

Abercarn Blast Furnace

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Introduction

This article describes a previously unrecorded blast furnace situated in Abercarn (ST 216948). It was first recognised in the autumn of 1993 by the authors who for many years have been intrigued by stories and reports concerning Abercarn Ironworks. All traces of these ironworks were previously believed to have disappeared; the present article demonstrates that this is not the case.

The early history of the iron trade at Abercarn is fragmentary. It has been said that a furnace at Abercarn was in production in 1576 or a few years later; this seems to have been located in the upper part of the Gwyddon Valley at ST 243963 (Graig Furnace) but only a few fragments remain today. It appears to have been founded by Edmund Roberts of Hawkhurst in Kent after he had been granted woods and minerals, jointly with Richard Hanbury, by the Earl of Pembroke. Three years later he died in debt and the works subsequently came into the possession of Hanbury.¹

Bradney quotes a letter dated 27 February 1748 from Charles Van of Llanwern to the Reverend Henry Burgh which mentions the failure of an Abercarn (Ironworks) Company.² Little seems to be known about this company. But in 1750 John Griffiths who had been Manager for Capel Hanbury at Pontypool built a new ironworks at Abercarn though he is said to have remained there only for seven years. (We believe that there may be a mistake in the letter quoted by Bradney which should have given the date as 1758; this would fit in with the foregoing.)

The next ironmasters of whom we have any record were the Glovers of Birmingham who carried on a lucrative trade at Abercarn for about 25 years. Lloyd records that 'in 1783 we find Messrs. Joshua Glover and Samuel Glover of Birmingham carrying on an important business there and entering into a contract with Anthony Bacon, senior, of Cyfartha for the supply of 800 tons of pig iron yearly'.³ The pig iron referred to was carried over the hills from Hirwaun to Abercarn on the backs of horses or mules, a distance of about 38 km but the exact route is unknown.

Archdeacon Coxe took note of the iron trade at Abercarn when he visited this part of Monmouthshire in 1800. In his 'List of the Principal Manufactories in Monmouthshire' mentioned in his itinerary he notes that at Abercarn there was a 'pitcoal forge and charcoal wirework and a charcoal furnace not listed';⁴ these belonged to S. Glover Esq.

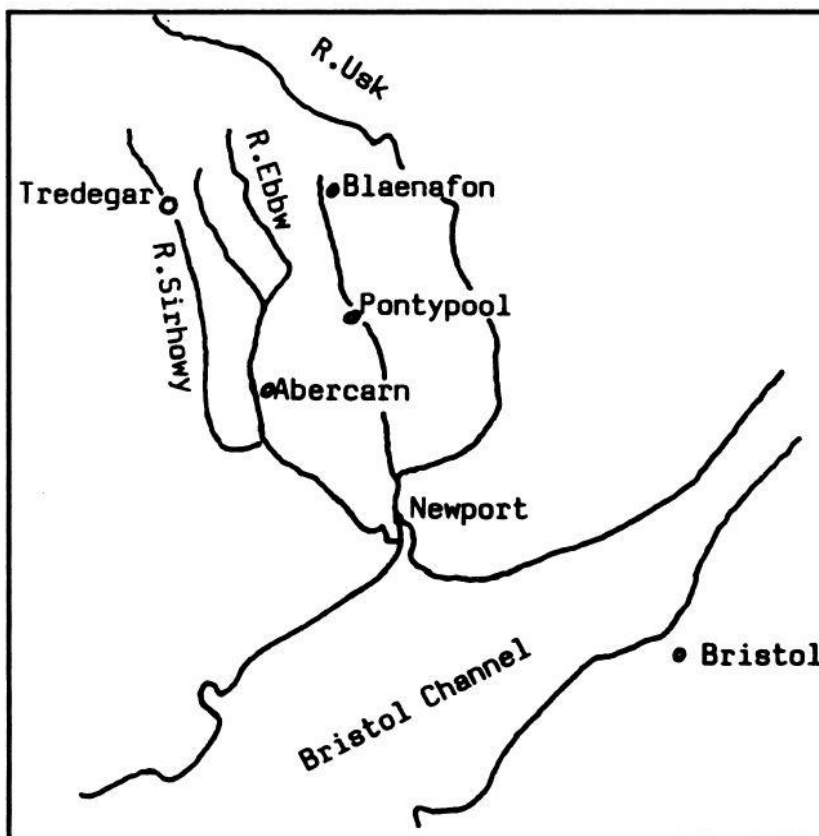
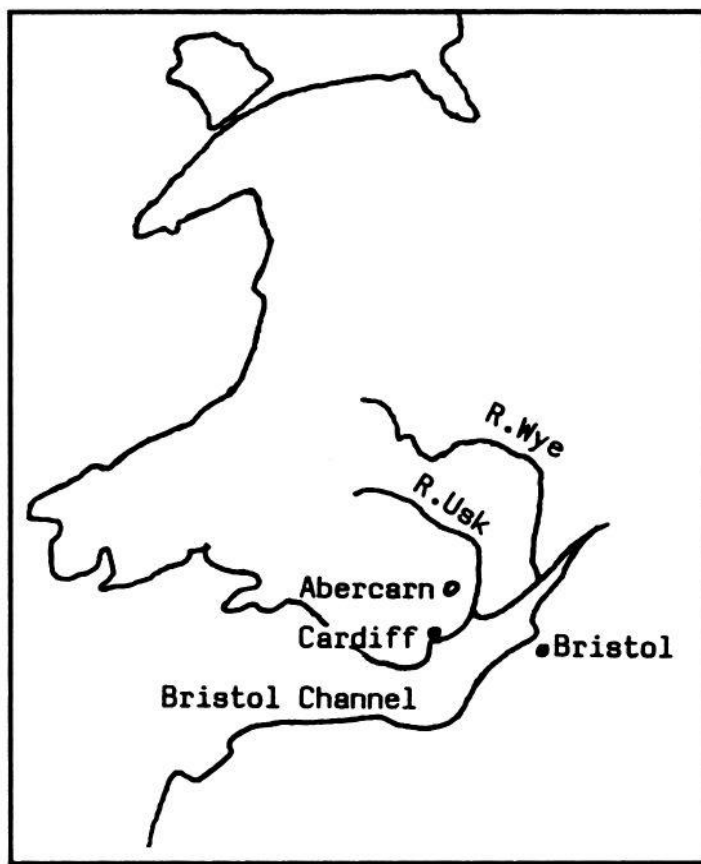


Figure 1: Abercarn in south-east Wales

Coxe remarks that 'between Newbridge and Risca, numerous houses, mills, forges and hamlets are scattered on the side of the canal and on the banks of the Ebwy, and the whole valley became a scene of bustle and activity'. He goes on:

I passed on the left not less than four of those wooded glens which are frequent in these parts; they are called cwms by the natives, and give a pleasant diversity to the uniform range of hills; rapid torrents rush down their hollows, and after supplying the canal, pour in superfluous waters into the Ebwy; one of these called Carn, which descends from Mynydd Maen gives the name of Abercarn to the place where the principal ironworks are situated.⁵ [Here Coxe appears to have confused the Carn with the Gwyddon.]

Abercarn tin plate works, developed on what we now know to have been the site of the mid eighteenth century ironworks site, continued into the early 1980s.

It is clear that besides the earlier furnace in the upper part of the Gwyddon valley [Graig Furnace] there was an ironworks at Abercarn with a forge, wirework etc., and that this was in operation round about 1750. Such a works needed a supply of pig iron. Abercarn ironworks was in business thirty years before the agreement with Anthony Bacon for Hirwaun pig iron to be taken to Abercarn, so either there was another, unknown supplier of pig iron to Abercarn works, or Abercarn was capable of producing its own pig iron - it had its own blast furnace. It seems probable that such a blast furnace would have been laid down at the same time as the other parts of the ironworks, and would have been at the heart of Abercarn ironworks.

At the start of our project, the authors speculated that there had been a blast furnace at Abercarn, and that something happened to make it inoperative. Abercarn blast furnace is listed as being blown out before 1788.⁶ That date and the 1783 agreement with Bacon for Hirwaun iron seem to us to be too close to be coincidence. We believe that the Hirwaun pig iron was needed at that precise date because the Abercarn blast furnace was no longer in use. It may well have been the 'Charcoal furnace not in use' mentioned previously by Coxe.

Incidentally, Philip Riden reports the existence of an early charcoal blast furnace at Abercarn though the grid reference given, taken from the site of a 'Furnace' marked on the 1846 Mynyddislwyn tithe map, indicates a position about 100 metres to the west of the present find.⁷ There is now no trace of a furnace at that spot but the map does show the outline of the old blast furnace and charging house found by us. This outline shape also appears on the Ordnance Survey maps of 1878, 1901, 1912 and 1920.

Discovery of the Blast Furnace

The authors believed that there had been a blast furnace associated with Abercarn Ironworks. Like others before us, we believed the works to have been lost under a tinplate works, which in turn was lost under a modern industrial estate. We were interested, therefore, in any industrial ruins in Abercarn.

In the middle of Abercarn there are some old buildings, which appear to have had industrial rather than farm origin (see fig 2). They have been looked at many times but local legend has put them as having been associated with the first Abercarn colliery. That colliery had been started in 1836 when Benjamin Hall, Lord of the Manor of Abercarn, granted a lease of land to the Monmouthshire Iron and Coal Company, to sink a colliery to get coal. This No. 1 Pit was a single shaft, which today lies in the ground of a builder's merchants yard. Immediately opposite that old colliery site, across the Nant Gwyddon, lie the old industrial buildings that had attracted our attention.

Looking at those old buildings again in the autumn of 1993 we saw something that needed further investigation. Permission was sought to enter a garden whose back wall was a west facing, solid stone built structure, attached to a roofed building that was being used for storage (see fig 3). Domestic waste had accumulated at the end of the garden against the wall of the structure that interested us. A damp morning session with shovels removed the rubbish to reveal a recess in the stone wall with a cast iron beam lying horizontally within that recess. Immediately below the iron beam was a modern concrete path at the end of the garden. Between the concrete path and the iron beam, the recess in the stone wall sloped inwards at the side and backwards from the top. Six features in particular caused us great excitement:

1. The cast iron beam, assumed to be a lintel over an inward sloping wall.
2. The recollection of elderly gentlemen in the area who talked of an 'arch' or opening in the eastern wall of the structure (mentioned on the following page).
3. The top course of a stone arch, with stones set radially, just visible above a modern footpath a short distance away on the same stone wall.
4. The top of a stone arch in the eastern wall of the structure, opposite the above mentioned western facing arch.
5. A stone building above the stone arches, which is today being used by a local craftsman. We believe it to have been the correct size and in the correct position to have been the charging house connected to what we believe to have been a blast furnace. The arches in the walls, mentioned above, would have been the ends of the bridge arch.
6. The relative position of the structure to water - the Nant Gwyddon, a pond upstream, and traces of leats in the immediate area.

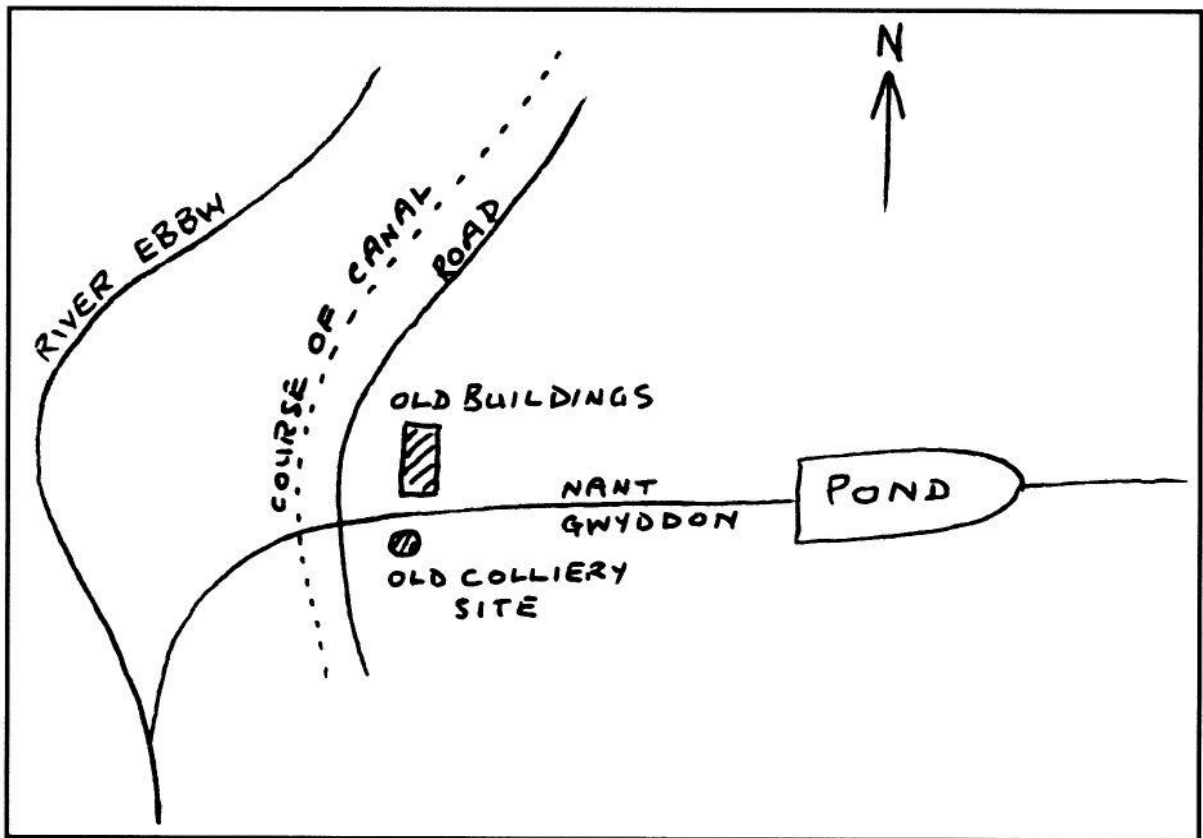


Figure 2: the site of the 'old buildings' in Abercarn

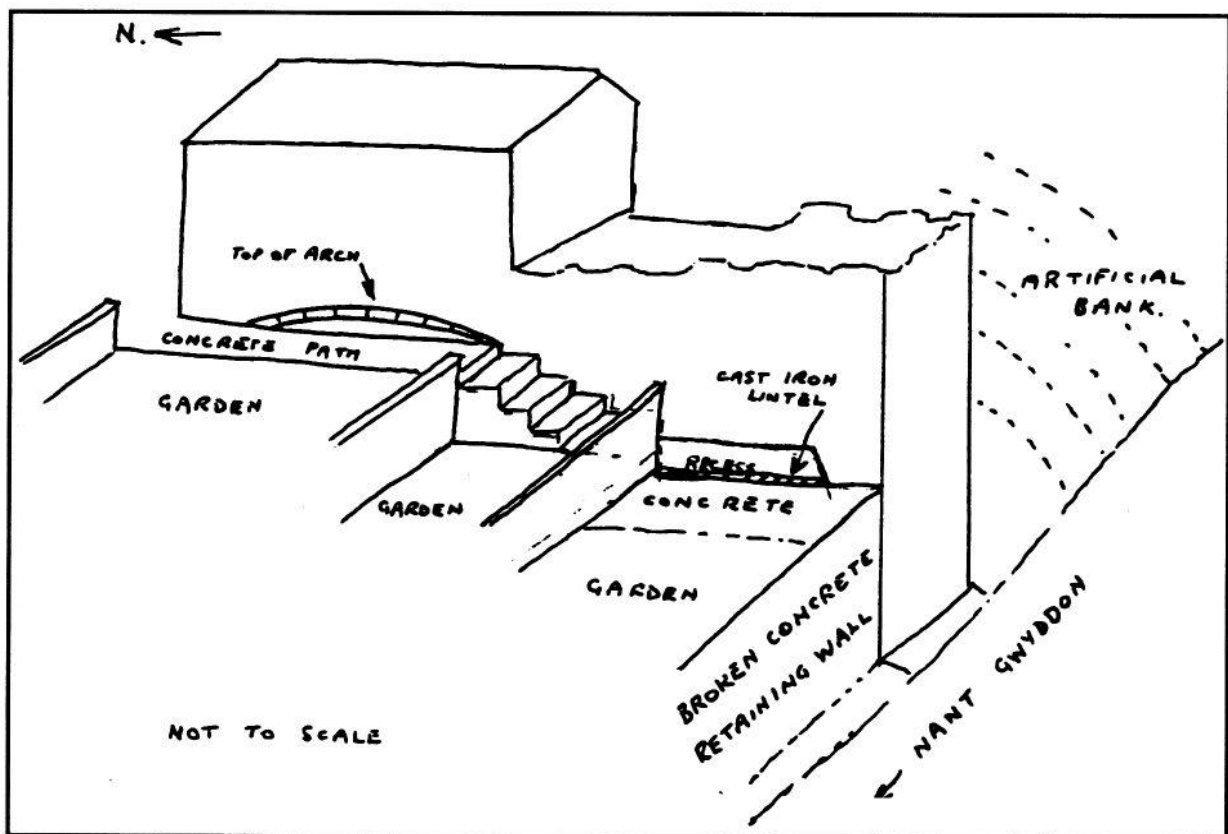


Figure 3: the stone structure analysed

Plate 1 shows the area in the 1920s. On the left is the long-disused headgear of the first Abercarn colliery. The tall stack was across the other side of the Nant Gwyddon from the old buildings and was a part of the old colliery. The old buildings that interested us are partially hidden by the tall stack.

A further point of interest is the fact that there is a stone arched bridge to the west of the supposed furnace site. The bridge carries the road through Abercarn from Crumlin to Newport. Only the western arch of the bridge can be seen. The eastern end is under a row of twentieth century buildings, which are now shops. It is possible that the bridge was built to carry the road over the extraction route from the cast house, attached to the supposed blast furnace. Pig iron from the cast house would have travelled in a westerly direction to other part of the Abercarn ironworks. Also in that direction was the Crumlin branch of the Monmouthshire canal, opened about 1799. We felt that there was sufficient evidence to suggest that the stone structure that had interested us was a blast furnace, with charging house and bridge arch. It was clearly a find worthy of further investigation.

A number of elderly gentlemen were spoken to, all of whom had spent their youth in the Abercarn area, and all of whom could remember the stone structure having a stone arch in the eastern wall with an opening going under the building that exists today. Ponies were taken under that archway to await shoeing in the blacksmith's shop above (the supposed charging house). The stone structure that was interesting us has for long been associated with collieries in Abercarn. It was thought of as being another old colliery building. However, we believe it to have been of earlier origin. We accept that ponies could have been taken under the bridge arch. Use was being made of a convenient structure, after the old furnace blowing mechanisms had been removed. The structure was old enough to have lost its original identity.

Description of the Blast Furnace

The buildings were on the north bank of the Nant Gwyddon, or Gwyddon Brook, a tributary of the River Ebbw which enters the Ebbw at Abercarn.

Surviving visible remains are the furnace itself, which was built with foundations almost in the Nant Gwyddon, a long charging bridge, and a charging house above the bridge. The charging house held the raw materials before they were tipped into the top of the furnace. A schedule of 1793 gives the dimensions of the above as 67 feet by 28 feet (furnace and bridge) and the surviving remains correspond almost exactly with those figures.⁸ The same schedule lists an adjoining casting house 40 feet by 24 feet, and a separate charcoal house 102 feet by 28 feet. The presumed site of the casting house is now under a garden. We believe that the recess in the western facing wall and the cast iron lintel,

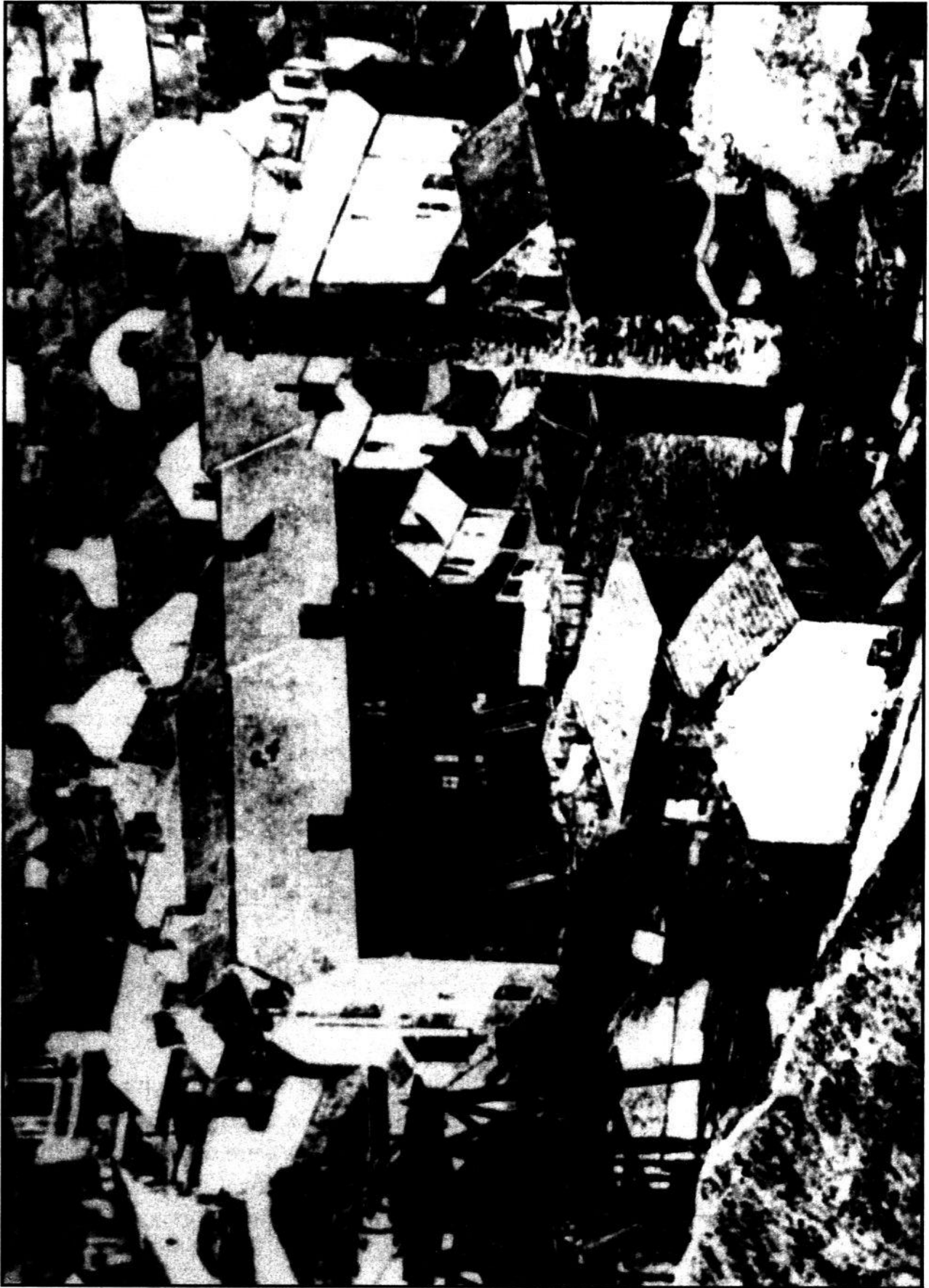


Plate 1: Abercarn in the 1920s (courtesy of Mr. Dave Thomas)

that first interested us, was in fact the tapping arch, and that the casting house would have been in front of it, to the west of the furnace. The charcoal house site has been destroyed and built on early this century, but the 1880 Ordnance Survey map outlines a building of that size aligned west-east to the western side of the charge house.

Surviving remains are built of local Pennant sandstone with some dressed stone used as quoins. The charging or bridge house is almost complete on the western outside wall, but the eastern wall has been rebuilt. The roof is not original, but the doorway at the northern end is, still with a wide low arch at its head.

The furnace itself consists of a substantially built tower some 8.6 m wide at the base at its southern end and about 6.10m high to the level of the charging floor. The lowest visible courses of the structure are less than a metre above the present level of the Nant Gwyddon. We feel sure that the level of the Nant Gwyddon today is higher than it was 250 years ago, and there is nearby structural evidence in the water to support this belief. A little downstream is a weir, probably of a later date, to direct water to other parts of the ironworks, or later still to the tinplate works.

The furnace, charging house and bridge are built as one structure with no break in masonry visible on the western side. The top of the furnace is buried beneath rubbish. Around the top of the charging floor the outside walls of the furnace continue upwards to form a low parapet about 0.6m above the present floor level. We believe that these parapeted walls are the truncated remains of the wall which once rose to the same height as the eaves of the charging house and supported a roof whose ridge was continuous with the charging house.

There is little or no inward batter on any of the sides of the furnace, although the top of the furnace is only 8.2m wide. The difference as compared with the dimensions at the base is accounted for by a rebate visible on the western side 5.3m above ground, level with the top of the tapping arch of the furnace. Because of the build up of ground on the western side of the furnace (the gardens of the adjoining houses and shops) it was not possible, at first, to examine the tapping arch in detail, although a cast iron lintel approximately 4.3m in length could be seen. The visible part of the lintel is not its total length because the northern part of it is buried under an adjoining garden.

The lintel is 560mm down into the recess and is 220mm wide. The garden level has a thin concrete path, set into the tapping arch recess, up to the bottom edge of the cast lintel. Further visits to the site revealed many fractures in the path, which easily broke away revealing a loose, dry infill of ash beneath, presumably domestic waste. The ash had settled away from the under-face of the tapping arch leaving a clear gap that a torch could be shone down. Gentle clearing of the ash revealed two further cast iron lintels, each 220mm wide,

the spacing between each being 950mm. Interestingly, below the second lintel, the slope of the tapping arch increased. All lintels are open-cast, so there will not be any identifiable mark cast on any of them. Further clearance of ash was considered inadvisable. It is presumed that there would be at least another lintel before reaching the hearth itself.

The blast furnace was the heart of Abercarn Ironworks, which included an Osmond Forge, Wiremill, Tilting and Turning Mill, Great Forge and a Rolling Mill. The Osmond Forge was a specialist end user of the iron from a charcoal blast furnace, and this fact, together with source and documentary evidence, suggests that the new find was a charcoal blast furnace.

The blast furnace, and the Tilting and Turning Mill, a short distance higher up the Nant Gwyddon, was powered by water from the Gwyddon. There was a pond in the valley bottom, up stream from the furnace, and from it ran two leats to the furnace. No trace survives of the water wheel or the wheel pit, but boundary hedges suggest the position of leats. The water wheel was unusual, if not unique, in having two supplies of water to drive it. A lease of 2 February 1807 reads - 'A head of water of about 21 feet (but 36 feet head and fall may be had for about 6 months in the year without prejudice to the Tilting and Turning Mill above it, but the 21 feet may be used at all times)'.⁹ This suggests to us that the wheel could be breast shot from a leat or backshot from a higher launder.

Having gained access to the chamber beneath the bridge arch, it can clearly be seen that on the western wall, the arch was covered in. The wall of the structure was continued across the opening caused by the arch. This was no temporary infill, or a later addition, because the stone work is keyed into the wall to the north and south of the arch. On the eastern side, the wall is not continuous, and has suffered from the collapse above of part of the arch. We would not expect the eastern archway to have been completely filled in because there had to be access for the shaft from the water wheel, and access to repair or replace blowing equipment. However there is enough wall visible, low down, to suggest that the eastern archway was at least partially filled in. If the entire structure was covered with a rendering of mortar, or lime wash, to keep the weather out of the stone work, then the long bridge arch would not have been noticeable from the outside.

The waterwheel which drove either the bellows or cylinders would have been located against the eastern wall of the charging house, presumably housed in a stone wheel pit. No trace of the wheel pit is visible today, as the ground level on the eastern side of the site has been greatly raised. An inventory of the Abercarn Estate dated 2 February 1807, lists under the furnace site 'A head of water of about 21 feet (but 36 feet head and fall may be had for about 6 months in the year, without prejudice to the Tilting and Turning Mill above it, but the 21 feet may be used at all times)'. As already mentioned, this suggests to us that the wheel could be breast shot from a leat or backshot from a higher launder. We have calculated that the water wheel was about 10 metres in diameter.

Using information gained from observation on the ground, as a result of minor excavation (see plates 2-5), and that gleaned from old documents, we have been able to put together a picture of how we imagine Abercarn blast furnace would have looked during its working lifetime in the mid to late eighteenth century.

That information was further interpreted by Mike Blackmore who was commissioned by the Oxford House Industrial History Society to produce an artistic reconstruction, which is included on the cover of this journal with his kind permission.

A schedule of 1793 lists a casting house measuring 24 ft by 40 ft, which must have stood against the western wall of the furnace, occupying the entire width of the furnace less a few feet at either side. There is no sign on the visible western wall of the furnace of a join with the casting house and it is impossible, at present, to investigate the furnace wall below the level of the tapping arch.

Since the tapping arch can be seen, the position of the blowing arch on the northern wall of the furnace (under the bridge arch) may be inferred without doubt. This is at present completely inaccessible due to a collapse of part of the bridge arch, but was presumably similar in form to the tapping arch.

The charging bridge and charging house, as already noted, form a single structure with the furnace. The entire building tapers slightly from south to north, since the northern end wall of the charging house is only 7.5m wide.

The floor of the charging house is paved with flag stones, interspaced with some brick patching. It is impossible to date this closely, but it may be contemporary with the working life of the furnace. The flagstones continue outside with a series of very large flagstones providing a hardstanding leading back to the track which gives access to the furnace. In the northern end wall of the bridge house is a wide low-arched opening with a radially set course of stones forming the arch. This is the only door to the charging house.

On both the western and eastern side walls of the charging house a stone set arch is visible close to the present (built-up) ground level. On the western side, only the coping stones of the arch can be seen, level with a concrete path which leads to the gardens to the west of the site, but on the east side, enough of the opening is accessible to make it possible to enter the chamber beneath the bridge arch. There has been a collapse of masonry in the southern half, blocking access to the blowing arch of the furnace.



Plates 2 and 3: The excavation. Basic surveying at the tapping arch



Plate 4: Under the bridge arch, the collapsed masonry.



Plate 5: The entry dug to get under the bridge arch

The chamber below the bridge arch would have housed the blowing equipment for the furnace. An inventory of the Abercarn Estate, dated 2 February 1807 lists 'A Bellows or Cylinder Room 29 by 20 feet'.¹¹ An inventory of June 1808 lists 'Old Furnace - a blowing tub', which could have been 'dumped' from elsewhere at the disused furnace.¹² However, if it was disused, it still had a rent of £40 set against it in February 1807. It is impossible to say for certain whether the furnace was blown by a pair of bellows or by the more modern mechanism of pistons moving in large cylinders. It is worth noting that the schedule of 1793 lists 'A New Forge a water wheel which works two small iron cylinders to blow one finery, another large water wheel which works two cylinders to blow into two fineries, another water wheel which worked a pair of Bellows to blow the Chafery'.

Why is the furnace at Abercarn thought to have been a charcoal fuelled blast furnace? The dimension and structure of the furnace follows the same plan as other known charcoal fired furnaces of the mid eighteenth century. The relatively low height of the furnace from the assumed base of the hearth (which has not yet been exposed) to the charge platform would allow charcoal to be used as a fuel, as the charcoal would be capable of withstanding the weight of the charge, relative to this height, without crushing. If the height of the furnace was greater, then an increased charge would cause crushing of the charcoal resulting in the loss of free passage of air blast through the furnace, and hence a necessary heat loss, making the melting of iron impossible.

Documentary evidence mentions a charcoal store house adjacent to the furnace, and there is also the list of charcoal blast furnaces that have ceased production by 1788, which includes Abercarn (see page 39).

Further evidence that Abercarn furnace was charcoal fuelled is to be found in the surrounding hillsides by the many charcoal platforms that we have found.

Iron produced from a charcoal fired blast furnace was necessary for the production of Osmond Iron (iron of high purity used for wire drawing). An Osmond Forge was part of the Abercarn Ironworks complex.

The Importance of Abercarn Blast Furnace

Following its rediscovery and preliminary examination, the eighteenth century blast furnace at Abercarn can now be assessed alongside other sites of the same type and period.

There were about two dozen water-powered charcoal blast furnaces in use in South Wales (although not all at the same time) between the mid-seventeenth century and the final demise of charcoal iron-smelting in the region in the 1820s, distributed over a wide area between Pembrokeshire and the Wye Valley. A rather smaller number existed in the period between the first introduction of the blast furnace to South Wales in the 1560s and

the mid-seventeenth century. Surviving remains of this earlier period are few in number and generally unremarkable, except to the specialist. The fragment belonging to the earlier furnace at Abercarn dating from the 1570s is typical of what can be seen on several sites.

Most, if not all, the more impressive surviving structures of this type date from the second half of the charcoal blast furnace period. In South Wales the most impressive site is Tintern in the Wye Valley, established in the early 1670s and still in use until the 1820s, which was excavated, consolidated for public display and interpreted by Gwent County Council in the 1970s. Although neither the furnace nor any ancillary buildings survives intact, it is possible to see structures illustrating most of the stages in the production of pig iron at Tintern.

Although visually less impressive than Tintern, the Abercarn furnace is in fact considerably more complete and certainly of comparable historical importance. The furnace is still standing, externally apparently virtually intact. The bridge-arch and blowing chamber beneath are similarly complete, and the charging house, although altered, is still roofed. The only features that are entirely absent are the casting house, which is buried beneath a garden, and the wheel pit, remains of which might be located by excavation.

Abercarn is therefore the most complete charcoal blast furnace in Gwent or Glamorgan and the only site which might be compared with it is the furnace (which also dates from about 1750) at Carmarthen.

Future Developments

The remains at Abercarn undoubtedly merit statutory protection. Although they are under no immediate threat, and the present owners are sympathetic to the preservation of the structure, they should be scheduled as an ancient monument at an early opportunity. Cadw has been notified, and one of its officers visited the site in May, 1994, but at the time of writing this report some nine months later, we have heard no more from Cadw.

Once the structure is scheduled any works there would of course be the subject of scheduled monument consent, including any external alterations proposed by the owner of the charge house and furnace top. A difficulty arises here, because the top of the site is under one ownership, the western wall is common with the different garden owners, while the eastern side is under a different ownership. There is no particular need for excavation at the site, since most aspects of the structure can be established from an examination of the visible features, although it might be possible to make a case for a limited investigation of the area likely to contain the wheel pit. It would be useful to locate the wheel pit and, if possible, establish the exact position and size of the wheel installed there. However, an excavation of the area occupied by the casting house seems most unlikely because it would involve destroying the garden of an adjoining householder.

Like other sites of the same sort elsewhere, the furnace will never become the object of attention from large numbers of visitors. It is, however, a site of regional, rather than purely local, importance and merits some conservation and interpretation, which might be undertaken by the local authority in association with the owner, preferably at the expense of neither. (Experience of similar sites elsewhere in South Wales suggests that funds may be available from the European Union for work of this sort.) The local authority, Islwyn Borough, has been notified of the find, and the site has been visited by an officer of the authority.

The documentary evidence: a calendar and commentary

We have been lucky enough to locate a number of contemporary documents which are in a private collection. We respect the owner's wish that the collection remains anonymous. The following section quotes from these and other documents to support our belief that we have found the Abercarn blast furnace of the 1750s, which, remarkably, survives almost intact after nearly 250 years. Abercarn is spelt in a variety of ways in eighteenth century documents; the authors use the modern spelling unless there is a direct quote. Similarly the name Nant Gwyddon is used for the stream referred to in the documents as the Gwyddon Brook.

1. An indenture dated 6 September, 1750,¹² details a partnership to start an industry in Abercarn which was to last over two hundred years. At that time the Lord of the Manor of Abercarn was the Reverend Henry Burgh, with his wife Mary. Henry was the eldest son of John Burgh, who had been steward to the Duke of Beaufort.

The partnership that purchased lands from the Manor of Abercarn consisted of John Griffiths of Pontypool, gentleman, John Roberts of Bristol, ironmonger, Elizabeth Hanbury of Bristol, widow and ironmonger and Henry Romsey of Bristol, gentleman. The property purchased consisted of:

All that messuage or tenement known as Cellonen [Celynen] House with bar, stable and garden attached thereto and belonging and in the possession of Daniel John. Also all that close or meadow adjoining the tenement known as Worlod ... and also the close or enclosure near the Ebbw River and Abergwyddon House with brew house, stable and garden belonging thereto, with the right of soil and common to use a piece of waste ground adjoining Abergwyddon House extending to the house of William Phillip Evans and from there to the bridge upon the Gwyddon Brook in the road from Newbridge to Newport ... and all that Corn or Grist Mill known as Abergwyddon Mill with its main water wheel, trough and water course thereto.

The partnership was also granted the right to construct a water course 9 feet wide and to make, extend, and repair weirs upon the river Ebbw and Gwyddon Brook, and also to use a newly constructed road across a piece of land known as the Gwern by men with or without horses, carriages and carts, and to construct a pond 15 feet deep and one acre in area.

That pond is not the existing pond in the Gwyddon valley, a short distance above the blast furnace, but was three hundred metres further upstream than the present pond, situated under what is today a children's playground.

The surface of the present pond would not present a sufficient head of water to work the furnace water wheel efficiently. The original was that much higher and would have supplied a furnace leat throughout the year. The following map shows the pond referred to in the document, and its accompanying inventory refers to it as 'The Furnace Pond'.

From this indenture we can build up a picture of what Abercarn would have looked like at that time. There were weirs on both the River Ebbw and Nant Gwyddon with a watercourse from the Nant Gwyddon to the water wheel which powered the corn mill. It is evident that there were roads and bridges in the valley at that time. The road from Newbridge/Crumlin, where there must have been a bridge over the River Ebbw, crossed a bridge over the Nant Gwyddon.

In addition to the highway from Newbridge to Newport, there was a newly constructed road across the Gwern, which we have not yet identified. However, the partnership had the right to use that road using horses, with or without cart or carriage, so that we can conclude that the use of wheeled transport on roads was envisaged. The Bristol partners would have had knowledge of the use of the transport of goods by carts or wagons, because at that time a fairly comprehensive system of road transport had built up centered on Bristol. Local papers in the Bristol Record Office give details of the services at that time available to and from Bristol, extending as far as Lond, Birmingham and Nottingham.

2. On 7 September 1750 the four partners agreed with Henry Burgh for the absolute purchase of the fee simple and inheritance of Abercarn lands for the sum of £400 'which being the most money that can be reasonably got for the sale of the said premises'.¹³

3. John Bedford gives us an interesting insight into road transport at this time when writing on 29 March 1777:¹⁴

I stopt a waggon on the road and the driver informed me that he had weighd his load of coale at the weighing machine just before I mett him, and the coale weighd four tons long weight, within a little. The waggon was common nine inch broad wheels and drawn by seven horses, viz: three pairs and one before. The horses was common farmers cattle and the farmers boy drove them without any other help. He came from home with his waggon and seven horses empty, and went ten miles to the colary, loaded the waggon with the coale and returned back immediately, and in general did the whole business, which is ten miles empty and ten miles back loaded, and they did it in nine hours. The horses did not appear over done nor did they even sweat, and this I find to be a fair example of all the other waggons I met.

Two journeys a day from my house to Newton with coale to the sea and back is just 16 miles and as the whole road is quite as good, it may be done on the same conditions of time and strength of horses by broad wheels.

Bedford's account of road traffic is not for the Abercarn area, but it was probably quite relevant to any area of industrial Britain, at that time.

4. An agreement of September 1750 gives us valuable information about the beginning of the business:¹⁵

Articles of Agreement made the 8th day of September 1750 between John Roberts of the City of Bristol, Ironmonger, Elizabeth Hanbury of the same city, Ironmonger, Henry Romsey of the same city, Gentleman, and John Griffiths of Pontypool, in the county of Monmouth, Gentleman, of the one part, and Henry Burgh of the town of Monmouth in the said county of Monmouth, Clerk, of the other part ...

The said John Roberts, Elizabeth Hanbury, Henry Romsey and John Griffiths shall and will within the space of seven years next ensuing the date of these presents, lay out and expend the sum of six hundred pounds of lawful money of Great Britain in the making, erecting and building a Furnace for making of Pigg Iron, with wears, and other buildings and works at and upon certain places called Aber-Gwython House and Mills ... situate lying and being in the parish of Monyddusloyne, in the Manor of Abercarne, in the county of Monmouth ... And also shall and will from time to time ... employ such of the tenants of the said Henry Burgh as he or they shall recommend, in the carriage of all sorts of goods and other materials to be used or made at the said Furnace, wears, and other buildings and works to and from the same ... The said Henry Burgh shall and will during the term of twenty one years from the twenty ninth day of September next, if the said Henry Burgh shall so long happen to live, sell and deliver unto the said John Roberts, Elizabeth Hanbury, Henry Romsey and John Griffiths, all the wood and underwood fit and proper to make charcoal, not less than fourteen years growth, or more than sixteen years growth, which he, the said Henry Burgh can spare of and from any of his Estates in the several Mannors of Newport, Caerleon, Park Lettice, Lanover and Abercarne, in the said county of Monmouth, at the rate or price of six shillings for every long cord, the dimensions whereof are to be eighteen feet long and four feet and six inches high and two feet and two inches Billott ... It shall and may be lawful to and for the said John Roberts, Elizabeth Hanbury, Henry Romey and John Griffiths, and their servants, agents and workmen, to enter into and upon the said ground called Coed Cae Velin and digg stones and haul and carry away the same for the erecting and building such Furnace, wears and other buildings and works as aforesaid, from time to time during the term of seven years next ensuing the date hereof ... And moreover that they, the said John Roberts, Elizabeth Hanbury, Henry Romsey and John Griffiths, shall and from time to time during the said term of twenty one years, accept of and buy all such Mine Ore and Pitt Coal as the said Henry Burgh shall raise or digg out of or upon all or any of his Estates.

It would appear from the previous agreement that Henry Burgh, the Lord of the Manor of Abercarn, also had estates about 30 kilometres from Abercarn at Llanover and Park Lettice, as well as estates nearer to the coast at Newport and Caerleon.

His estates were rich in timber, iron ore and pit coal, and by granting a lease for a furnace at Abercarn, he contracted to supply it with timber for charcoal, and with minerals, from his own Estates. He was making money by both leasing the ground for the furnace and by supplying it with raw materials.

5. On the same date of September, 1750, the Abercarn partnership entered into a different agreement with Henry Burgh to start the Caerleon Forge. In this case, Burgh himself spent £600 on the erection of the forge and then leased it out, whereas at Abercarn he had no capital involvement.

6. A lease of 16 July 1753 shows that the four partners already mentioned:¹⁶

Have lately purchased to them from Henry Burgh of the town of Monmouth, clerk, the several messuages, lands, tenements and hereditaments ... and have thereon started a Forge for manufacturing iron, a Wirework, a Furnace for casting pigg iron, a Tilting Mill, three Kilns, two Smith's Shops, and nine Houses or Tenements, and other buildings, and are carrying on a considerable Iron Work or works on the premises in partnership.

John Griffiths the Elder had occasion to look for money to assist him in carrying on the work and had to borrow £500 from Henry Romsey. The document goes on to list land that had been leased by the partnership 'Whereon or some part whereof are started the said Forge, Wirework, Furnace, and other buildings above mentioned'.

7. On 8 January 1958 Michael Flinn read a paper at the iron and Steel Institute, London.¹⁷ This paper tells us that in the century before 1760 a great deal of valuable technical progress in the iron business was made in Britain, and it therefore became something of a Mecca for the technicians of other European countries during the eighteenth century. There were virtually no technical journals at the time and the only method for the interchange of technical ideas was through personal contact. This flow of technical visitors appears to have been greatest from Sweden. There was already a strong trade link between the two countries, Sweden sending bar iron, copper and timber in return for woollen cloth and other manufactures.

In the early eighteenth century only about half of the needs of Britain for bar iron was met by the home industry, and there were growing imports from Sweden to meet demand, resulting in an imbalance in trade.

The technological effort in the British iron industry was being directed towards the elimination of the Swedish iron imports. Naturally, the Swedes were concerned to know what progress was being made in Britain which might ultimately enable them to dispense with Swedish imports.

The Swedish engineers and metallurgists were assiduous in recording their finds in a series of travel diaries, which survive in Swedish academic libraries. Probably the most valuable of all the travel diaries are those of Reinhold Angerstein, who came here between 1753 and 1755. He arrived in England in September 1753. In March 1754 he toured the Midlands. He later made a second tour, to the West Country. From Bristol, he crossed the Channel to South Wales and the Forest of Dean, and among other visits were ones to Pontypool and Abercarn.

Angerstein's travel journal, covering 900 pages, is well illustrated by simple but informative drawings.¹⁸ However, it has never been published. The diary provided us with a valuable contemporary sketch of Abercarn Blast Furnace in the very early years of its life, together with interior details.

However, we have not been able to obtain a translation into English of Angerstein's diary, if indeed it has been translated, in order to read his words on Abercarn.

The main sketch shows a number of interesting features. As we have already mentioned, the furnace, charging house and bridge arch are one structure. The long bridge arch is not visible on the western side, as we have already speculated. The opening under the arch has been filled in, and if the whole structure was covered by mortar, or a wash of

whitelime, the arch would not be identifiable from a distance. To the western side of the furnace is the cast house, set in a little from the edge of the furnace. Also on the western side is a small office. The position of the waterwheel is wrong. Such a position would have the shaft through the middle of the furnace. Angerstein probably drew it to infer its presence on the eastern side of the furnace. On the left of the sketch, to the north of the furnace, are four calcining kilns, where the iron ore, or mine was baked before being added to the furnace. On the left of the sketch is a high wall, on top of this is what appears to be a hand rail. We make the guess that Angerstein's elevation was wrong, and that he has tried to show the wooden launder carrying water to the top of the wheel. In the bottom left corner is a scales, used to weigh the pigs of iron. The interior view of the bridge loft is interesting. It shows what appear to be bunkers for storing the different materials before they are put into the top of the furnace. They could have been to store different grades or iron ore, because as documentary evidence will show, ores from different parts of Britain were used at Abercarn. This interior sketch also shows that there was a low wall at the base of the chimney, to stop barrows going into the furnace along with their contents, as they were tipped into the top of the furnace.

8. In 1755 John Griffiths, junior, leased a sloop called the Hopewell from Thomas Clifford of Newport.¹⁹ The essential details of this document are reproduced below:

Indenture (lease) dated 25 March 1755 between Thomas Clifford of Newport, esq. and John Griffiths the younger, of Aber Gwython, gentleman. Thomas Clifford demising to John Griffiths a vessel called the Hopewell Sloop of Newport of 60 tons or thereabouts together with the cock or small boat and all its appurtenances with full liberty of skurlage at and in the quay of Newport and like liberty for said John Griffiths to make use of said vessel over the wharf or Cynder mill leading from the town of Newport to the said quay of Thomas Clifford; also all those three stores adjoining together called the Piazza Store Houses, late in the tenure of John Poole with their appurtenances.

term: 3 years
rent: £47 5s.

9. By the end of March in the following year Thomas Clifford has evidently died and John Griffiths has cause to be concerned about his lease. His letter to Mr. Richard Morgan, attorney at Law ('to be left at the Green Dragon, Newport') is dated 29 March 1756 and is written from the Abercarn works.²⁰ He begins by saying that he has just heard of Mr. Clifford's death and had drawn his account before he knew of it. He goes on to record the extent of the repairs he has had to make to the vessel. The letter continues:

Could a new lease of the [ware?] houses be procured ... £30 to be laid on her, still more than what I have done in raising her decks and putting a new mast, without both which she is not fit to go to sea, nor will ever be leased out by me. If you agree to the same and can procure the said warehouses, I will enter into a new lease, otherwise shall send for her home and deliver her up immediately, and I think damages will justly lie against Mr. Clifford's heirs, ... to us no trade can ever be carried on without those houses. I am expecting the above will be very acceptable ...

If you are inclined to make a sale of her I will give £120 for her, which with what I have on board, to the value of £60, and necessary very immediate repairs of £30, is a great deal more than she is worth or ever will be.

[Page 2]

Mr. Clifford to J. Griffiths for sundries dr[awn] as per agreement.

To Evan James, Smith, Newport, note 15/9 two quarter lbs. of iron at 18/- had from Caerleon Forge, 9/-.

... rodds from Abercarne at 20/-, 7/6

... of iron at 18/- from Abercarne, 9/-.

To carpenter, caulking, and allowance drink £3 - 10/-.

To a new spar to make a boom by Charles Jones £1 - 15/-.

To Lewis, Bristol, smith, work done as per order, 15/-.

To John Skelding, for iron work done, 6/6.

To Richard Baker, blockmaker, 2/10.

To Richard Baker, paid by Captain Andres, 12/-.

To smith work, 2/6.

To coopers work, hoops about the mast, ...

£40 - 13 - 6

Sundries I have paid for at Bristol, of which I have as yet no receipts - £4. The foresail gibb and flying gibb, cable, new anchor, the ... and every block and rope that is new on board is mine, not having made any charge of them, and which I shall take from thence.

10. Abercarn Ironworks was up for sale in 1758, a newspaper advertisement recording:²¹

To be sold by Auction or otherwise on or before the 9th Day of February next The several Iron-Works carried on in the name of Abercarne Company, situate in Monmouthshire, viz. 1 Furnace, 1 Forge, 1 Tilting-Mill, and a Wire-work; all erected on a Freehold to the same belonging, upon the River Ebnydd, and Brook Abergwyddon, in the Manor of Abercarne, and about Seven Miles from Newport; Also a Forge, at Caerleon, held by Lease from the Rev.†Henry Burgh.

For further Particulars enquire of Mr. Joshua Williams in Bristol; or of Mr. John Griffiths and Mr. George Worrall, to be met with, or heard of, at either of the said works. In the mean time all Persons having any Demands thereon are desired to send in their Accounts to either of the Persons above mentioned.

N.B. The Place and Day of Sale will be published in the subsequent Advertisement.

11. The above advertisement ran for a number of consecutive weeks, until the following advertisement appeared:²²

An Advertisement of the Works at Abercarne having by Neglect been continued in this Paper a month after they were contracted for, the present Purchasers, in order to prevent any further Deception of the Public, take the Liberty of publishing this notice. That the said Works are carried on with great Improvements; and that Mr. John Griffiths, of the said Place, is impowered to make Purchases of Materials, and Sales of the Manufactures of the said Works.

N.B. The Lease of Caerleon Forge was contracted for prior to the Sale of Abercarne Works, and is now carried on under the Direction of Mr. John Griffiths, Junior, and those Gentlemen who will favour these Undertakings, by applying as above, will meet with Punctuality and the utmost Gratitude.

12. By 1759 the partnership was in trouble.²³ John Griffiths had departed to America, Elizabeth Hanbury had died, but not before being declared bankrupt. (Is this the failure of the Abercarn Company mentioned in Bradney, but dated 1748? We believe that Bradney's

date is wrong, possibly a printing error.) In March 1759 the new partnership at Abercarn is listed as Samuel Birch, Birmingham, Toymaker; John Humphries, Birmingham, Threadman; John Darbyshire, Birmingham, Brazier; Thomas Richards, Birmingham, Gunmaker and Samuel Garbutt, Birmingham, Gentleman.

Samuel Garbutt was well known in the business world in Birmingham at that time. He had made his name by perfecting a process for the manufacture of sulphuric acid and had been the chairman of the National Committee of Manufacturers.

John Griffiths, who had departed to America, had been prominent in the Baptist movement, as had Henry Romsey, who was associated with the Broadmead Baptist Church, Bristol. Griffiths became a judge for New York State before his death in 1774 at Kingsbury, U.S.A. Romsey died in 1761.

13. In June 1760 John Darbyshire mortgaged his share of Abercarn Works as security for a loan of £1,500 from Joseph Wimpey and Thomas Marsden.²⁴ The description of the works was the same as in 1753, but the names of Joshua Glover and Richard Rabone appear as partners.

14. John Bedford wrote in his papers:²⁵

From 10 - 14 December, 1763, After 2 days high flood into the finerys, I weighed out Abby pigs, and mixt about one third of old cast iron as balls and the mixing of which I conceive lowered the quality of the iron, but it yet stood as solid and well as possible even although when no pains was taken and loops come out farr from looking handsome, yet they stood hard and solid and fell none like as though it was all cinder. And it appears plain that the Abby and other rich pigs, such as Lancashire, do not make so much iron of them as when some of this poorer old castings are intermixed, which have had a melting or two in the air furnace, so that they come more solid and soon to nature than any pig iron whatever, and therefore in that respect are more valuable than all the rich pig. Tis known, but to some, that mixtures are a benefit, and those that know only the pigs are to be used so, and not known how or why to use old cast iron, to answer better before being at not two thirds of the price as at Abbercarne. They mix Tewball Coleshort with their own pigs, and answers well in making the loops, not only, but cut down without breaking or cracking, or which I saw myself there.

The 'balls' were mixed with rich pigs such as Abby or Lancashire in a finery to form an iron of inferior quality, which still had satisfactory working qualities.

Bedford had obviously visited Abercarn Furnace where he saw the mixing of old iron castings with new pig, and that intermixing produced a satisfactory iron which proved to be cheaper in the long term than using only new pigs.

15. Another extract from Bedford's papers, headed 'Cases of Practice on making Pig Bar iron, from the 25 January - 24 May 1766' reads:²⁶

CASE NO. 129 - On Iron Stone from Lancashire that is like the Welch poor mine.

CASE NO. 130 - On the practice of Abbercarne furnace with Lancashire mine and some Welch mine.

CASE NO. 131 - Why Lancashire furnaces blow pigs better and cheaper than any in Wales.

CASE NO. 132 - On the mine of Lancashire for blooming, as used by the Lancashire Bloomery.

This Lancashire mine came from within about seven miles of Lowwood furnace. See I have a piece of the very parcell in the repository. This cost 10/6 per ton freight from Lancashire to Newport, and they had 120 lbs. to the hundred and 21 hundred to the Ton.

I find in Lancashire they have a poor kind of iron stone they use always with the Lancashire mine, which must be very poor because their mine is so very rich. This poor stone I find to be very much like the Blanhavon (Blaenafon) mine. See in repository that they in Lancashire use this poor iron stone with their Red ore, I believe is very certain, as I was informed to by the captain who brought this ship load of red Ore to Newport, and from which same account they first began trying it at Abbercarne furnace, and this practice of trying it was as follows - viz: the look of the Rassa mine from Breconshire, which is a work belonging to Mr. Burgh (see sample in repository) also some mine of Gwarkey belonging to Thomas Miles. These are both poorish mines but I think Gwarkey is the best for the purpose because I know its the most Coleshort, although its the most rich. I am not certain if or not they used of any other sort, but if they did, it was of the same kind of stone. And then they charged the furnace as always were used to do with their own mine, both as to qualities of coale and quantity of mine, on with this alteration - they took off four baskets of the Welch mine which they used in each charge and weighed it, and put on four baskets of the same weight of the Lancashire ore in lew of it, without either burning it or cleaning of it, but just as it came to hand, all small like durt, and very little lumps, for it was in parcell just like Red Gravell. To this I say they had no other aleration at all, but exact the same quantity of charcoale, only took off four baskets of Welch mine in a charge and put on four baskets of this, and the consequence was soon felt, and was very great and which I shall sum up in few words, which is - that it yealded very little cinder, but melted exceeding coole in the furnace and melted very quick, for in the same time of blowing and with exact the same quantity of charcoale that they always used when they worked all Welch mine, they found by weighing the sows for weeks together that they had above six hundred weight of pig iron more at every casting than ever they had from the richest mine they ever worked of the Welch mine, and they cast thirty hundred at a casting, which was a neat advantage of six hundred of mettle more in every thirty hundred of pig iron than ever they had from Welch mine with the same coale, and besides to the having of the expence of burning with Brays breaking and for all this went into the furnace as it came, and this pig iron was grey and broke with a fine grain like the Lancashire pig, and they took the pig hot out of the Furnace and made it moderately into Osborne iron, and litted it, and it worked kind of well and they found they had seventeen hundred of Round Rods in a ton, which was very well for pigs just made, and perhaps as good as the Lancashire would do when first made - This extra yeald of iron is to be valued against the extra cost of this mine over the Welch mine. And I am here to observe that this mine cast in Lancashire about is or 9 or 10/- per ton weight delivered at the sea side, and 10/6 per ton carriage to Newport, and 6/- per ton up to Abbercarne. But then they had six score pound to the hundred and twentyone hundred to the ton and bought it so in at first, and this, if calculated, allows great profit over all Welch mine, but would have 4/- per ton if I was to use it at Rochestone (Rogerstone) works. Besides there is the extra good quality of the pig and being delivered to at the forge to be considered... They found at abbercarne that three baskets of this Lancashire mine weighed exact as much as five baskets of the Welch mine of the poorer sort, such as Rassa etc.

Bedford's reference to Lancashire mine means rich haematite of approximately 60% iron. He had experience of mixing this with inferior quality iron stones, found in such places as Rassa and Gwarkey which were on the northern rim of the South Wales coalfield where the ironstone outcropped with the coal measures. Clearly, rich Lancashire Haematite was being imported to Abercarn Furnace via the riverside at Newport.

Mr. Burgh is mentioned as owning the land on which Rassa ironstone was mined. The same Mr. Burgh was the Lord of the Manor of Abercarn and was leasing out the land on which Abercarn Furnace and ironworks was built. (Rassa was approximately 24 kilometres north of Abercarn.)

At the charging of the blast furnace a set quantity of local ore was substituted with richer Lancashire ore, which did not need to be calcined, as the local ores needed to be. Using the Lancashire ore gave a higher yield from Abercarn blast furnace - 6 cwt. pig iron more at every casting than the richest of the poorer local ores yielded, that is from Lancashire ore they got 30 cwt. per casting, but from local Welsh ores they got 24 cwt. per casting. That made the economics of transporting ore from Lancashire to Abercarn very favourable.

16. Charles Wood was the project manager who supervised the building of the first blast furnace at Cyfarthfa Ironworks in Merthyr for Anthony Bacon. Some of his diary entries read:²⁷

Thursday 19 June 1766 - Mr. Glover, master of Abergwyddon Furnace and Forge, dined with me. He informed me that he had last claim for L. Mill Co's debt due from Mr. David Weston and Mrs. Weston his wife having all her husband's effects and she became bankrupt. [L. Mill is probably Low Mill in Cumberland.]

... - Mr. Glover told me he was out of blast, his bellows being bad and must have new boards. I offered him ours that lye in Cardiff and Bridgewater, he said he would look at them and if he liked them he would give me a line or two. [It would be a year before the Cyfarthfa blast furnace was built and have need of bellows boards.] At this date Abercarn furnace was blown by bellows.

Thursday 26 June 1766 - Note from Mr. Thomas Atkinson of Whitehaven to see me at Edward Morgan's in the village ... found Mr. Robotham, Mr. Glover's clerk at Abergwyddon Furnace, with him. He had been with Mr. Webb at Dowlais Furnace relating some pig iron sold Mr. Dorsett for Cardiff Forge, that Mr. Webb was always looked upon as a partner there. Mr. Atkinson has produced from Dorsett several of Webb's letters to him by which it appears very clear that he was a partner in my opinion. I would not prevail upon Mr. Atkinson to wait long enough to take a view of our Work, he must be off by five o'clock to meet Mr. Glover at Cardiff.

Friday 27 June 1766 - Atkinson and Robotham visited ... but ... He seems so full with the affair between him and Webb that he could not attend to any other discourse.

Monday 25 August 1766 - Mr. Morgan desired that I would send our carpenter George Ford to take an account of all the trees left on the Estate ... Mr. Glover of Abergwyddon Furnace had applied for a contract for all the Coalwood in the first Estate - but we should have first offer and as we are to have by our lease all Winterwood for a rail or Waggon way at the rate of Cordwood and we should have the whole and what was not usefull for us we may sell to Mr. Glover.

[The 'Coalwood' was timber to be turned into charcoal.]

17. Laurence Ince has published a list of 'Charcoal Furnaces supplying iron to the forges of the Stour Partnership 1726 -1810'.²⁸ The list includes 'Abercarne (Jos. Glover) 1765-66'. The original list is in the Worcestershire County Record Office.

The Stour Valley was an area popular for blending 'tough' iron with cold short iron for nails. The Stour Works were almost self sufficient in cold short iron. Perhaps the limited export from Abercarn suggests cold short, rather than tough iron.

18. By the end of 1772 there had been many changes in the Abercarn partnership. An indenture of 1772³⁰ gives details of the conveyance of Abercarn Ironworks to Joshua Glover and Elias Wallin, who were to remain as owners of the works until 1786 when Joshua Glover died, handing over his share of the works to his son Samuel Glover, who proceeded to buy out Elias Wallin in April 1788, and became sole owner.

In the early years of Abercarn Ironworks the Lord of the Manor of Abercarn was Henry Burgh who sold the land to start the business. He had inherited the title from his father John Burgh of Mitchel Troy who had been steward to the Duke of Beaufort.

Henry Burgh passed on the title to his son Charles Henry Burgh who died a minor so it passed sideways to Charles Henry's sister, Maria, who was married to Thomas Johnes of Cardiganshire. Maria died in April 1782 passing the estate to her husband who sold it to Samuel Glover in 1787. Thomas Johnes died in 1816.

Samuel Glover, therefore, was Lord of the Manor of Abercarn from 1787 and sole owner of Abercarn Ironworks (on the estate) from 1788.

19. In 1783 Joshua and Samuel Glover had contracted with Anthony Bacon for the supply of 800 tons of pig iron per annum from Hirwaun Ironworks, to Abercarn.³¹

20. Abercarn furnace is listed in a document headed 'An account of charcoal blast furnaces which have declined blowing since the year 1750, either to the want of wood or the introduction of making Coale Iron. January 1st 1788'.³² The list includes 'Abercarn - 12 miles Newport'.

But we do not know exactly when it went out of use. It seems to us rather too much of a coincidence to have ceased use at about the same time that the Hirwaun contract was being arranged. Was the Hirwaun pig iron needed because Abercarn furnace was at that date ending its working life?

21. Another extract from John Bedford's papers, dated 6 March, 1786 reads:³³

At Abbercarne furnace and chaffry, when the people from Birmingham began, and both miscarried, at Pontypool ditto, and succeeded ditto, except the many ends in air furnace, and because it would not do magots and everything, they refused what it would do, not being acquainted with those principles in manufactorys, which I have here before recited.

The above is reference to the introduction of pit coal in the chafery failing. He argued for the use of both pit coal and charcoal in fining, whereas some have tried all or none and failed. Bedford continues:

On an air furnace with pitt coale to assist refinery and shorten the business. Have been trying to get this air furnace to do work of a charcoal finery, using common balls or scraps in fire of coal or coke. When this heated throw in finery and so avoid heating in finery from cold. Would save time in chaffry.

Bedford goes on, with an entry of 8 March, 1786:

...by the practice of old Triban, a finer at Abbercarne, who being master finer at a finery there, and worked Lancashire and other pigs - and seeing a quantity of old pitt coal chaffry loops lye amongst the cinders, for no use, began to use some by first breaking the loop and picking out the best of it. And having a good deal of luck he flung it into the ditch that ran from the wheell and kept it in water and then took some and flung it up a little at every loop, just as much as he thought it would bear, and he found his yeald greatly increased by it and yet iron of a sufficient quality for merchant iron and well approved of at Birmingham, and he in the course of the year got above two tons of over yeald at the finery, and was accordingly paid two guineas for it, but it was in the time of Griffiths and Jones when this item was taken no notice of, to be either push or improved. And so it dyed without being of further service. Thus does nature accident and make a thousand items for improvement.

The above mentioned 'people from Birmingham' arrived at Abercarn in 1759. It appears that they wanted a certain quality of iron that they could use in their manufactories in Birmingham. One of these partners was John Humphries, a threadman. Was he making wood screws? Another partner was Thomas Richards, gunmaker.

Initially the Birmingham partners tried the use of pit coal instead of charcoal in their fineries, but found the results to be unsatisfactory for their uses.

The reference to 'old Triban' who worked in the days of John Griffiths, is interesting. John Griffiths left Abercarn for America in 1759, and old Triban was using Lancashire and other pigs at Abercarn before that date. The other interesting point is that pit coal was used at Abercarn finery at that date, not charcoal. However, old Triban's technique was ignored by the works owners.

22. The indenture of 1793 includes a lengthy inventory of the Manor of Abercarn and listed amongst it are all the buildings in the Abercarn Iron Manufactory.³⁴ Most importantly, it shows the furnace to be still intact, quoting its size, along with that of the charge house. Those measurements are consistent with the stone structure that the authors have been looking at in Abercarn.

23. The same measurements are quoted in a schedule of 1807:³⁵

Furnace 67 by 28 feet, casting house adjoining 40 by 24 feet, a Bellows or Cylinder Room 29 by 20 feet, four kilns to calcine ore, a large bridge house, a head of water of about 21 feet (but 36 feet head and fall may be had for about 6 months in the year), a Charcoal House 102 by 28 feet'. The furnace, casting house and Bellows or Cylinder Room were assessed with an annual rent to the estate of £40 ... These buildings are capable of being converted into a very powerful work at a small comparative expence - for rolling bars or for a Hoop Mill.

However, we can find no documentary evidence that Abercarn blast furnace worked after 1788.

24. The schedule of 1807 was accompanied by detailed maps of the Abercarn Estate, produced when Samuel Glover was negotiating the sale of the Estate to Richard Crawshay, the ironmaster of Cyfarthfa, Merthyr Tydfil. One of the maps shows detail of all the various parts of Abercarn Ironworks and shows the blast furnace (and names it) in exactly the place where we have been looking.

The schedule lists:

| | |
|---|------|
| Osmond Forge, valued at an annual rent of | £130 |
| Wire Mill | £250 |
| Furnace, Casting House, Bellows Room | £ 40 |
| Foundry | £ 50 |
| Tilting and Turning Mill | £100 |
| The Great Forge & Shingling Mill | £350 |
| Rolling Mill | £350 |
| A Colliery | £250 |

25. After the blast furnace had been blown out, there are other references to the ironworks at Abercarn, but not the furnace that we are interested in. The Mynyddislwyn Tithe Map of 1846 shows the outline of the old blast furnace and charging house, showing that it was still in existence as a shell of a structure, or that the charging house was being re-used. It shows water courses and ponds. It also shows, and names, a 'furnace' about 100 metres west of the original furnace.

26. Ordnance Survey maps of 1878, 1901, 1912, and 1920 all show the outline shape of the furnace and charging house structure. Dimensions can be scaled to match the present structure that we are interested in.

27. Photographs of the early part of the twentieth century in local history books show the structure and associated buildings.

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NOTES

- 1 R.H. Pugh, *Glimpses of West Gwent: an historical survey of Abercarn and district* (1934), 61.
- 2 Sir Joseph Bradney, *A History of Monmouthshire* vol. 3 pt 2 The Hundred of Usk (pt 2) 205 n. 7.1923 reprint. 1993.
- 3 J. Lloyd, *The early history of the old South Wales Iron Works 1760-1840* (1906), 157-160.
- 4 William Coxe, *An historical tour in Monmouthshire* (1801, repub. 1995) vol. p.3.
- 5 *Ibid*, vol. 2 pp 257-8.
- 6 Birmingham Reference Library, Boulton & Watt Collection, MII/5/10.
- 7 Philip Riden, *A Gazetteer of charcoal-fired blast furnaces in Great Britain in use since 1660* (1993), 12.
- 8 Private Collection, lease of 1793.
- 9 *Ibid*.
- 10 Included in a lease of 2 Feb. 1807, Private Collection.
- 11 *Ibid*.
- 12 Private Collection.
- 13 *Ibid*.
- 14 N[ational] L[ibrary of] W[ales], John Bedford Papers in the Iolo Aneurin Williams collection.
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- 28 Laurence Ince, *The Knight Family and the British Iron Industry* (1991), 117.
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- 32 Birmingham Reference Library, Boulton & Watt Collection, MII/5/10.
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