to gases and discharged into the atmosphere.<sup>25</sup>



Calcining took about twelve hours,<sup>26</sup> and once completed the fire was drawn (extinguished). Openings in the long sides of the furnace allowed the calcined ore to be raked down into a large, vaulted cavity underneath the hearth. Water was also introduced into this cavity to suppress dust, thereby retaining as much ore as possible.<sup>27</sup>



**Diagram of a calcining furnace**

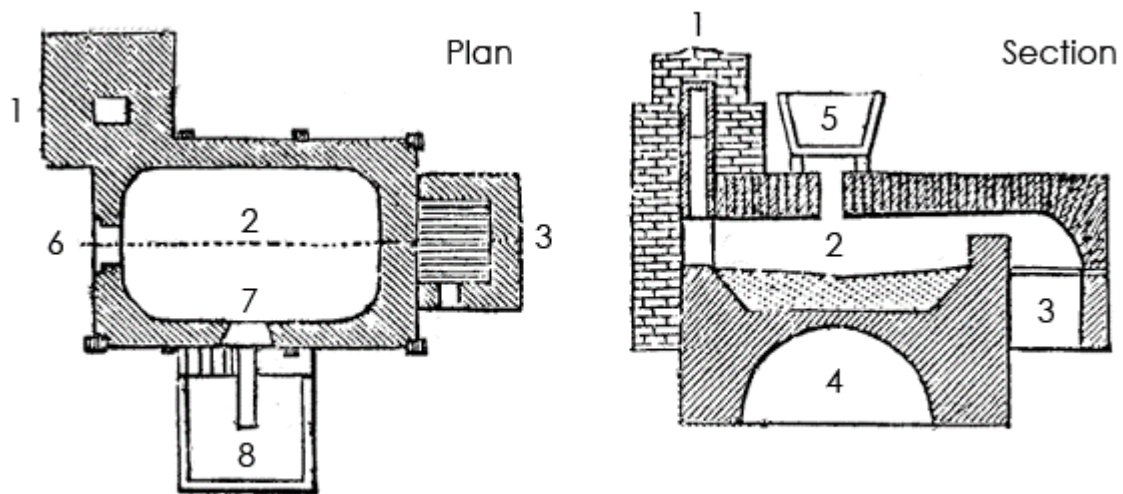
Source: Adapted from Andrew Ure, *A Dictionary of Arts, Manufactures, and Mines* (1840) p. 318

1. Chimney or flue
2. Flat firebrick hearth with vaulted roof above
3. Firebox with grate
4. Cooling vault
5. Hoppers for loading the charge of ore
6. Passage from hearth to cooling vault (circular features in diagram)
7. Access port for raking ore

Ore was occasionally calcined in open pits,<sup>28</sup> prior to or in lieu of calcining in a furnace. This process was sometimes described as roasting,<sup>29</sup> not to be confused with a later stage of the process.

The next phase of the Welsh Process, known as smelting (sometimes called 'melting'<sup>30</sup>), was to heat the calcined ore above the melting point of copper, causing the charge to melt. Copper, with its higher specific gravity, sank to the bottom of the hearth, while impurities, known as slag, rose to the surface. An opening in one of the

short ends of the furnace allowed the slag to be periodically skimmed from the surface of the molten charge using long hoe-like tools called rabbles.<sup>31</sup>



**Diagram of a smelting furnace**

Source: Adapted from Andrew Ure, *A Dictionary of Arts, Manufactures, and Mines* (1840) p. 319

1. Chimney or flue
2. Sloping refractory sand hearth with vaulted roof above
3. Fireplace with grate
4. Cooling vault
5. Hopper
6. Access port for rabbles (rakes)
7. Iron sluice or gutter leading from hearth to granulating pit
8. Water-filled granulating pit

Slag solidified upon cooling to form a durable, semi-vitreous rock-like substance. In the nineteenth century, slag was typically dumped in heaps adjacent to smelter sites. Occasionally slag heaps were re-worked to extract additional metal or quarried as a source of building material.<sup>32</sup> Sometimes slag was deliberately cast into manageable blocks to facilitate removal from the smelting works.<sup>33</sup> Slag could also be used as a flux in subsequent smelting operations.

The smelting phase produced matte or regulus, a mixture of copper, copper sulphide and ferrous silicate containing 40 to 60 percent copper.<sup>34</sup> At the conclusion of the smelting phase, the fire was drawn and the regulus and slag were tapped from separate openings in the side of the furnace.<sup>35</sup> Molten regulus ran through a sluce or gutter supported by a gutter-ramp and into a water-filled pit, causing the regulus to become granulated as it entered the water,<sup>36</sup> ready for the next stage.

While the calciner hearth was flat and comprised of firebricks, the smelting furnace hearth was comprised of refractory sand. The smelting hearth was also inclined towards openings in the side of the furnace to facilitate draining the molten metal. Smelting furnace hearths were typically smaller than calciner hearths, but their fireboxes were larger, to produce more heat.<sup>37</sup>

By repeating the calcining and smelting processes, coarse or black copper containing 80 to 90 percent copper was produced. The next phase of the Welsh process was roasting and involved melting the black copper while exposing it to a constant current of air in a reverberatory roasting furnace. During roasting, iron and other impurities were oxidised producing blistered copper, which was cast into blocks or ingots and is distinguished by black surface blisters caused by bubbling gas. The Welsh Process was then completed by refining the blistered copper into (nearly) pure copper in a reverberatory refining furnace.<sup>38</sup>

Smelting furnaces were fired 'day and night' and smelting workers were typically paid by the ton of product charged.<sup>39</sup> Sometimes reverberatory furnaces possessed their own independent chimneys, as at Callington, but it was also common for multiple furnaces to share a common flue with a single large chimney.<sup>40</sup>

The extreme heat generated by smelting caused the firebricks of the reverberatory furnace hearth and vault to erode and sometimes fuse, while regular cycles of thermal expansion and contraction damaged the furnace masonry, despite iron buckstays and tie rods employed to bind the structure together. Furnaces required constant maintenance, with associated downtime and a steady supply of firebricks and skilled bricklayers available on site. Initially, firebricks were imported from Britain,<sup>41</sup> but later they were produced locally. Damaged bricks were sometimes recycled to pave working areas or floors, which allowed crushed ore and granulated regulus to be shovelled around the Works without becoming contaminated by topsoil.<sup>42</sup>

The 'secretive' nature of the Welsh smelting industry meant that the Welsh Process and its associated technologies are poorly documented.<sup>43</sup> Instead, smelting expertise was transmitted by apprenticeship,<sup>44</sup> especially through families.<sup>45</sup>



**Roofed smelting works at Kapunda with reverberatory furnace clearly visible on right c.1860**

Source: State Library of South Australia B 9955

Reverberatory furnaces were also used in smelting other minerals such as silver and lead. After early experimentation with German cupola or blast furnace technology, reverberatory furnace technology dominated Australian smelting until the very late nineteenth century. Thereafter, improvements in blast furnace technology led to its increasing use and eventual dominance over reverberatory furnaces.<sup>46</sup>

Redevelopment of the Lower Swansea Valley from the 1960s, which removed most of the local industrial landscape,<sup>47</sup> has contributed to a 'general paucity' of archaeological evidence regarding Welsh smelting in the geographical region in which it originated.<sup>48</sup>



**Abandoned chimney (centre) and reverberatory furnace (right) at the Paringa Mine, c1890**

Source: State Library of South Australia B 19925

### **Copper and copper smelting in South Australia**

Copper was discovered at Kapunda in 1842 and Burra in 1845. The mining, processing and export of copper played a significant role in South Australia's industrial, economic and social history during the nineteenth and early twentieth centuries. Copper mining brought about the beginning of industrialisation in South Australia, triggered waves of Welsh and Cornish migration, and reputedly saved the colony from bankruptcy.<sup>49</sup> By 1850, South Australia was the third-largest producer of copper in the world,<sup>50</sup> with the value of mineral ore exports exceeding that of wool and grain.<sup>51</sup>

The high cartage and export costs to Wales where most of South Australia's copper was smelted led to the establishment of local smelters. These small works were typically equipped to handle the early stages of smelting; regulus was then exported for further processing in Wales. Local smelting made export more economical by lowering transport costs, since regulus contained a greater concentration of copper by weight

than ore.<sup>52</sup> Smelting thus formed an integral part of the copper mining industry and was essential to its economic success.

Initially, small local smelters were built at or near mine sites or along transport corridors and in proximity to timber fuel.<sup>53</sup> Later large, centralised smelters were built adjacent to export facilities, such as those at Port Adelaide and Wallaroo.<sup>54</sup> Throughout the nineteenth century the success of South Australian smelting relied upon the employment of expert Welsh metallurgists and smelter hands.<sup>55</sup>

### **Copper mining and smelting in the Callington-Kanmantoo district**

Callington is located on the traditional lands of the Peramangk people, close to Meru and Ngarrindjeri Country.<sup>56</sup> The Peramangk deliberately modified their landscape to create a park-like<sup>57</sup> environment suitable for hunting, which in turn proved attractive to pastoralists who began grazing stock in the Mount Barker district from the late 1830s.<sup>58</sup>

The Peramangk people initially welcomed their new neighbours, helping them to survive by sharing food and teaching them to access local resources.<sup>59</sup> However, tensions emerged when the Europeans began clearing the land for farming and restricting Peramangk access to water.<sup>60</sup> The Peramangk were rapidly dispossessed and by the 1850s surviving families had relocated to and merged with First Nations groups living along the River Murray.<sup>61</sup> The land occupied by the former Callington Smelting Works is not currently subject to Native Title claims or determinations.<sup>62</sup>

In 1845 news of mineral discoveries in the Mount Lofty Ranges prompted the South Australian Company to send two Cornish miners to search for minerals in the Mount Barker district. They discovered rich copper deposits on Crown Land occupied by pastoralist brothers Lachlan and Duncan MacFarlane,<sup>63</sup> held under an Annual Occupation Licence.

Under regulations of the *Waste Lands Act 1842*,<sup>64</sup> mineral rights could only be acquired outside of Counties by purchasing a Special Survey of 20,000 acres in one contiguous block, at a cost of £1 per acre.<sup>65</sup>

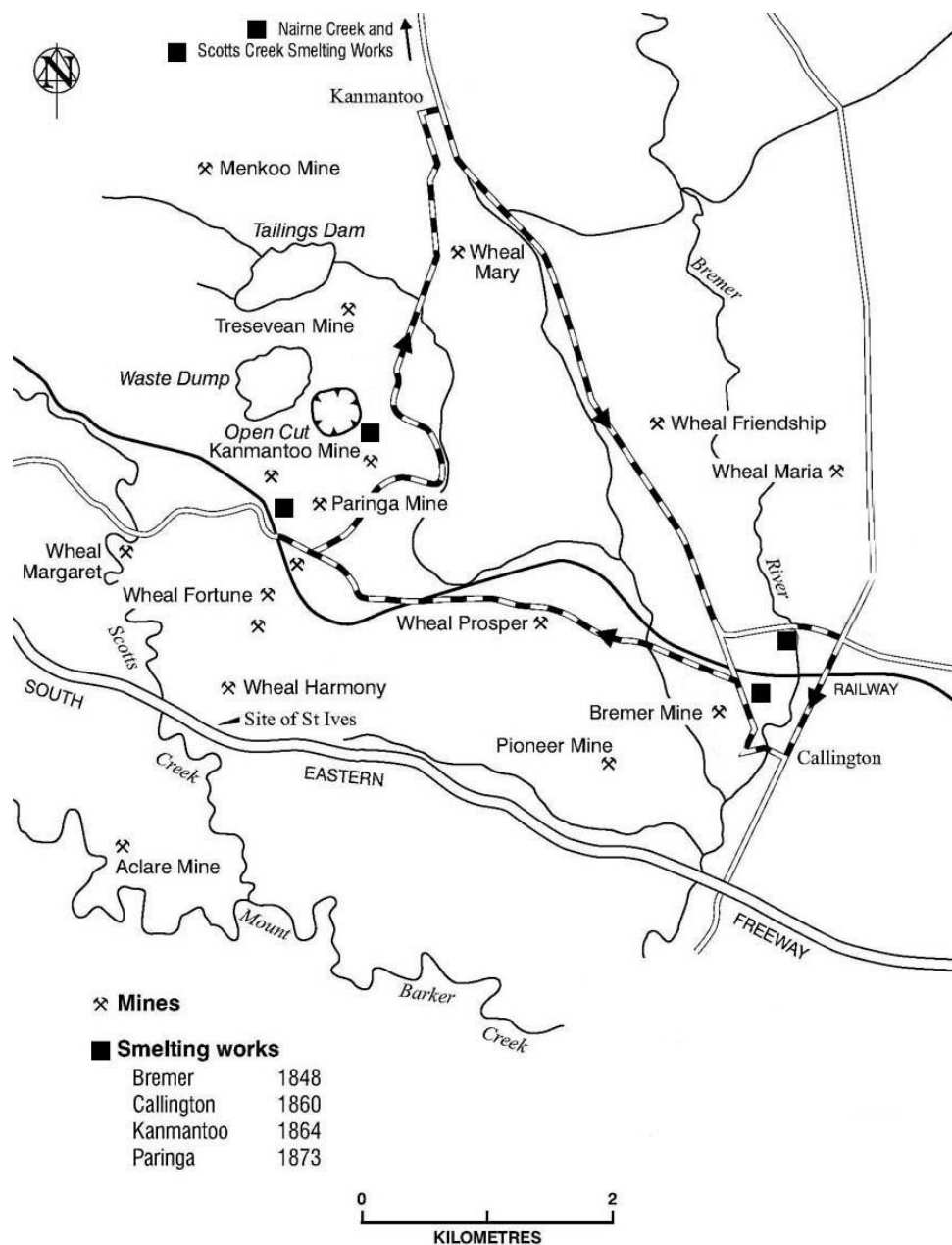
With financial backing from supporters in Adelaide,<sup>66</sup> the MacFarlanes formed the Paringa Mining Company (PMC) with capital to purchase 8,000 acres, and reached an agreement with the South Australian Company, whereby the South Australian Company would fund the balance of a joint application for a Special Survey.<sup>67</sup> When surveyed, the land<sup>68</sup> was subdivided into twenty strips of 1,000 acres each, with ownership determined by drawing lots. The South Australian Company's first choice resulted in the establishment of their Kanmantoo Mine (1846), while PMC's first choice resulted in the establishment of their Paringa Mine (1846).<sup>69</sup>

In about 1848 copper was discovered near the Bremer River in rock broken by the wheels of a dray. PMC opened the Bremer Mine in about that year and laid out the private township of Callington adjacent to the Bremer Mine, named for the town in Cornwall.<sup>70</sup> Callington's first settlers were Cornish miners who constructed stone cottages in vernacular Cornish styles. After mining the 'rich, shallow oxidised cap'<sup>71</sup> of



the Bremer lode, PMC leased<sup>72</sup> the Bremer mine to the Bremer Mining Company (BMC) in about 1850.

By this time numerous copper mines existed in the Callington-Kanmantoo district. The most important were the Kanmantoo, Paringa and Bremer Mines.<sup>73</sup> Six smelters were constructed in the Callington-Kanmantoo district between 1848 and 1873<sup>74</sup> to process ore from these mines, including four in the vicinity of the Bremer, Kanmantoo and Paringa Mines, one at Nairne and one (The Brae, former copper smelters, LHP) at Scott's Creek (now Dawesley).<sup>75</sup>



### Mines and smelters in the Callington-Kanmantoo district

Source: Greg Drew, *Notes on the Kanmantoo-Strathalbyn Mining District* (2014) p. 24

## Smelting at Callington

Two smelting works were established at Callington to serve the nearby mines, namely the Bremer Smelting Works (trading as the Bremer Smelting Company), opened in 1848 by brothers Mauris and John Thomas in partnership with Mauris' sons Mauris Jnr and Charles, and the Callington Smelting Works (subject of this assessment) opened in 1860 and built by Mauris Jnr and Charles Thomas.

Mauris Snr and John Thomas arrived in South Australia in January 1848 and were the colony's first accomplished smelters, with practical experience smelting and trading copper in Chile. Mauris' sons Mauris Jnr and Charles were born in Chile<sup>76</sup> and were learning the smelting trade from their father and uncle<sup>77</sup> when they arrived in South Australia.

Mauris Snr's and John's brother Nicholas was also associated with smelting at Callington through employment as a 'servant' at the Bremer Smelting Works.<sup>78</sup> Unusually, while most experienced smelters in the nineteenth century were Welsh or German,<sup>79</sup> the Thomas family are described as Cornish.<sup>80</sup>



**Map showing approximate locations of the Bremer Smelting Works (shaded red), Callington Smelting Works (shaded blue) and the Bremer Mine (shaded green). The township of Callington is located south-west of the ovals.**

Source: Google Maps

The Bremer Smelting Company was contracted to smelt ore from the nearby Kanmantoo Mine, owned by the South Australian Company,<sup>81</sup> and the Bremer Smelting Works is claimed by South Australian mining historian Greg Drew to be the first commercially successful smelter in Australia.<sup>82</sup>

After establishing the Bremer Smelting Works the Thomas family planned to build numerous smelters where ore and timber were abundant.<sup>83</sup> However, friction soon emerged between Mauris Snr and William Giles, the colonial manager of the South Australian Company.<sup>84</sup> When gold was discovered in Victoria in 1851, Mauris Snr and John departed for the Bendigo goldfields with 'several financial disputes [including those with Giles] outstanding,' leaving Mauris Jnr and Charles behind to complete their contract with the South Australian Company.<sup>85</sup> Mauris Jnr and Charles later followed their father to the goldfields and the Bremer Smelting Works closed.<sup>86</sup>

In 1853, the government refused Mauris Jnr's and Charles' application to cut timber for smelting on their return from the goldfields.<sup>87</sup> Instead the brothers established a mixed farm and flour milling business in Callington. Subsequently in 1856 or 1857 Nicholas Thomas sued his brother Mauris Snr over unpaid wages and 'his share' of gold from Ballarat.<sup>88</sup> When Mauris Snr failed to appear before the Supreme Court, Nicholas sued his nephews, leading Mauris Jnr and Charles to accrue legal fees totalling £1,400 and forcing them into insolvency.<sup>89</sup> These events resulted in the 'total loss' of Mauris Jnr and Charles' assets, including 60 acres of farmland, a steam engine, a mill (Former Mill, SHP 10628) and the Bremer Smelting Works.<sup>90</sup>

The site of the Bremer Smelting Works, on the western bank of the Bremer River near the Old Princes Highway bridge, is now marked by a square, bluestone chimney built as a monument in 1986.<sup>91</sup> Around this time, ruins previously evident on the site were deliberately cleared.<sup>92</sup>

## **Callington Smelting Works**

### *Construction*

In 1860, Mauris Jnr and Charles Thomas built and began operating the Callington Smelting Works (subject of this assessment)<sup>93</sup> for Alfred Hallett, manager of the Worthington Mining Company's Bremer Mine at Callington,<sup>94</sup> to smelt ore from the adjacent Bremer Mine.<sup>95</sup>

The first smelting furnace was completed and operational by June 1860. A second smelting furnace was operating by October. The first calciner was under construction in February 1861 and operational by May. A second calciner was completed in late August or early September 1863.<sup>96</sup> Prior to construction of the calciners, ore was calcined in open pits.<sup>97</sup> In August 1863, Mauris Jnr and Charles resigned as the managers of the Callington Smelting Works 'on account of some question of authority.'<sup>98</sup>

A vague comment in the *South Australian Register* alludes to the construction of a 'new furnace' at the Bremer Mine roughly a decade later in August 1872,<sup>99</sup> however, there is currently no evidence of a fifth reverberatory furnace on the Callington

Smelting Works site. Archaeologist Dr Nicolas Grguric speculates this comment may relate to the 'substantial [...] rebuilt[ding]' of an existing furnace.<sup>100</sup> Alternatively, one of the existing calciners may have been entirely replaced with an updated furnace design, or the report may refer to an undiscovered furnace at the Bremer Mine itself.

### *Operation*

Calciner 1 follows textbook calciner design, with off-axis chimney (see diagram p. 19) and four cooling vaults instead of two, like the extant calciner at Talisker (see diagram p. 5). Calciner 2 demonstrates unusual design elements not evident in the extant physical fabric of known surviving Welsh reverberatory furnaces internationally,<sup>101</sup> notably the central paved channel with a chimney at one end and features interpreted as paired fireboxes at the other. It is not clear how the furnace operated, nor why paired fireboxes would be an advantage. It has been suggested an adjacent channel cut into the shale bedrock may have been designed to drain water used in quenching calcined ore in vaults under the calciner.<sup>102</sup>

The smelting furnaces were built as near mirror images of one another. Ore was stockpiled and charged from the outer sides, while slag and regulus were tapped from the inner sides. Granulated regulus was exported to Wales in large barrels called hogsheads.<sup>103</sup>

Slag was sometimes poured into moulds excavated directly in the ground, creating large blocks which occasionally captured the impressions of hobnail boot-prints in the topsoil.<sup>104</sup> The size and position of the slag heap arose naturally from the orientation of the furnaces, radiating out 'almost exactly' from the centre line between the smelters.

Firebricks at the Callington Smelting Works marked 'Watts' were manufactured by J.S. Watts & Sons at Nairne from 1863, reputedly the first commercial firebrick maker in South Australia.<sup>105</sup> Over time damaged firebricks and red bricks were re-used to pave working floors at various places across the site.<sup>106</sup> Numerous 'Watts' stamped bricks are evident on the site today.

Remnant timber posts adjacent to furnaces and other archaeological evidence such as timber shingles suggests the furnaces may have originally had roofs, such as those depicted in contemporary photographs of smelting works at Kapunda,<sup>107</sup> to protect workers from the elements.

Like the Bremer Smelting Works, furnaces at the Callington Smelting Works were fuelled with firewood cut by farmers. During harvest season, the furnaces sometimes sat idle as the local farmers were not available to cart firewood to the Works.<sup>108</sup> Mining and smelting in the Callington-Kanmantoo district denuded the district of timber, a feature of the landscape still evident today.<sup>109</sup>

### *Production*

The Callington Smelting Works produced mainly matte or regulus and some 'rough' or blistered copper,<sup>110</sup> of about 96 percent purity.<sup>111</sup> Until 1863<sup>112</sup> or 1864<sup>113</sup> regulus produced by the Callington Smelting Works was exported to Wales for refining. After

1863 or 1864 and up until 1867 regulus was sold to the English & Australian Copper Company (E&ACC) for further processing at Port Adelaide prior to export.<sup>114</sup> By 1868, regulus from Callington was sent to Scotts Creek, about three kilometres east of Nairne,<sup>115</sup> where a refinery had been opened the previous year, capable of producing 98.5% pure copper.<sup>116</sup> Finally, from 1873 until the closure of the smelter in 1875, regulus was again sold to E&ACC.<sup>117</sup>

In 1870, the Bremer Mining Company went into liquidation due to declining copper prices, high production costs and a reduction in the quality of ore produced by the Bremer Mine.<sup>118</sup> In 1872, the mine was reopened by new owners, again as the Bremer Mining Company, but closed again in 1875.<sup>119</sup>

Between 1860 and 1875 the Callington Smelting Works produced over 1200 tons of regulus and 800 tons of rough or blistered copper. As such it was the most productive of the six smelting works in the Callington-Kanmantoo district.<sup>120</sup>

### *Subsequent history*

After leaving Callington in 1863, brothers Mauris Jnr and Charles Thomas played 'significant roles' in the Australian copper smelting industry over the next thirty years in New South Wales and Queensland.<sup>121</sup> Notably Mauris built at least three further smelting works<sup>122</sup> over the course of his career, namely at Newcastle NSW, Peak Downs QLD and South Cobar NSW.<sup>123</sup>

The Bremer Mine, but not the Callington Smelting Works, reopened for a brief period from 1907.<sup>124</sup> Sometime after closure the above-ground structures at the Smelting Works were deliberately demolished. The site was marked on a 1913 survey map of the Kanmantoo area with the annotation 'white stacks,'<sup>125</sup> which suggests firebrick chimneys were standing at that time.

During the Depression, the site was plundered for bricks<sup>126</sup> and then in 1941, the centre of the slag heap was mined for road fill.<sup>127</sup> By 1949 all structures on the site had been demolished to near ground level,<sup>128</sup> and soil was dumped over the ruins during the 1980s or 1990s.<sup>129</sup> A house stood on part of the adjacent paddock during the late 1980s but has since been demolished.



The former Callington Smelting Works is associated with and located close to the Former Powder Magazine, Bremer Mine Area (SHP 10499) and the Former Settling Tanks, Bremer Mine Area (SHP 10501).



**Site of Callington Smelting Works, aerial view, 1949.**

Note slag heap and light areas corresponding with ruins of Calciners 1 and 2, Smelters A and B and outbuilding foundations (very faint diagonal linear feature below centre). Other light areas (coloured orange for clarity), including linear feature upper left, irregular area below slag heap, and small elliptical area at slag heap top left, may correspond to remains of as-yet undiscovered structures.

Source: ENVMaps

## Archaeological investigations

During the early 1980s part of the Callington Smelting Works site was excavated by unknown individuals, revealing a 'well-preserved' area of brick paving surrounded by bluestone retaining walls on at least two sides. Greg Drew photographed the excavation in c.1983, before it was either backfilled or the feature razed as it is no longer visible on site.<sup>130</sup>

Callington Recreation Park Incorporated commissioned a two stage archaeological excavation of the Callington Smelting Works with funding from the District Council of Mount Barker. Digs took place in November 2016 and October 2019 and were directed by archaeologist Dr Nicolas Grguric with assistance from local volunteers. South Australian mining historian Greg Drew contributed to historical research and assisted with the excavation.<sup>131</sup> The excavation revealed smelter remains more intact than was expected prior to excavation.<sup>132</sup>

The first excavation took place over 12 days between November 2016 and May 2018 and uncovered remains of two smelting furnaces, known as Smelters A and B, a calciner, known as Calciner 2, and a length of bluestone footings from an outbuilding. Grguric and volunteers also investigated two small historical artefact scatters.<sup>133</sup>

The second stage was carried out over two days on 5-6 October 2019 and resulted in the excavation of a calcining furnace, known as Calciner 1 and determined it to be the first calciner constructed on the site, in 1861.<sup>134</sup> Due to time constraints, other features of the site were not excavated<sup>135</sup> and further excavation of Calciner 1 is 'certain to expose more of the cooling vaults and other structural features which may contribute to an understanding of how the furnace was designed and [how it] functioned.'<sup>136</sup>

Thus far, the archaeological excavations at the Callington Smelting Works site have yielded 'significant new information on the history of copper smelting in Australia.' Calciner 2 is 'probably unique' and 'presents physical evidence of hitherto unknown technological design innovations,'<sup>137</sup> notably paired fireboxes and the longitudinal brick-paved channel, a feature not present in contemporary descriptions nor in archaeological remains elsewhere.<sup>138</sup> As such, Calciner 2 may be internationally significant.<sup>139</sup> Further excavations of the known features, and so far undisturbed below ground features indicated by aerial photography taken in 1949, are highly likely to yield a greater understanding and context of the site including potentially internationally significant calciner and furnace design modifications.<sup>140 141</sup>

NOTE: Excavations during 2016-2019 were completed with permits from the South Australian Heritage Council (0005/15 and 0008/17) under section 27 of the *Heritage Places Act 1993*.

## Future Plans

Callington Recreation Park Incorporated, with the cooperation of the owner, Mount Barker District Council, intends to preserve the former Callington Smelting Works site as a cultural tourist attraction, with the intention that conservation will be achieved 'through a combination of preservation, very limited reconstruction and restoration and maintenance.'<sup>142</sup>

## Chronology

Year	Event
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- |      |  |
|------|--|
| 1845 | Mineral discoveries in the Mount Lofty Ranges prompt the South Australian Company to send to Cornish miners to search for minerals in the Mount Barker district.   |
| 1848 | January 28, Mauris Snr, John, Mauris Jnr, Charles and Nicholas Thomas arrive in South Australia.<br><br>Copper discovered near the Bremer River near site of present-day Callington.<br><br>Paringa Mining Company opens the Bremer Mine and lays out the private township of Callington.<br><br>Bremer Smelting Works opened by Mauris Snr and John Thomas. |
| 1850 | Paringa Mining Company leases the Bremer Mine to the Bremer Mining Company.  |
| 1851 | Victorian Gold Rush depletes local workforce. Mauris Snr and John Thomas leave for the Bendigo goldfields. The Bremer Mine closes and the Bremer Smelting Works falls idle.  |
| 1853 | Mauris Jnr and Charles Thomas return to Callington and establish mixed farming and flour milling business.<br><br>Nicholas sues Mauris Jnr and Charles Thomas, forcing the brothers into insolvency.   |
| 1860 | <b>Callington Smelting Works constructed by Mauris Jnr and Charles Thomas.</b><br><br><b>June, first smelting furnace at the Callington Smelting Works is completed and operational.</b>   |
| 1861 | <b>February, first calciner under construction.</b><br><br><b>May, first calciner operational.</b><br><br><b>August, Mauris Snr and Charles Thomas resign as managers of the Callington Smelting Works.</b>  |
| 1863 | J. S. Watts & Sons commence commercial production of firebricks in Nairne.<br><br><b>Late August or early September, second calciner completed.</b>  |
| 1870 | <b>Bremer Mining Company enters liquidation and Callington Smelting Works closes.</b>  |

- 1872** August, the *South Australian Register* reports on construction of a 'new furnace' at the Bremer Mine.
- 1873** Callington Smelting Works reopens.
- 1875** Callington Smelting Works ceases production, coinciding with the closure of the Bremer Mine.
- 1907 Bremer Mine briefly reopens.
- 1913** Site of Callington Smelting Works marked on military map with the notation 'two white stacks.'
- 1941** Callington Smelting Works slag heap is mined for road fill.
- 1949** Aerial photography reveals all structures at Callington Smelting Works site have been demolished to near ground level.
- 1980** 21 October, the Callington Township and Bremer Mine are listed on the Register of the National Estate (ID 7545), including the former Callington Smelting Works site by implication.
- 1983** SA mining historian Greg Drew photographs archaeological excavation on the former Callington Smelting Works site.
- 1986 Replica smelting chimney constructed on the Bremer Smelter site, which is apparently cleared of ruins at the same time.
- 1990** Soil is dumped over the ruins of the Callington Smelting Works around this time.
- 2007 The Register of the National Estate is closed as a statutory list.
- 2017** November, first stage archaeological excavation at the former Callington Smelting works site under direction of archaeologist Dr Nic Grguric commences.
- 2018** May, first stage archaeological excavation at the former Callington Smelting works site under direction of archaeologist Dr Nic Grguric completed.
- 2019** 5-6 October, second stage archaeological excavation at the former Callington Smelting Works site under direction of archaeologist Dr Nic Grguric.
- 2022** February, February, in-situ iron tie rods are stolen from the Callington Smelting Works site.

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## SITE RECORD

<b>NAME:</b>	Former Callington Smelting Works	<b>PLACE NO.:</b>	26515
<b>FORMER NAME:</b>	Callington Smelting Works		
<b>DESCRIPTION OF PLACE:</b>	Former smelting works site, including four excavated reverberatory furnaces and outbuilding footings, slag heap and underground remains		
<b>DATE OF CONSTRUCTION:</b>	1860-1875		
<b>REGISTER STATUS:</b>	Nominated 25 May 2020 <a href="#">[Date of Provisional Entry]</a>		
<b>LOCAL HERITAGE STATUS:</b>	Unlisted		
<b>CURRENT USE:</b>	Interpretive archaeological site adjacent to Callington Oval and Recreation Centre 2016-		
<b>PREVIOUS USE(S):</b>	Copper smelter 1860-1875		
<b>BUILDER:</b>	Mauris Jnr and Charles Thomas 1860-1863; ongoing rebuilding through use until 1875		
<b>LOCAL GOVERNMENT AREA:</b>	Mount Barker District Council		
<b>LOCATION:</b>	<b>Street No.:</b>	22	
	<b>Street Name:</b>	Callington Road	
	<b>Town/Suburb:</b>	Callington	
	<b>Post Code:</b>	5254	
<b>LAND DESCRIPTION:</b>	<b>Title</b>	CT 5522/495, CT 5398/700	
	<b>Reference:</b>		
	<b>Lot No.:</b>	A16, A15	
	<b>Plan No.:</b>	F160755, D28328	
	<b>Hundred:</b>	Kanmantoo	
<b>MAP REFERENCE</b>	35°06'43.2"S 139°02'26.3"E		

## PHOTOS

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**NAME:** Former Callington Smelting Works

**PLACE NO.:** 26515

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**Overall view of Calciner 1 looking south**

Source: DEW Files 1 March 2022



**Overall view of Calciner 2 looking east**

Source: DEW Files 1 March 2022



## PHOTOS

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**NAME:** Former Callington Smelting Works

**PLACE NO.:** 26515

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**Overall view of Smelter A looking north-east**

Source: DEW Files 1 March 2022



**Overall view of Smelter B looking north-east**

Source: DEW Files 1 March 2022



## PHOTOS

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**NAME:** Former Callington Smelting Works

**PLACE NO.:** 26515

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**Chimney of Calciner 1 showing firebricks**  
Source: DEW Files 1 March 2022



**Calciner 1 cooling vault**  
Source: DEW Files 1 March 2022



**Typical forged tie rod**  
Source: DEW Files 1 March 2022



**Chimney of Smelter A showing collapsed firebricks**  
Source: DEW Files 1 March 2022



**Refractory sand hearth of Smelter B with remains of elliptical firebrick walls**  
Source: DEW Files 1 March 2022



**Hearth of Smelter B showing coursed firebricks**  
Source: DEW Files 1 March 2022



## PHOTOS

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**NAME:** Former Callington Smelting Works

**PLACE NO.:** 26515

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**Paved firebrick working floor**

Source: DEW Files 1 March 2022



**Ash pit of Smelter B**

Source: DEW Files 1 March 2022



**Chimney of Smelter B showing eroded,  
previously exposed upper courses**

Source: DEW Files 1 March 2022



**Chimney of Smelter B showing firebrick core**

Source: DEW Files 1 March 2022



**Calciner 2 paved central channel**

Source: DEW Files 1 March 2022



**Calciner 2 chimney**

Source: DEW Files 1 March 2022



## SITE PLAN

**NAME:** Former Callington Smelting Works

**PLACE NO.:** 26515



**Former Callington Smelting Works, 22 Callington Road, Callington (CT 5522/495, CT 5398/700; F160755 A16, D28328 A15 Hundred of Kanmantoo)**

- Significant components of the SHP include ruins of smelting works comprising remains of four reverberatory furnaces and footings of outbuildings, slag heap, and underground remains of smelting works (full extent unknown)
- The non-significant components of the site include star post and wire fences, gravel roads and vegetation

N ↑

### LEGEND

- Parcel boundaries (Indicates extent of Listing)
- Existing State Heritage Place(s)
- Outline of Elements of Significance for State Heritage Place

## SITE PLAN

**NAME:** Former Callington Smelting Works




**PLACE NO.:** 26515



Detail showing Elements of Significance for State Heritage Place

N ↑

### LEGEND

-  Parcel boundaries (Indicates extent of Listing)
-  Existing State Heritage Place(s)
-  Outline of Elements of Significance for State Heritage Place

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- <sup>1</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting Technology in Australia, Part 1" in *Journal of Australasian Mining History* vol 8 (September 2010) pp. 33-34
- <sup>2</sup> Swanbury Penglase, *Australian Cornish Mining Sites: Burra Conservation Management Plan* (March 2021 ref 18188) pp. 116, 225
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- <sup>5</sup> Anna Pope and Claire Booth, *DC Mount Barker Heritage Survey Part 2: State Heritage Recommendations* (2004) pp. 34-39
- <sup>6</sup> See photographs in DEW files for SHP 26450
- <sup>7</sup> David Bannear, "The Interpretation of Structural Remains at Bolla Bollana Copper Smelting Works, South Australia" in *Australian Historical Archaeology* 6 (1988)
- <sup>8</sup> Peter Bell and Justin McCarthy, "Walleroo Smelters Site: Heritage Assessment, Report to Incitec Pivot Ltd" (January 2008) pp. 29-30
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<https://web.archive.org/web/20190520070331/http://www.samininghistory.com/wp-content/uploads/2014/11/drew-2014-kan-strath-district.pdf>
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- <sup>14</sup> Harry Seager pers. comm. 1 March 2022
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- <sup>16</sup> Cornwall County Council Historic Environment Service, *Flying Through Cornwall's Past* <https://web.archive.org/web/20170518180012/http://www.historic-cornwall.org.uk:80/flyingpast/age.htm> accessed 17 March 2022
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- <sup>18</sup> <http://www.cadiavalleyheritage.com.au/copper-mining/copper-mining-and-smelting-history/copper-smelting-technology-south-wales-new-south-wales/> accessed 5 January 2021
- <sup>19</sup> Nicolas Grguric, *Callington Smelting Works Archaeological Project, Excavation Report* (2016) p. 7
- <sup>20</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting, Part 1" pp. 4-5
- <sup>21</sup> The terms roasting and calcining were sometimes used synonymously; see Andrew Ure, *A Dictionary of Arts, Manufactures and Mines: containing a clear exposition of their principles and practice* (1840) London: Longmans <https://www.gutenberg.org/files/44562/44562-h/44562-h.htm> accessed 17 March 2022
- <sup>22</sup> <http://www.cadiavalleyheritage.com.au/copper-mining/copper-mining-and-smelting-history/copper-smelting-technology-south-wales-new-south-wales/> accessed 17 March 2022
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- <sup>25</sup> D. A. Cumming and G. J. Drew, "Copper Smelting in South Australia: the first fifty years" p. 115
- <sup>26</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 321
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- <sup>29</sup> For example, <http://www.cadiavalleyheritage.com.au/copper-mining/copper-mining-and-smelting-history/lentins-description-copper-smelting-anglesey-1800/> accessed 21 March 2022
- <sup>30</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 322
- <sup>31</sup> Nicolas Grguric, *Callington Smelting Works* p. 8
- <sup>32</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting, Part 1" p. 12
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- <sup>36</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 319
- <sup>37</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 319
- <sup>38</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 323
- <sup>39</sup> Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* p. 321
- <sup>40</sup> Examples of nineteenth century South Australian smelting works with independent chimneys include Kapunda, Burra and Callington; examples with common flues and a single large chimney include Bolla Bollana, Talisker and Port Adelaide.
- <sup>41</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting, Part 1" p. 5
- <sup>42</sup> Nicolas Grguric, *Callington Smelting Works* p. 44
- <sup>43</sup> <http://www.cadiavalleyheritage.com.au/copper-mining/copper-mining-and-smelting-history/copper-smelting-technology-south-wales-new-south-wales/> accessed 5 January 2021
- <sup>44</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting Technology in Australia, Part 2" in *Journal of Australasian Mining History* vol 9 (September 2011) p. 31
- <sup>45</sup> <https://web.archive.org/web/20170518180012/http://www.historic-cornwall.org.uk:80/flyingpast/age.html> accessed 17 March 2022
- <sup>46</sup> Peter Bell and Justin McCarthy, "The Evolution of Early Copper Smelting, Part 1" pp. 6-10
- <sup>47</sup> <https://hafodmorfacopperworks.com/the-past/> accessed 4 March 2022
- <sup>48</sup> Nicolas Grguric, *Callington Smelting Works* p. 61
- <sup>49</sup> Swanbury Penglase, *Australian Cornish Mining Sites: Burra* p. 45
- <sup>50</sup> G. J. Drew and J. E. Connell, *Cornish Beam Engines in South Australian mines (Special Publication No. 9)* (1993) Adelaide SA: Department of Mines and Energy of South Australia p. 75
- <sup>51</sup> R. Keith Johns, "The Cornish at Burra, South Australia" in *Journal of Australian Mining History*, Vol. (4 September 2006) p. 170
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- <sup>53</sup> Fred Thomas, "Establishing Copper Smelting in Australia" in *Royal Historical Society of Queensland Journal* Vol XV No 7 (May 1994) p. 313
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- <sup>56</sup> <https://aiatsis.gov.au/explore/map-indigenous-australia> accessed 25 February 2022
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- <sup>58</sup> Lothar Brasse, "The First Special Survey, W. H. Dutton and the Hahndorf Contract" in Young et al p. 56
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- <sup>60</sup> Bernard Arnold, "German settlers' accounts of the Australian Aborigines" in *Torrens Valley History Journal* No. 33 (1988) p. 50
- <sup>61</sup> Philip A. Clarke for Terramin Australia Limited, *Report on the Bird-in-Hand Heritage Assessment for a mining lease application* (2016) p. 26
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- <sup>63</sup> Flightpath Architects Pty Ltd, *Thematic History of the Mount Barker District* (2020) p. 7

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- <sup>64</sup> Douglas Pike, *Paradise of Dissent: South Australia 1827-1857* (1957/1967) London: Longmans, Green and Co Ltd/Melbourne VIC: Melbourne University Press p. 306
- <sup>65</sup> Ian Auhl, *The Story of the 'Monster Mine': The Burra Burra Mine and its Townships 1845-1877* (1986) Burra SA: District Council of Burra Burra p. 23
- <sup>66</sup> Australian Mining History Association Annual Conference Proceedings, 12-18 September 2011 Hahndorf SA p. 7 <http://www.mininghistory.asn.au/wp-content/uploads/17-AMHA-Proceedings-Volume-compressed-2.pdf> accessed 17 March 2022
- <sup>67</sup> Flightpath Architects Pty Ltd, *Thematic History of the Mount Barker District* (2020) p. 7
- <sup>68</sup> Known as the Mount Barker Special (Mineral) Survey, not to be confused with the Mount Barker Special Survey of 1839.
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- <sup>70</sup> Australian Mining History Association Annual Conference Proceedings p. 35
- <sup>71</sup> Australian Mining History Association Annual Conference Proceedings p. 35
- <sup>72</sup> Australian Mining History Association Annual Conference Proceedings p. 36
- <sup>73</sup> Nicolas Grguric, *Callington Smelting Works* p. 5
- <sup>74</sup> Nicolas Grguric, *Callington Smelting Works* p. 5
- <sup>75</sup> Nicolas Grguric, *Callington Smelting Works* p. 5
- <sup>76</sup> Fred Thomas, "Establishing Copper Smelting in Australia" p. 313
- <sup>77</sup> Nicolas Grguric, *Callington Smelting Works* p. 6
- <sup>78</sup> Fred Thomas, "Establishing Copper Smelting in Australia" p. 314
- <sup>79</sup> Swanbury Penglase, *Australian Cornish Mining Sites: Burra* p. 31
- <sup>80</sup> Fred Thomas, *The Thomas Smelter 1848-1852: the first commercially successful copper smelter in Australia* (2002) Carey Bay NSW: Fred Thomas
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- <sup>82</sup> G. J. Drew, *Notes on the Kanmantoo-Strathalbyn Mining District* p. 23
- <sup>83</sup> Fred Thomas, "Establishing Copper Smelting in Australia" p. 314
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- <sup>89</sup> Fred Thomas, "Establishing Copper Smelting in Australia" p. 318
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- <sup>94</sup> "The Bremer Mine. Complimentary Dinner to Mr. Alfred Hallett." in *South Australian Weekly Chronicle* 7 November 1863 p. 7 <http://nla.gov.au/nla.news-article90264240> accessed 4 March 2022
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- <sup>98</sup> "Callington." in *Adelaide Observer* 1 August 1863 p. 1 <http://nla.gov.au/nla.news-article159519199> accessed 4 March 2022
- <sup>99</sup> "Mining Intelligence." in *South Australian Register* 10 August 1872 p. 5 <http://nla.gov.au/nla.news-article39272110> accessed 4 March 2022; another article in the *Evening Journal* notes the smelting furnaces were being 'set in order and extended' at this time; "Latest News, The Bremer Mine." 10 August 1872 p. 2 <http://nla.gov.au/nla.news-article196742191> accessed 4 March 2022
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- <sup>101</sup> Nicolas Grguric, *Callington Smelting Works* p. 61
- <sup>102</sup> Nicolas Grguric, *Callington Smelting Works* p. 60
- <sup>103</sup> Nicolas Grguric, *Callington Smelting Works* p. 8
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- <sup>111</sup> Nicolas Grguric, *Callington Smelting Works* p. 8
- <sup>112</sup> G. J. Drew, *Notes on the Kanmantoo-Strathalbyn Mining District* p. 23
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- <sup>114</sup> Nicolas Grguric, *Callington Smelting Works* p. 5; G. J. Drew, *Notes on the Kanmantoo-Strathalbyn Mining District* p. 23.
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- <sup>133</sup> Nicolas Grguric, *Callington Smelting Works* p. i
- <sup>134</sup> Nicolas Grguric, *Annex 1 to Callington Smelting Works Archaeological Project, Excavation Report* (January 2020) p. 1
- <sup>135</sup> Nicolas Grguric, *Annex 1 to Callington Smelting Works* p. 6
- <sup>136</sup> Nicolas Grguric, *Annex 1 to Callington Smelting Works* p. 15
- <sup>137</sup> Nicolas Grguric, *Callington Smelting Works* p. 23
- <sup>138</sup> Nicolas Grguric, *Callington Smelting Works* p. 61
- <sup>139</sup> Nicolas Grguric, *Callington Smelting Works* p. 62
- <sup>140</sup> Nicolas Grguric, *Callington Smelting Works* p. 58
- <sup>141</sup> Nicolas Grguric, *Callington Smelting Works* p. i
- <sup>142</sup> Nicolas Grguric, *Callington Smelting Works* p. 15