Mining and Smelting

A brief general history

The main mineralized granite formations of Devon and Cornwall go back as far as the Permian and Carboniferous ages. The five main granite areas can be seen in fig. 1. The Basset mines were situated at the top of the region in central West Cornwall with Carn Marth just to the right. The granite region between Budock and Camborne forms high land culminating in the hills of Carnmenellis (819 ft.), Carnmath (771 ft.) and Carn Brea (740 ft.). The Carn Brea granite joins the Carnmenellis granite beneath the basin of Killas which divides them. The belt of country between Gwennap and Camborne has been ever the chief seat of the mining industry in the County. (James 1952: 153).

A short while after formation, some 300 million years, mining for the minerals began. Historically tin mining in Cornwall goes back until antiquity but this statement requires some qualification. Lewis does so by saying, “that if we omit the extensive collection of literature upon the question as to the relation of the Phoenicians to the early Britain tin trade, - a subject that has long excited the ardor of antiquarians – there remains little evidence, either monumental or documentary, which can enlighten us upon the history of tin or any other form of mining before the Norman Conquest”. (Lewis 1908: 33).

Penhallurick, although agreeing with the Phoenician myth, describing it as one of two, the other being that Stonehenge was built by the Druids, that has tenaciously maintained their hold on popular imagination, (123) later goes on to explain in fine detail prehistoric finds from ancient Cornish tin streams. (173-224). There can be little doubt that tin was worked in Cornwall 3,800 years ago although perhaps it should be noted that Camborne and Illogan had no productive streams so no archaeological remains have been found.

After the Norman Conquest all this changed and there was an increasing abundance of documentary evidence which can be said to have begun in 1156. (Lewis 1908: 34). For example in 1195 the yield was 256 thousand weight (the thousand weight was the Stannary equivalent of 1200 lbs). In 1201 John issued the first charter of the stannaries giving certain freedoms to miners and further charters were issued by Edward 1 in 1305. The amount of tin produced fluctuated in the following centuries before increasing rapidly towards the end of the 17th. Century. There was one major hiccup when the Black Death devastated the country. In the years before and after 1350 many miners died and the market virtually disappeared but recovery in Cornwall was relatively quick in the
more important mines and by the end of the century output had reached a peak only once before exceeded before the Black Death. (Ziegler 1991: 105).

So far the concentration has been on the history of tin mining but for a short period from around 1700 to 1866, copper mining dominated not only the mining industry but the economy of Cornwall. This coincided with Cornwall becoming the world’s most technically advanced mining district. It is also a very important period in the history of Carnkie because, although the mines around the village were late joining the copper boom, they soon became major players and the growth of modern day Carnkie can really be taken from this period.

This brief history cannot be concluded without a few words about the methods of mining. Essentially there were three types of mining. Pryce in 1778 described the ores as, “shode, stream, and mine (lode). (Lewis 1908: 2). Shode and stream are very similar and vary only in the size of the stones being washed down. Shode stones being larger and the stream much smaller and sandy in nature. These were washed down from the original lode and formed alluvial deposits in the valleys which were then accessible to the tinners. For centuries alluvial workings continued to be the main source of tin but from the 15th. Century onwards there was a significant move towards lode mine working and by the middle of the century underground mining was well established. (Buckley 2005: 47).

The earlier ways of working the lodes consisted of sinking pits upon them, by driving tunnels along their course from the outcrop, or else exposing them in open trenches known as “coffins” or “goffens”. These could be fifty or sixty feet deep. (Jenkins 1927: 43). By the end of the century shafts were being sunk and groups of tin bounds known as “bals” were being exploited. In the Penwith-Kerrier stannary there were eleven such bals including Carnkie, which many years later was to become the centre of the Basset mines. (Buckley 2005: 48, 50).

It’s interesting to note that from these humble beginnings, thanks mainly to the innovative brilliance of Cornish engineers and the dedication of the miners, at no small cost to their health, in the late 19th century the New Sump shaft in the great Dolcoath mine reached the astonishing depth of 3,300 feet below adit. (Morrison 1983: 52).

Importantly it should also be remembered that the physical changes to the terrain were huge during the period. Up until Tudor times (1485-1603) the valleys would have been filled with ancient deciduous forests and the only places exposed would have been the high ground such as Carn Marth and Carn Brea. The forests stretched from the lower slopes of these hills to Portreath (Schwartz and Parker 1998: 12). Deforestation was the result of expanding agricultural activities and smelting around the many tin works. Tehidy Country Park is all that remains of this once great forest.

**Carnkie Bal and the end of an era.**

The transition from tin-streaming to lode mining was gradual, not least because the latter required a large increase in investment. In the early days of streaming the tin works were worked by the farmer as part of the use of his land. Pick-axes of oak, holm and box were used and wooden bowls for bailing purposes. The importance of the latter point cannot be overstated because the question of drainage was to dominate shaft mining ever after. (Lewis 1908: 2, 9).

Later came associations of tinners, financed by wealthy adventurers, today’s venture capitalists, who bought shares in several tin mines and each shareholder was responsible for an equal share of the cost of the tin work and the time spent working it. A share in a tin mine was a chattel and could be sold or willed to family, friends or the local chantry
priest or parish church. Camborne church was bequeaved a share in Carnkie Bal in the
1540s. (Buckley 2005: 45).

By the 15th. Century Carnkie was one of many ‘bals’ being exploited by groups of
miners in Penwith-Kerrier, financed by the local gentry and wealthy merchants. (Buckley
2005: 48). This finance was essential because shafts were having to be sunk deeper and
deeper to locate viable lodes - 72 feet reached in 1472 - and the ever increasing problem
of water ingress was becoming acute and ways had to be found to combat this.
Fortunately the next couple of centuries saw the beginning of inventions and innovations
that were to become a feature of Cornish mining ever after.

In fact during the 17th century many new mine engines were invented, mainly water
driven, also the horse-whim for hoisting ore up deep mine shafts, and in 1698-9 the
Carnkie adventurers entered into an agreement with a John Tomson of Phillack to erect a
multi-wheel water engine at a cost of £500 in order to drain the “deep bottoms”. By this
time the mine had probably reached a considerable depth. Power to drive the machine
was supplied by the water of ‘Lethe Filtricke’ and an adit called “Whealjow”, the
construction of the necessary leats to bring it on the mine being undertaken by a sub-
contractor, Richard Buggens of St. Keverne. (Jenkins 1965: X: 6). It is interesting to note
the names of some of the adventurers at the time. They included Francis Basset, Sir John
St. Aubyn, Hugh Tonkin, Benjamin Buller, Thomas Worth, Thomas Glynn, Reginald
Angove and Richard Remfry. By this time tin worth about £100,000 had been extracted
from the mine. A quite considerable sum.

In 1737 a plan of the Manor of Tehidy was commissioned and the Doidge Map (Plate
1, CRO X/101/5/1) clearly shows the fifteen principal shafts in the Carnkie Bal. They are:
survey of Higher Carnkie (Sharpe 1992: 28) located and named four of these disused
shafts, Gigmagouge, Jonathans, Boundsbean and Whealcarn. By this time water-power
for the engine was obtained from the Penventon adit near what was much later to
become, after 1851, the South Basset mine. The leat can clearly be seen on the map. At
the time the land immediately to the north of Carnkie Bal was known as Burnithon and
became Carnkie not long after this. On the subject of leats, two important ones can been
seen on the 1819 Richard Thomas map of the Camborne-Chacewater mining district. As
Hamilton Jenkins explains (1927: 109) they both brought water at different levels from
Selligan (Carnkie) to mines around the foot of Carn Brea. The upper one went as far as
Wheal Druid, where it worked a water-pressure engine that had originally been erected by
Trevithick and the lower one, after passing by, or through, the mines of Barncoose,
Tregajorran, Wheal Fanny, Wheal Providence, and Tin Croft, joined the water coming
down the Entral Valley in supplying Cook’s Kitchen Mine.
Walter Reed was now the largest shareholder and he also became manager of the mine. An examination of the mine’s Cost-Books for 1771-80 (CRO TEM,60,61) in which he figures prominently, shows the sale of white tin to be worth £492 pounds between 1773-78 but by now the bal was reaching the end of the line and the end of the era was fast approaching. An interesting item in the Cost-Book for 1773 indicates that in June the cost of carrying the tin to the smelting house was 10/3. It is interesting for two reasons. Firstly, a hundred years later smelting played an important role in the mining history of Carnkie and secondly, it gives rise to the question, where did the ore go for smelting?

At roughly this time there are records of fourteen blowing houses in the parishes of Illogan, Redruth and Carn Brea. The nearest to Carnkie would have been the one at Tregajorran which is marked on the 1819 Thomas Map and also noted in an 1824 Tehidy Memoranda Book. (Cornwall and Scilly Historic Environment Record 18077). Given the close proximity of this blowing house it is not unreasonable to assume that this was the probable destination of the ore.

Shortly after this the mine was abandoned and the site was later to become the Wheal Basset mine. During the century there were other mines in the area such as Wheal Mark, Wheal Ram, Wheal Carn, Wheal Rock, Wheal Peathy, Old Metal Work and “The Washells Called the Piece”.(Morrison 1983: 295). On the northern slopes of Carnkie Hill there was a mine called Wheal Tinner that can be seen on the 1819 Thomas Map.

**The copper boom and the transition back to tin**
The last quarter of the 18th century and until after the French Wars were years of conflict within the copper industry and the mining community. The situation was very
complicated and needn’t concern us further here. (For a detailed account of those years see Rowe 1993: 68-113). But two things did emerge from this that did affect Carnkie and naturally other mining areas. Firstly, Cornish engineers and engines gained a pre-eminent position, with Harvey’s of Hayle becoming a great foundry, and secondly the speculative boom in copper in the 1820s, although short lived, initiated the emergence of Carnkie as a mining area of consequence.

Before this time, mining in the mines north of the Carn Brea granite range had been far more productive than in the south, although much mineral wealth was extracted from the latter, mainly from vertical lodes. This was due to the fact that the Great Flat Lode was either unknown or its importance unrecognized. (Plate 2). The search and location of the Great Flat lode played a significant role in the history of the mines around Carnkie.

**Wheal Basset**

During the speculative boom about forty new copper mines were opened but only about a dozen were still active in 1830. One of these, South Wheal Basset, was the most productive and still going strong in 1855. (Rowe 1993: 139). Between the years 1815-56 it produced 7,200 tons of copper worth £614,243. (Phillips and Darlington 1857: 256-265). This mine lies where the old Carnkie Bal used to operate and here lies some confusion.

![Plate 2. BGS Geological Map Mining Region – SW England Vol.1 (Memoirs of the Geological Survey, 1956) showing the Great Flat Lode and the near vertical lodes around Carnkie.](image)

According to Hamilton Jenkins (1964 X1: 17) at the same time as this there was mine in Porthtowan called Wheal Basset which operated until 1833 when it amalgamated with it’s neighbor Wheal Music and became Wheal Ellen. It seems clear that when Lady Basset granted a new lease to the mine at Carnkie in 1832 Wheal Basset was still an
operational mine so the lease was renewed under the name South Wheal Basset. This state of affairs lasted until 1851 when a new twenty one year lease was negotiated and the mine formally became Wheal Basset. To add to the confusion Wheal Basset appears to have been worked as a north and south mine and in 1857 a separate set, near the hill top at Four Lanes, was worked and called South Wheal Basset. (Morrison 1983: 294-296). This is not to be confused with the original South Wheal Basset and any future reference will be to this mine and similarly any future reference to Wheal Basset will include the original South Wheal Basset. The nomenclature of Cornish mines can be somewhat confusing which is slightly unfortunate because Wheal Basset was one of the great Cornish mines.

From the time that the new lease was granted in 1832 until 1895 when it ceased operating under the name of Wheal Basset the mine was the greatest producer of copper in the area and second only to West Wheal Basset in the production of black tin. Within this time frame fifteen shafts were sunk. These were, Grace’s 180 fm below adit, Lyle’s 230, Mitchell’s 50, doctor’s 70, Marriott’s 80, Boundary 45, Sampson’s 115, Carnkie 115, Richard’s 100, Theaker’s 110, Old Sump or Engine 160, Steven’s 112, Fisher’s 55, Dennis’s 80 and Magor’s 80. The mine had two distinct phases. Up until 1880 it was worked mainly for copper at relatively shallow depths from the steep dipping lodes down to 100fm but later, having at last located the Great Flat Lode, concentration was focused on two shafts, Lyle’s and Grace’s, (see North Wheal Basset below), which were sunk to greater depths.

It’s heyday as a copper mine was 1854 when it produced 8,378 tons but it was still going strongly in 1864 when Spargo (1865) reports that at the time the mine employed 248 men, 46 females and 63 boys (total 357). Pumping engines, 72 and 36 inch. Stamping-engine, 18 inch (24) heads. Winding-engines, 19 and 18 inch. Winding and crushing-engine, 20 inch.

As has already been seen the copper industry collapsed in 1866, mainly due to the financial crisis at the time, although Wheal Basset limped on until 1880. Although this date has been identified as the final nail in the copper coffin, the writing had been on the wall for some time. Falling output in Cornwall and the increasing productivity abroad in Chile, Cuba, the United States and S. Australia, where there appeared to be unlimited prospects for expansion, made the collapse in Cornwall inevitable. A brief glance at the figures for the production of copper ore (in tons) tells the story. (Rowe 1993: 308-9). The irony is that many of the miners overseas were Cornishmen who had emigrated, particularly in Michigan.

<table>
<thead>
<tr>
<th></th>
<th>1851-60</th>
<th>1861-70</th>
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<tbody>
<tr>
<td>Britain</td>
<td>142,200</td>
<td>116,300</td>
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<tr>
<td>Chile</td>
<td>214,500</td>
<td>447,400</td>
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<tr>
<td>Cuba</td>
<td>47,500</td>
<td>25,600</td>
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<td>United States</td>
<td>37,000</td>
<td>97,100</td>
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<tr>
<td>S. Australia</td>
<td>31,500</td>
<td>71,300</td>
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Inevitably all of this meant that if the mine (and other mines in the area) was to continue as a profitable concerns new investment and development was essential. In 1863 the working shafts were Richards’, Carnkie, Fisher’s, Denis’, Sampson’s, Old Engine, Steven’s and Old Sump. In May 1866 the Richards compound engine was rebuilt as a simple 50 inch. Around the same time a new skip road was installed in the Carnkie shaft, boilers replaced at both Richards pump and the stamps engines and the pitwork at Old
Sump shaft changed from 6 inch to 8 inch. In late 1867 construction started on new steam-driven stamps on the northern slopes of Carnmenellis, sometimes known as East Stamps, and they came into operation in August the following year. A substantial part of these and the Associated dressing floors still remain. (Palmer & Neaverson 1987: 24-5).

Developments were continuing apace with perhaps a tinge of desperation about them. At Theaker’s shaft 15 buddles and two small buddles were constructed and in February 1869 an additional 32 heads and a third boiler had been added to the stamps. An Oxland and Hocking calciner was erected below them that had a cylinder 28 feet in length and 4 feet in diameter mounted at an inclination of 1 in 16; it rotated at 4 rpm and processed 7 tons of concentrates in 24 hours, burning 17/18 cwt of coal in the period. (Palmer & Neaverson 1987: 26).

Despite all of this the outlook was not optimistic. In 1870 pumping was stopped at the Carnkie shaft after a fire destroyed pitwork but a very important event did occur on the 18th July 1871. A lease was issued granting the combined Wheal Basset set and part of the North Basset set for the consideration of £20 per year for 21 years. At the time the mine employed 184 at the surface and 198 underground. (Palmer & Neaverson 1987: 26).

In 1875 an old enemy caused further major disruptions. It has already been noted that drainage was a serious problem, and in fact the mines around Carnkie were some of the wettest in Cornwall. This was caused not only by fairly high rainfall but also from drainage from adjacent mines and upwelling ground water. That year heavy rainfall caused the drainage adit to collapse; not helped by the fact that South Francis were in arrears in their contribution to its maintenance and the closure of the East Basset sett meant additional pumping.

By now it was becoming increasingly obvious to the adventurers that they were fighting a lost cause and that the mine was becoming exhausted. They decided to abandon the original shafts and to concentrate on Lyle’s, Grace’s and Miner’s shafts, recently acquired from North Wheal Basset. By doing so they hoped to locate the Great Flat Lode. Substantial amounts were spent on the development and the remains can still be seen today.

Palmer & Neaverson (27) describe in detail the new engine pumping house constructed at Lyle’s.

“The engine house contained an 80 inch pumping engine designed by Hocking and built by Harvey’s of Hayle. This had three plunger and two drawing lifts in the shaft and the mine was in fork down to 100fm by February 1980. The winding engine house, also on Lyle’s shaft, for a 26 inch engine with steam capstan attached was similarly specified; in this case stone was to be employed from Theaker’s and Dennis’ winder houses on the Basset set for completion within eight weeks of foundation. This winder drew from a double skip road and was operative by August 1880 raising stone produced using four compressed air Darlington rock drills then in use in the workings. Development also proceeded in Grace’s shaft which had ladder roads and a double skip road. Drainage was Improved by clearing the Penventon adit and by crosscutting at the 112fm level into the old South Carn Brea workings. A flat rod connection was made in 1880 from Lyle’s to Grace’s shaft, which was drained down to 130fm with a view to further sinking and development.”

Lyle’s shaft eventually discovered copious amounts of black tin at the 190fm level and a short period of relative prosperity ensued although the mine continued to be plagued with problems. Worn out machinery had to be replaced and the perennial problem of
water drainage was getting worse. In 1894 it was estimated that over 1 million gallons per day were being lifted to keep the mine in fork. To finally compound the problems around about the same time the price of tin collapsed. The story can really be summed up by looking at the production figures from 1876-1890.

<table>
<thead>
<tr>
<th>Year</th>
<th>Copper ore (tons)</th>
<th>Black tin ore (tons)</th>
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<tbody>
<tr>
<td>1876</td>
<td>759</td>
<td>147</td>
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<td>1877</td>
<td>445</td>
<td>164</td>
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<td>1878</td>
<td>230</td>
<td>208</td>
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<td>1879</td>
<td>101</td>
<td>23</td>
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<td>1880</td>
<td>30</td>
<td>8</td>
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<td>1881</td>
<td>8</td>
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<td>1882</td>
<td>60</td>
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<td>1883</td>
<td>174</td>
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<td>1884</td>
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<td>1885</td>
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<td>1886</td>
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<td>1889</td>
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<td>1890</td>
<td>3</td>
<td>396</td>
</tr>
</tbody>
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Problems continued to abound and a general meeting of shareholders was called on the 10th September 1895 and the upshot of this meeting was the approval of a new limited company to be known as Basset Mines Ltd which commenced trading in February 1896 while at the same time Wheal Basset was formally liquidated.

Between 1832 and 1895, Wheal Basset produced 128,370 tons of copper ore and 9,320 tons of black tin in return for an investment of £78,298 and dividends of £341,709 were paid out. (Morrison 1983: 306).
North Wheal Basset

North Wheal Basset mine was comparatively short-lived. It lay to the north-east of Carnkie village and was reopened in the late 1840s by Captain J. Lyle whose family was to contribute greatly to the development of the Camborne-Redruth mining industry. The remains of the buildings could still be seen in the 1980s. (Morrison 1983: 316). It was briefly very productive of copper in the 1850s when a rich vein was struck at the 52fm but the great problem was that they failed to locate the Great Flat lode. It had five main shafts. Miner’s shaft 82 fm below adit, New Shaft 142fm, Lyle’s 102, Western 52, Grace’s 122.(Morrison 1983: 316-20). Lyle’s and Grace’s Shafts were to regain a new lease of life in 1878 when the set was taken over by Wheal Basset. Total production figures of copper ore from 1846-1868 were 30,157 tons of which most were concentrated in the 1850s decade. When Spargo did his survey in 1864 the he noted that the mine had become poor. It had pumping engines, 60 and 40 inch. Winding and crushing-engines, two 24 inch, two water stamping mills. There were 85 men, 50 females, and 30 boys employed.

North Wheal Basset cannot be left without repeating the story of the location of Grace’s shaft. It is straight out of mining folklore. The story went something like this. In 1850 the miners were becoming increasingly desperate to locate sufficient copper deposits to meet costs. Casually they often mentioned to an elderly local woman, “Nothing can be done Gracie; we shall have to knack the bal”. But Gracie Mill always made the same reply. “Take’n try over there, do’ee; that’s where we seed the Jackey Lanterns”. Initially they ignored Grace but in some desperation they finally set to work at the place recommended. The rest is history. From it, profits of £90,000 were made. The old lady was granted 5s a month and a new dress annually by the mine in recognition of her acute ability to ‘read the signs’.(Jenkin 1927: 296). Actually there was nothing particularly new about this. As Jenkins points out (1927: 43), a feature regarded by tinners from earliest times as the favorable indication of mineral was the appearance of the Will-o’-the-Wisp, or Jack-o,-Lanthon. The clairvoyants were known as ‘dreamers’ and are remembered in the name Wheal Dream. No doubt every mining community had its fair share of dreaming geniuses.
North Francis.

North Francis was a mine of little consequence. It was situated on the south-east of Bosleake on the Carn Brea slopes north of Piece. Apparently this was in the vicinity of an old mine called Foxhole.

The mine was reopened in 1852 in the subsequent twelve years there were four shafts at work in the mine, Eale’s, Hunt’s, Mackean’s and Engine shaft, but they met with little success producing only 189 tons of copper in total. In 1865 Spargo stated that the depth of mine was 110 fm; no adit. Pumping-engine, 30 inch, winding-engine 20 inch. Rocks granite and slate. 25 men and two females employed. He added that perseverance is likely to be rewarded but as D.B. Barton points out in his foreword, Spargo – as befitted a shareholder – was invariably optimistic as to the prospects of a mine.

West Wheal Basset

West Wheal Basset was an elongated sett, about a mile long, lying to the west of Carnkie village. It was second only the South Wheal Francis in actual area. In its relatively short lifetime it was second only to Wheal Basset in production of copper and actually superior in the output of black tin. It ranked eleventh for copper ore and seventh for black tin among the Camborne-Redruth mines. (Palmer & Neaverson 1987: 17)

The sett was originally occupied by a couple of older mines, Wheal Charmer, which dated back to the 18th century and more recently a mine called Wheal Haste which was granted a lease by Lady Basset in 1835. As has been mentioned elsewhere the original tin workings were at fairly shallow depths on the steeply dipping, near vertical lodes, because at the time the Great Flat Lode which underlay these (Plate 2) had not been
discovered and much time and money was spent attempting to rectify this. In fact the eventual discovery is attributed to miners working on the West Wheal Basset set in 1869. (Palmer & Neaverson 1987: 7).

It would appear that Wheal Haste surrendered the sett in 1846 but effectively West Wheal Basset didn’t become a major producer of copper until the early 50s when a new company was formed. Copper ore sold by West Wheal Basset by public ticketing between 1852-6 amounted to 22,135 tons which is a very significant amount in just four years. (Phillips & Darlington 1857: 256). In fact 1856 was the apogee of copper production and after that there was a rapidly increasing decline until 1880 when it ceased. The history of the mine is very similar to Wheal Basset, although somewhat shorter, in that it had two obvious phases. One has already been mentioned above and the other is the rise of black tin production after 1870, not unconnected with the discovery of the Great Flat Lode.

Investment and development was considerable in the 1850s. The first priority was to drain the old workings before any explorations on lode could take place. Engine shaft was cleared out and by the end of 1851 was clear to the 94fm level. That’s 84fm below adit. In addition a new hoisting shaft was sunk vertically from the surface and finished at the same time in addition to two new ventilation winzes were sunk down to the 65 and 75 levels. This introduces an aspect which, along with drainage, the importance of which cannot be over stressed when considering mine history. As the shafts were sunk deeper, good ventilation, or rather the lack of it, and the subsequent ill health of the miners, was a concern that was never to go away during the 19th century.

A new shaft was holed from the surface and by late 1852 levels 94, 84, 75, 65 42 and 30 were being worked and copper production was increasing rapidly. By 1855 two new shafts were sunk. The first called Thomas after the chairman W.A. Thomas and the second, later known as Percy’s. The bob wall of the former still stands by the Piece to four lanes road. In 1859 a further new shaft was sunk west of the Treskillard road and close to the boundary of North Wheal Francis. A year later Grenville’s shaft was begun and was operating the following year. (Palmer & Neaverson 1987: 17).

In 1864 a Report to the Commissions on the Condition of All The Mines in G.B. was published within which there are a number of sections on Cornish Mines. C. Twite M.E. submitted a general report and one of the mines he included was West Wheal Basset. The details are quite interesting. (300).

There are four shafts upon a length of 1,530 fathoms of workings. These are:

Thomas Shaft, 110 fathoms from the eastern end down to the 154 fathom level, at which place levels are commenced to be driven. It is an engine and drawing shaft, 13 feet long and 27 feet wide. It is perpendicular to the 60; then underlays 18 inches per fathom to the 104 and is then perpendicular to the bottom.

New Shaft, 750 fathoms west, perpendicular on the cross-course to the 114 fathom level. It is 8 feet long by 5 feet wide.

Percy’s Shaft, 120 fathoms west, now sinking below the 114 fathom level, 8 feet by 5. Perpendicular to the 65, and then underlays 16 inches per fathom to the bottom.

Grenville, East Shaft, now down to the 134 fathom level, where a cross-cut is being driven to cut the lode. Perpendicular to the 94 fathom level, then underlays 16 inches to the fathom to the bottom.

He made one other interesting observation.

This mine possesses one of the best changing houses in Cornwall. Is large, light, well ventilated, and kept scrupulously clean. A constant supply of warm water is circulating
through a large trough in the floor, which is taken the greatest advantage of by the men when changing their clothes, after their underground labours are over.

Three years later Spargo (23) observed that the mine employed 300 men, 90 females and 30 boys.

Fig. 4 West Wheal Basset Sett from the 1878 survey 25 inch OS map sheet LXIII 10

The map shows Grenville’s, Percy’s and Thomas’s Shafts. Carnkie Shaft is 280 yards east of Thomas’s and Pryor’s 380 yards south east, just south of the Four lanes road.

By this time the sharp decline in copper production was well under way and it wasn’t accompanied by an increase in black tin. The mid 60s were exceedingly fallow years. In 1866 1,956 tons of copper were produced and only 10 tons of black tin. (Morrison 1983: 289).

To compound these problems water to operate the stamps was scarce and despite the fact that 16 new heads of stamps were erected, driven by the whim engine at Percy’s shaft, the mine was unable to take advantage of the steep rise in tin prices which occurred in the early 70s because of lack of stamping capacity. This even led to raw tinstone being sold off the sett for treatment. (Palmer & Neaverson 1987: 20).

The prolonged boundary dispute with South Francis was finally resolved (see below) but the limited stamping capacity was still a major headache - large amounts of raw tinstone was still being sold off the sett - and lack of available land limited further expansion. Other options had to be found and the adventurers settled on a site on the southern slopes of Carn Brea which had originally belonged to North Wheal Basset.

There were some major disadvantages with this, not least being the water supply and the distance from the West Basset shafts but these were overcome by channeling water from Thomas’ pump along a new tramway linking the West Basset shafts to the new stamps and floors. (Palmer & Neaverson 1987: 21).

Expansion continued at relatively fast rate during the 1870s and early 80s and considerable amounts of black tin was produced, 1000 tons in 1879 worth £38,170, but
the price of tin was extremely unstable and the running costs of the mine were huge. So much so that it was revealed that the debt to Tweedy’s bank had reached £25,000. (Morrison 1983: 285). The story during the 1880s decade is one of steady decline. Morrison surmises that possibly a major reason for this was the concentration on exploiting the Great Flat Lode at the expense of the rest of the mine which was under developed and using worn out equipment.

In 1890 work was still being actively pursued on Grenville’s shaft and a new branch at the 174fm level was being exploited east of Thomas’s shaft but the mine was in its death throes. Morrison says (288) that when Captain Rich arrived he remarked that ‘when he came there he found the mine a wreck, the ladders not being in a fit state for a rat to run over’. On 6th February 1892, West Wheal Basset and South Francis were amalgamated, a partnership not made in heaven, and one that was to last but a short period of time.

Between 1852 and 1891 the mine produced 85,989 tons of copper and 10,363 tons of black tin. (Morrison 1983: 288).

Before leaving West Basset mention must be made of William James. He was Mine Captain during the Basset Mines years (1896 – 1917) and during that period he kept a very interesting journal. Page 184 of the latter gives a brief history of West Basset as he saw it and as a contemporaneous view it’s worth recording.

I believe it was about the year 1842 that West Basset was first worked. It don’t appear as if any work had been done on any of these lodes previous to the above date. It was some years before much rich ore was found; at any rate from 1850 to 1860 they had prosperous days. Note also that the copper was shallow, but a little deeper than it was in Wheal Basset or North Basset. In places the lodes were fairly rich for copper down as low as the 100 fathoms level, but very little found under that level.

From 1860 to 1870 not much profit was made. Mine carried on by working branches with little deposits of copper here and there and a little tin in some of the lodes to the south of Thomas shaft. About 1870 the Flat Lode was found about the 130 level where its junction with the old copper lode. This was midway between Thomas & Grenville shafts, but on rich deposits of tin was found East and West of Grenville shaft. The junction has being at the 124 fathom level. If these had been good managed West Basset should have made good profit for 10 years from say 1875 to 1885 but the western ground was neglected which produced most of the tin, and the eastern ground developed that produced but little tin, and at any rate they kept on working – losing money all the time until 1894, then the West basset got amalgamated with South Francis, but no improvement came. In 1896 South Francis could go no further. A further amalgamation took place. The Basset Mines Co. taking and working the whole properties. West Basset at the time was supposed to worked out, but to west I found a fine section of ground producing £15,000 worth of tin, that I got away very cheaply and could easily have been taken away 20 years before, of course the Flat Lode passed into South Francis set at the 170 fathom level. The old Copper Lodes passed down through the Flat lode but nothing payable was found under the junction, these two shafts Grenville and Thomas were sunk to the 170 level on the old Copper Lodes. This property is clean worked out.

**South Wheal Francis.**

South Wheal Francis was the largest of the four setts that eventually amalgamated under the umbrella of basset Nines Ltd. It was essentially a north/south operation and Spargo commented in 1865 (22) that it ought to be divided into two so that the southern
part may be thoroughly developed. That didn’t happen and the southern section remained under developed compared to the north so the concentration here will be on the latter.

![Fig. 5 South Wheal Francis Sett from the 1878 survey 25 inch OS map sheet LX111 10](image)

The sett was situated between Treskillard and Carnkie and mined the same very productive copper – tin lodes that were also mined by the adjacent mines Wheal Basset and West Wheal Basset. Not surprisingly its history follows a similar path to those two and it ended up being ranked eleventh in the Camborne – Redruth district for the production of copper ore and twelfth for black tin. (Morrison 1983: 23). However this may give a slightly distorted view because for a short period of time, the three mines mentioned here, plus East Wheal Basset, played a dominant role in copper production. A quick look at copper ores sold at Cornwall Ticketing during the quarter ending June 1860 is quite illuminating. (West Briton 17/7/1860 p.7). The total production of copper ore of the mines mentioned above was 4172 tons, significantly greater than any other mine except Devon Great Consuls with 4912 tons.

During the speculative boom of the early 1820s some work was done on the sett but little came of it and it wasn’t until the mine was reopened in 1834 that serious investment took place. The new adventurers were granted a lease on the Grillis and Filtrick lands to the south of the sett in 1843 and by 1845 serious development had taken place. (Palmer & Neaverson 1987: 10). The following year an engine was bought costing over £1,000 and erected on Marriot’s shaft (E.C. Marriot was Lady Basset’s agent) that significantly increased the pumping capacity of the mine. By now the output of copper ore was steady between 2,200 and 2,800 tons so the output was fairly rosy entering the 1850s decade. This scenario has a familiar ring to it.

In 1854 a new lode was developed which was declared to be a new epoch in the history of the mine. (Morrison 1983: 249). And the following year it was estimated that ore reserves in the north lode were worth £180,000 whilst the south of the sett remained
undeveloped. The following year saw the construction of one of the finest skip winding plants in all of Cornwall. It was erected on a site, now lost, 450 feet from Marriot’s shaft and 600 feet from Pascoe’s. As the distances from the shafts are known it can only have been situated at two sites so an educated guess could perhaps be made here. (Morrison 1983: 250). It was one of the first applications of wire rope for winding in Cornwall and from 1861 men as well as materials were raised from Pascoe’s shaft, four to a skip.

Copper ore production peaked in 1858 at 6,256 tons and thereafter the, now familiar steady decline took place and apart from a brief flurry between 1866-9 had virtually petered out by 1873. Spargo reports in 1865 (22) that depth under adit was 154 fathoms. Pumping-engine, 75 inch. A 36 inch engine is idle and for sale. Winding-engine, 24 inch. Winding and crushing engine, 22 inch. Four water-stamping mills (44 heads). At the time there were 100 men, 20 females and 30 boys employed. The profit to date has been £190,000. He also comments on the boundary question which was currently before the House of Lords. (see below).

As the production of copper dwindled there was no immediate compensation by an increase in black tin which did not become significant until the late 1870s and even then South Francis did not show a profit as a tin mine. Morrison comments (251), “it is sad to relate, South Francis, after fifteen years as one of the brighter lights of the Cornish mining scene, spent the rest of its days as a deep, hot, wet mine, unproductive and inefficient, which fate it shared with Wheal basset and West Wheal Basset”.

Spargo mentions the boundary question and there is no doubt that this legendary dispute was one of the dominant features of the 1860s. Without going into a blow by blow account of the dispute the essential details were these. South Francis miners drove a crosscut on the 80fm level and cut a lode lying directly beneath and parallel to the boundary with West Basset. Between Treskillard and the road coming down from Four Lanes at the turn off to Carnkie. At the same time Miners of West Basset were driving south at the 40fm level which was within their boundary. (Morrison 1983: 252). You can see the problem. If a boundary is taken as line driven down vertically from a given point, who owns the mineral rights on a sloping lode? Anyway it got ever more complicated and legend has it that the ground in question lay under John Vincent’s house and this ground was an elongated triangle with it’s base being the width of the cottage. In any case the dispute dragged on, it lasted from 1853 until the final appeal by West Basset was dismissed in 1869 with costs. The first action in 1858 was won by West Basset and they were awarded £10, 000 damages. A subsequent action by South Francis reversed the decision and all the following lawsuits maintained that position until the aforementioned final appeal.

It is worthwhile putting this dispute into a rather larger context. Between 1750 and the time under discussion boundary disputes, or mineral right ownership (read money) were quite common. William Jenkin, (he was Steward of lanhydrock at the time), mentions them in his letters to George Hunt. (Jenkin 1951: 19, 55). In the first letter he complains that Thomas Kevill (then Steward of the Basset family) goes about intimidating witnesses and “who acts as an Imperious Nabob within the district”. In his second letter which concerned what was known as the ‘dispute of the Lanes’ he went slightly further. “I could never yet learn by what right or grant that family (the Bassets) presumed to attack their neighbors’ property. They must in the judgment of every candid unprejudiced man be considered as trespassers and troublesome disturbers of the peace of the neighborhood in which they reside”. It’s distinctly possible of course that his opinion was slightly biased but it is certainly true to say that landowners of the county were frequently at war with
one another in attempting to establish their claims with the Bassets often leading the
charge.

Work continued to concentrate on Pascoe’s and Marriot’s shafts and in April 1876,
driving from Pascoe’s, at the 185fm level they encountered the Great flat Lode which
naturally had an immediate effect on black tin production which increased from 23 tons
in 1876 to 879 tons in 1879. But major problems still beset the mine. Wheal Basset
decided to abandon the western side of their set adjoining South Francis which
immediately raised the problem of water ingress if the pumping engine stopped so South
Francis was forced into an agreement to buy the pumping engine on Richards’s shaft and
share the cost of running it.

Despite the fact that operations were still not profitable, mainly due to the price of tin,
shaft sinking continued. Pascoe’s was now below the 246fm level and Marriot’s below
the 200 and the Great Flat Lode was cut by the latter in 1886. But drainage problems
continued and the winder at Pascoe’s was used to raise water in skips but didn’t provide
the answer and flooding of the mine remained a serious problem with water entering from
both the West Francis and West Basset sets. (Palmer & Neaverson 1987: 13). The
financial position was now becoming acute and as has already been noted above it was
decided to amalgamate with West basset and a new company, South Francis United, was
formed in February 1892.

It faired little better. All stamping and dressing operation were transferred to the
former West Basset stamps and shaft sinking at Pascoe’s and Daubuz shafts. But losses
continued to mount up, not helped by a serious fire at Marriot’s shaft which severely
damaged the pumping engine and house with serious effects on production. The house
was later rebuilt by Basset Mines Ltd. This state of affairs couldn’t continue and on the
9th January 1896 a merger was agreed with Wheal Basset to operate as a limited liability
company called Basset Mines ltd.

From 1844-91 South Francis produced 67,823 tons of copper ore and 6,907 tons of
black tin. The figures for South Francis United, 1892-5, were 43 tons and 2,809.
(Morrison 1983: 268).

East Wheal Basset

East Wheal basset lay on the north side of the road east of Carnkie on the rising
ground east of the stream. It would appear that there was mine here during the 1830s and
then later formed part of Wheal Buller but became separated and worked as separate set
in 1851. (Morrison 1983: 323). It was a relatively short lived mine 1857-77 and even then
only a few of those years were productive. Between 1859 and 1864 9756 tons of copper
were produced, some of it very high quality.

The main shaft was engine shaft, to be joined later by New shaft, and by 1859 the
former was sinking below the 90 fm level and was active at the 60, 70 80 and 90 levels.
At the same time New shaft was sinking below the 70fm level. These were heady times
when high grade copper ore was being extracted but, even for this area, the optimism was
short lived as the quantity and grades rapidly declined when the headings became poor.

By 1866 New shaft was down to the 120 fm level and three years later to 140, the
deepest in the mine as the sinking of Engine shaft stopped at the 110fm level, but
significantly no fresh ore was found at the bottom workings and the mine began suffering
some serious financial problems. These were compounded in 1871 when New shaft
collapsed between the 60-70 levels seriously effecting production, which wasn’t great to
start with.
There were further set backs after this with the mine suffering a series of floodings and most work was carried out in the shallower levels. In fact the mine never recovered from the collapse in the New shaft. The bottom levels were never reopened and given the results found in development, there didn’t seem much point in doing so. (Morrison 1983: 326-7). The mine stagnated with scattered exploration among old workings but in 1885 the company was eventually wound up.

The total production of East Wheal Basset was 13,132 tons of copper ore, 40 tons of black tin and roughly 18,000 tons of tinstone.

Fig. 6 East Wheal Basset Sett from the 1878 survey 25 inch OS map sheet LX111 10.

The fig. has two points of interest other than those mentioned in the text. It shows Selligan which was later to become a major tin smelting works and the branch of the Redruth-Chacewater railway that terminated at Buller Downs with no obvious connection to the tramway at the East Basset stamps.

**South Wheal Basset**

Not much can be said about this mine that hasn’t already been said. The workings lie on the crest of the hill by the radio mast north of Four Lanes. From its inception in 1857, when it separated from Wheal Basset, until it was abandoned in 1868 it was a complete disaster. In total it produced 1,307 tons of copper ore.

**The growth of the village and some social aspects.**

The copper boom of the mid 19th century inevitably led to the growth of Carnkie. Of course it was nothing like the scale of lanner but circumstances were slightly different. Carnkie mines were relatively close to already established population areas, plus the fact the area was littered with villages. But grow it did.
According to the 1841 census the population was 132 with one child under sixteen working at the mines. By 1851 this had risen to 223 with 18 boys and 11 girls working at the mines. By 1861 this had risen again quite sharply to 486 with 20 boys and 20 girls doing some form of mining work. It appeared to peak here because by 1871 the population was down to 422 with 16 boys and 9 girls at the mines. This is probably not surprising because the end of the copper boom resulted in thousands of miners being thrown out of work in Cornwall and west Devon. In the eighteen months prior to 1867 it is estimated that the total amounted to 11,400, of which about two thirds left the counties. (Rowe 1953: 322). Having said that it must be remembered that the Carnkie mines did have recourse to tin at deeper levels whilst many other copper mines were knocked. In fact the employment of Wheal Basset increased by 371 between 1864 and 1870.

Spargo in his 1865 survey has 167 boys and no girls working in the mines under discussion. This has to be incorrect and it can be assumed that he has incorporated the girls in with the women. In total 1157 people were employed so a considerable number came from surrounding villages and further a field. In 1861 of the 20 boys employed from the village 9 were under 13 and similarly 5 of the 20 girls, although the latter only worked above ground. The age split is deliberate because Dr.Barham broke down the figures in this way in his report to the Royal Commission on Child Employment in 1842. His report is most interesting because there is a direct correlation between the age of starting work underground and the subsequent poor health and death of many miners. Peacock reiterated this in his medical report to the Commissions in 1864 stating that “All experience shows that when persons in early life are exposed to injurious influences they suffer from them more severely, and earlier fall under their influence, than if they had attained a more advanced age and greater constitutional vigor”.

Table of ages at which mines now suffering from Illness first worked underground from 150 miners examined.

<table>
<thead>
<tr>
<th>Years</th>
<th>No.</th>
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<th>No</th>
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<tr>
<td>8</td>
<td>3</td>
<td>16</td>
<td>15</td>
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<tr>
<td>8-9</td>
<td>2</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>18</td>
<td>8</td>
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<tr>
<td>9-10</td>
<td>1</td>
<td>19</td>
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</tr>
<tr>
<td>10</td>
<td>5</td>
<td>20</td>
<td>3</td>
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<td>10-11</td>
<td>1</td>
<td>21</td>
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<tr>
<td>11</td>
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<td>21-22</td>
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<td>11-12</td>
<td>2</td>
<td>22</td>
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<td>12</td>
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<td>25</td>
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<td>13-14</td>
<td>1</td>
<td>26</td>
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<tr>
<td>15-16</td>
<td>2</td>
<td>137</td>
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</tbody>
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Source, Bankhart, Medical Report to Commissioners on Conditions of All Mines in G.B. 1864.
Barham’s conclusions were:

<table>
<thead>
<tr>
<th></th>
<th>Above 18 or adults</th>
<th>13 to 18 or Young Persons</th>
<th>Under 13, or children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>15,500</td>
<td>2720</td>
<td>1639</td>
</tr>
<tr>
<td>Females</td>
<td>2700</td>
<td>1740</td>
<td>696</td>
</tr>
</tbody>
</table>

He took into account mines that hadn’t responded and omissions and concluded that the number of children and young persons employed in the mines of Devon and Cornwall at the time can safely be taken as between 9000 to 10000; and of these 3000 were under 13. One of the reasons for the increase in child labor was the difficulty under the New Poor Laws of 1834 of obtaining relief and fear of the workhouse and secondly the introduction of machinery for the performing of particular operations, previously executed by manual labor, had generally tended to the substitution of younger hands for those before employed. He later went on to identify the ages children were removed from school to go to continuous employment in various districts:-(803)

Illogan division:-
I regret to say that the children of the laboring classes and miners, from poverty, are removed from school at an early age, say from 8 to 10 years of age.

Reduth:-
On average about 10.

Peacock interviewed 464 miners and found the average age at which miners commenced working underground was 14.6 years and 185 of these were 13 or under.

There can be no doubt that Cornish metal mining was probably the most dangerous occupation of any pursued by significant numbers in nineteenth century Britain. The toll of men, both young men through accident and older men through lung disease was extreme. Official figures reveal Cornish mining to be the unhealthiest of employments. Mortality was more than two and a half times that of coal miners and half as much again as that for seamen. Between 1849 and 1853 an analysis was made in six mining parishes comparing two groups, miners and non-miners. Two significant facts emerged. Firstly, mortality among the younger age group (15-25) was significantly higher for miners than non-miners and secondly the death rate in middle age was more than double that for non-miners. The former figure can be attributed to accidents normally resulting from premature explosions of gunpowder; plunging falls from ladders or faulty platforms; rockfalls; or incidents involving the lifting or pumping machinery. Deaths from accidents accounted for 25% of miners dying between the ages of 20 and 30 in the four central mining poor law districts between 1837 and 1847. (Rule 1998: 159-161).

The higher mortality rate in the older age group was due to the impact of working in oxygen–deficient underground levels, dust in suspension, exhausting climbs up ladders and the sudden change from hot to cold when leaving the mine. (Report to Commissioners 1864). Without doubt the greatest toll was taken by phthisis (lung disease), much of which could have been prevented. Dr. Bernays concludes his report on the air of mines to the Commission in 1864 with these comments.
The effects of bad ventilation are two-fold. 

a. It affects the health and duration of life.

b. It also directly diminishes the working power of the individual.

There is no greater proof of its effects upon the duration of life than the distressing fact which thrusts itself upon the notice of the observer in all mining districts, that almost all of the male sex are cut off in comparatively early life. The ordinary limit of life among them is from 40 to 45; it is rare to see a man the age of 50..................... It is well known that miners are subject to a peculiar disease in which the lung becomes charged with a black deposit. The nature of the deposit has given rise to considerable discussion, but I have proved it beyond doubt to consist of finely divided particles of carbon. Now, in my experience I found the air abounding most in such floating particles in the immediate neighborhood of burning candles, and my attention was accordingly directed to the wretchedly bad candles employed. I believe the miners suffer far more from the finely divided carbon from these candles with their flaring wicks than from the blasts of gunpowder.

Ironically the candle acted as the metal miners’ canary. If the candle burned then the air was okay and if it didn’t then the air was ill-ventilated. In fact this was a false assumption because candles could burn in air that was already harmful. The following is a brief account of a miner who worked for many years in North Basset written in 1864 as part of the Report already mentioned.

First worked at North Downs for 12 months, at good air, and then went at East Wheal damsel for two or three years, in good air. Then went to Wood mine for two or three years in the 80fm level. The air was bad there and the candle would sometimes hardly burn. Felt ill effects from it. Then went to North Basset, where he has now worked nearly 17 years. Has worked in a quantity of bad air there. The worst air he has ever worked in was in the 40fm level. The candle could scarcely burn and he could hardly breath, and when he came into fresh air his legs would tremble so he could hardly stand. He worked in that place for two or three months. After that he worked in the 70 level, 100 from shaft for two or three years. “That done me up, and I was never worth anything after that”. He went on to say, “I think a score of men worked in that bad place and left because they could not stand it. Many of them are now dead”.

The result of all this was that mining communities contained a high proportion of widows with large families to support. There is no reason to suppose that Carnkie was any different in this respect. In fact the proportion of widows to total female population in Cornwall in 1851 was higher than in any other county. (Rule 1998: 162). This naturally increased the pressure on the children to seek employment to put bread on the table.

This is, perforce, only a brief foray into some of the social aspects of mining but it’s important and often understated. Cornwall, and individual parishes, is justifiably proud of its mining heritage but when one gazes around the landscape at Carnkie it should be remembered that it was achieved at no small cost to the community.

**Basset Mines Ltd.**

Basset Mines Ltd commenced formal trading on the 7th. February 1896 operating the mining setts of Wheal Basset, West Wheal Basset, South Francis, and part of North Basset. It had a nominal capital of £100, 000 and was under the guidance of Francis Oats, who was the largest shareholder. (Barton 1867: 220). The other directors were Thomas B.
Bolitho, Thomas Robins Bolitho, George Carter, Philip Henwood, John Mayne, Henry Olds, Michael H. Williams, Francis Freatly Oats, Horton Bolitho and Captain W. James was the mine manager. Many of whom were pillars of the Cornish mining hierarchy. But the driving force was undoubtedly Oats.

Oats had great experience in mining and a great deal of faith in Cornish tin mining. He’d emigrated to South Africa in 1874 and eventually had attained control of the Kimberly diamond mines and a directorship with De Beers. It was his faith in Cornish mining that led to the long term strategy of Basset Mines to put virtually all their eggs in one basket and enlarge and sink Marriot’s shaft on the old South Francis sett. The thinking behind this was that tin would hold down to the 1000fm level and Basset could then rival Dolcoath using the same principle as the latter by centralizing all pumping and winding, updating all appliances and by-passing the bottle-neck imposed by crooked engine and hauling shafts. (Barton 1967: 220). Unfortunately this idea turned out to be geologically unsound and not a little expensive.

![Fig. 7 Marriot’s Shaft from 25 inch OS map 1906 Survey Sheet LX111 10](image-url)

Work started immediately on Marriot’s but it meant that for three years it was unproductive. The shaft that was originally crooked was cut down and enlarged and it was decided to put in a compound 40inch/80 inch Davey Cornish engine for pumping to
500fm depth, with room in the engine-house for a second subsequent engine for the next 500fm. (Barton 1967: 226). A new boiler house was erected and a winding engine was built by Holman Bros of Camborne at a cost of £3,600. This was followed by new headgear for the shaft at a cost of £1,400 and the double deck cages could be wound to a high level gantry along which trams of stone could be pushed to the crusher hoppers nearby. (Palmer & Neaverson 1987: 34).

During the barren years at Marriot’s work continued elsewhere on the sett although the West basset stamps lay idle during this time. All stamping being done at the Wheal Basset stamps and all pumping had been done by Lyle’s and Thomas’ pumps although during 1897 the latter was damaged by fire and arson was suspected as it was with the previous fire at Marriot’s. The following year the company was given license to exploit the abandoned sections of West Basset and the adjacent section of West Wheal Francis so development work was started on Grenville’s shaft.

The dressing floors at Wheal Basset and West Wheal Basset were revamped with many of the old floors being replaced. This was in anticipation of the increased output from Marriot’s and Grenville’s shafts. Further modifications to the surface installations included a new building to house 20 vanners in 1902 and in the same year 140 flat frames and eight round frames were built in the valley to the east of Miners’ shaft at the head of Church Combe. During this period (1901-2) black tin sales rose from 568 to 793 tons.

All of this surface reconstruction was hideously expensive and more money had to be raised. This was done by raising the share capital to £120,000 by issuing 20,000 new ordinary shares at £1. The in 1904 an old enemy returned with a vengeance. The winter 1903-4 was exceptionally wet and pumping costs rose rapidly and the bottom levels of some mines, including Basset mines were under water. At the latter no tin ground was available below the 190fm level for nine months and concentration had to be on the side lodes and this resulted in a loss of £2194 pounds despite the high prices of tin. Decreasing lode value was much anxiety and there was a desperate need to make a rich strike. (Barton 1967: 232). At this point it’s very interesting to read another small extract from the journal of Captain James concerning the price of tin 1832-1906. (P.116).

.......But for years previous to 1898 the best Black Tin (i.e unsmelted) only brought £40 per ton and as low at times as £32. From 1899 it began to rise and went to £150 per ton, back to £110, up to £140, back to £120, until in 1905 it continued to rise as far as I can see as not reached the summit as yet, now at £188 per ton, and with all of it, this mine is so poor that I can’t make over £500 per month profit.

Te fact is for the last 18 months we have had no tin in any of our Ends worth speaking about. I feel it very much as I know the outside world thinks something else must be wrong.

The long term strategy of developing Marriot’s was proving an expensive failure with a profit in 1909 of £86 12s 6d, although this could be deemed a success compared to the loss the previous year of £4358. The chief problem lay with the cost of pumping. For example in 1902 the coal consumption of the sets was a colossal 15773 tons which translated meant that a ton of coal was burnt for every three tons of ore raised. (Barton 1967: 239). To try to get a handle on this, consider that in 1909 the mine was pumping three million gallons per day, two to four times as much as any other mine in Cornwall. The deepest shaft was 1,940 feet compared to 3,000 feet at Dolcoath. At this time the mine employed 542 staff but there was a high cost of developing work for every ton of tinstone treated relative to other mines. (Palmer & Neaverson 1987: 37).

The next four years seem to have been comparatively calm with most of the production coming from Pascoe’s and Marriot’s shafts and a link was made at the 310fm
level between Marriot’s and Lyle’s with the hope of penetrating the Great Lode. That
sounds a bit familiar. The exploitation, or not as the case may be, of the Great Lode,
played a significant role in the strategies of the mines around Carnkie for about forty
years.

But the end was nigh. The outbreak of war in 1914 coincided with a disastrous year for
the mine and a loss of £14,145 was reported. Labor also now became a problem because
men were leaving to fight in the war and this naturally resulted in a drop in output so
losses continued, compounded also by serious damage sustained by the pumping engine
at Pascoe’s shaft. A new engine was eventually built by the Worsley Mesnes Ironworks
at Wigan, retaining the original beam made by the St. Blazey foundry. This was the last

The decline continued and in 1915 G.F. Basset sold his mineral rights and then his
estate and within two years Captain James resigned after serving the mine for twenty six
years although he did remain as a director. Losses continued to accumulate and
eventually the creditors stepped in and pumping on the mine stopped on the 21st
December 1918 thus bringing to a rather sad conclusion the centuries of mining in the
district.

Smelting.

In early times the smelting of the tin ore into white tin would have taken place near to
the mine and carried out by the tinners themselves. A small pit would have been dug an a
fire kindled upon which the stones would have been thrown and the metal later
recovered from the ashes. This later developed into what became known as “Jews”
houses. The derivation of this name has led to many complicated explanations over the
years, one plausible and fairly obvious one being that it came from the Cornish chew
(house) but there are many others with which we needn’t concern ourselves. (For a
detailed discussion see Pearce & Fry (ed) 2000). Anyway they were inverted cones built
of hard clay, about three feet broad at the top and three feet deep. The bottom of the cone
was then subjected to a blast of hot air created by bellows that melted the tin which then
flowed out of the bottom. (Jenkin 1927: 68).

Later, improved methods of smelting were introduced and it was no longer necessary
to fuse the tin twice. This heralded the introduction of the “blowing House” process and
that was entirely separate from the mining of the ore and the tinners. It’s difficult to pin
down a date for this transition but it seems likely that blowing houses were in general use
about the middle of the fourteenth century. The blowing house was a pretty crude affair
and consisted of a structure of rock and turf with a thatched roof. Every so often it would
be deliberately burnt down to extract the tin that had collected in the roof. These houses
were often rented by the landowner whose land on which they stood to the blowers. In
1659 “Chitroose” blowing house was let by John Basset to John Mill for a yearly rent of
26s. 8d. This house was north of the current Barncoose roundabout. Blowing houses
continued for a number of years using charcoal as a source of heat until the invention of
the reverberatory furnace in 1702 and the use of pit coal which gradually superseded
them, although this took a number of years.

With the reverberatory furnace the ore could be smelted easily without coming into
direct contact with the fuel. This is the origin of the so-called Cornish method of tin
smelting. The ore, mixed with finely crushed anthracite or culm, was charged upon the
bed of the reverberatory furnace and heated until reduction was complete. The less
fusible and pasty slag was then drawn from the furnace, while the completely melted
portion, or “glass,” was tapped out with the liquid metal. The former was then removed
and the metal purified. This method essentially remained unchanged except smelters such as the one built at Seleggan on what used to be the East Basset dressing floors could handle tons of ore instead of hundred-weights. (Lewis 1908: 26).

During the 18th and 19th century the smelters were very influential and operated a virtual cartel. The depression of the late 19th century caused a breach in this ring and new smelting works began to emerge that didn’t play by the old rules. That is buying tin by private contract at prices below a fair market value. One of these was at Seleggan (Carnkie), which had previously been the East Basset dressing floors, which was set up in 1887 by the Cornish Tin Smelting Co. Ltd. The partners in this enterprise were Alfred and J.C. Lanyon, John R. Branwell and John Jose who were major shareholders in the lucrative East Pool mine where most of the ore for the new works originated. (Barton 1967: 190).

In the following years the new companies, including the Cornish Tin Co. at Sellegan, ticked along quite nicely having rested most of the trade from the former cartel whose plants had all gradually closed down. But dark days were just around the corner. After the Great War the world’s tin smelting capacity was a third in excess of world consumption which is a situation that is untenable. Gradually major smelting works began to close, starting with the large American works, and in Cornwall the effect was quickly felt when in 1920 the London Tin Smelting Co. ceased to buy ore. By 1923 all the works in Cornwall had closed bar one and Sellegan was left as the only one active in the whole county. The latter was dependant on foreign ore with ninety per cent of it emanating from either Africa or South America. During this same period Cornish tin ticketing had died a natural death. Or as the Mining Magazine put it in June 1920, ‘this ancient comedy appears to be nearing its end’. (Barton 1967: 266).

In Cornwall hopes rested on new mining enterprises at East Pool, Tolgus and Roskear but the expected returns did not materialize and tin production in Cornwall had virtually ceased by 1930 when the trade depression had the world in its grip. The same depression again brought about over capacity in the smelting industry and in 1931 the sole remaining works in Cornwall at Sellegan closed for ever thus ending a unique Cornish industry that had lasted over two thousand years. It was doubly unfortunate because during the previous decade a programme of expansion had been going on at Sellegan and four new furnaces, each with a two ton capacity, had been installed, giving an overall capacity of 350 tons of black tin per week. Unfortunately this expansion was taking place when, apart from a brief boom, world demand was moving in the opposite direction. (Barton 1967: 278).

**Railways and Tramways.**

The introduction of the railways and tramways was a long awaited lifeline for Cornish mining in the 19th century. It revolutionized the transport of ore, coal and timber. To get an idea of the scale of this, prior to the introduction of the tramway at Portreath it took about 1000 mules a day to carry the ore in two to three hundred weight packs. The tramway replaced these with three ton horse drawn wagons. (Buckley 2005: 129).

The umbilical cord that breathed life into the mines around Carnkie and later the Basset Mines was the Redruth-Chacewater Railway, although in fact it never did extend to Chasewater. The railway was laid to the gauge of four foot and was horse drawn until locomotives were introduced in December 1854. It was essentially a mineral line and never carried passengers. Not officially anyway. Its only purpose was to carry ores from the mines south of Redruth and Chacewater to the harbors at Devoran and Point and to transport coal and timber back.
It was a private line owned by John Taylor and sons and the first section from Wheal Buller to Narabo quays was opened in June 1824, soon followed by an extension to Devoran. The following year the line was further extended from Lanner Hill to Redruth. The busy Wheal Buller branch crossed the main road just below the brow of Lanner Hill.

According to Dart (2005: 65) between 1847 and 1851 the line was extended west for half a mile from Wheal Buller to East Basset stamps and South Wheal Francis mines and possibly even further west but it apparently closed west of Wheal Buller at an unknown date. It certainly doesn’t appear west of the East Basset stamps on a map in 1856 (Barton 1960) although the fact that it extends that far may be significant.

During the copper boom of the 19th century the railway carried all the ore from the four main Carnkie mines, South Francis, West Wheal Basset, Wheal Basset, and North Basset. But coal was the most important traffic and continued to be so for the remaining years of the line. During the last few years of the railway Basset Mines Ltd and the smelting works at Sellegan became the most important customers of the railway. The tin now being raised from the Great Flat Lode was essential to its viability. The Sellegan smelting works not only supplied a useful source of traffic in ingot tin but required a lot of coal for its furnaces. About 1,000 tons of metal a year were sent down to Devoran in twice weekly consignments. (Barton 1960: 72).

Ironically it was the decision by Basset Mines Ltd in 1915 that drove the final nail into the coffin of the railway. It decided on a new policy of purchasing coal delivered to them at the colliery’s expense and using Portreath and the Great Western branch from there to Lanner Hill. As a result of this the line was closed to all traffic on September 15th.

If the railway was the umbilical cord of the Mines around Carnkie the tramways were the arteries within the complex. They were a narrow 1ft 8in gauge and were horse drawn except for one engine that was introduced in 1909. This was a 0-4-0 well tank built by Orenstein and Koppel. (Dart 2005: 1). At this time the system was operated by Basset Mines Ltd but part of the operation had been introduced at an earlier date.

As has been noted above when West Basset opened their new stamps in the early 1870s they also built a tramway to connect them with the main shafts. This
tramway traveled south crossing the Piece-Four lanes road just east of Piece where it eventually split with one extension going to Grenville’s shaft and the other to Marriot’s. In Higher Carnkie the tramway started at the East Basset stamps and called at Theager’s, Robert’s, Richard’s, Steven’s shafts before terminating at Samson’s. At some time around 1908 it was further extended to Marriot’s shaft making it about 1200m in length. A third line was added connecting the West Basset and East basset stamps. This entailed tunneling under the road in Carnkie. This tunnel had been buried under mine dumps but was re-discovered during work on the Cornwall Mineral Tramways Trail and was subsequently repaired and re-opened in 1997. (Dart 2005: 2).

Fig.9. The tramway system from the 1906 survey 6 inch OS map LX111 SW. The Extension to Marriot’s shaft had not yet been completed.

Conclusion
The mines around Carnkie have been worked for centuries. Initially on the relatively shallow near vertical lodes in the area and then later the Great Flat Lode was exploited with varying degrees of success. Undoubtedly the apogee of their history was the mid nineteenth century when they became pre-eminent in copper production in the area. Without question Wheal Basset can be classed as one of the great Cornish mines.

Fortunately the area has been spared much of the urban re-development, construction of housing and industrial estates that has obliterated much of the surface evidence for the famous mines to the north of Carn Brea. It is only in the landscape between Carnkie and Piece that one can truly grasp the scale and extent of a large and successful 19th century Cornish mine. ( Sharpe 1992: 5).

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References


Dart, M., Cornwall Narrow Gauge, Middleton Press, Midhurst, 2005.

James, C.C. A History of Gwennap, published by the Author, 1952.


Morrison, T.A. Cornwall’s Central Mines; The Southern District 1810-1895, Alison Hodge, Penzance, 1983.


