As previously stated my own researches were prompted by my observations of mining relics seen when walking the local footpaths around Abersoch and Penrhyn Du.

A long trawl of books, articles and archive material was made, but when it became apparent how little was actually recorded about the mines I set about a preliminary survey and with the kind assistance of my new friend the late Wilf Ryan ,we photographed as much as possible of such that remained .

Those photographs formed the basis of a talk, the Lead Mines of Penrhyn Du., which was in the form of a walk around some of the remains, illustrated by in excess of seventy slides. Starting at Sarn farm, the cutting with its wide and level track-bed marked the route of the old tramway. As we travelled along the tramway route, the incorporation of the track into the modern landscape was noticeable, initially as road, later as bridle way and then footpath.

Many people would hardly notice the spoil heaps and other signs of mining as they have become part of paths, golfing greens or merely masked by undergrowth.

Hidden by bushes on the site of the old Tan-y-bwlch mine was part of a retaining wall and a back-garden wall included a section of the base of a once towering chimney !

Old O.S or other plans reveal sites of workings now destroyed, levelled or materially altered for the benefit of visitors. One example of such obliteration are the granite columns and plinths of what was probably a water wheel support, circa 1790 -1880, recently demolished now covered over by an overgrown heap of builders waste.

A detour took us up the hill at Porth Tocyn to see some open mine shafts, and from that vantage point could be seen the engine tower house and across an expanse of dead ground a distant hillside betrayed the position of Penrhyn Du. lead mine itself.

Continuing along the path, we traced the old boundary between two estates, those of two powerful landowners, Assheton Smith and the Marquis of Anglesey.

Passing evidence of building remains, we arrived at Penrhyn Du. with the remains of its engine house, open mine shafts and even evidence of medieval scrape trenches.

The talk concluded by continuing along the old tramway through rock cuttings to its old terminus at the old lifeboat house, on the point of Penrhyn Du itself.

Sadly the majority of the remains of the important lead mining industry and its benefit to the local economy and community has been all but lost .

The desire to "improve" the look of the area, the concern for "safety" and the complete disregard for any history and heritage which may have remained have combined to destroy most of the lead mine sites .

Whilst this had been a long gradual process, it seems to have accelerated at such a rapid pace that some sites have all but disappeared since we photographed them in 1996/97, and it almost became a race against time to see who would get their first us or "them"

Sadly little now remains of the Deucoth mine site, the Tan Y Bwch site, the Pant Gwyn site the Bwlch Tocyn site or the Jones site, having been levelled and earthed over for caravans, levelled for golfing ,or the improved roadway, picnic areas, the bridle way or just somewhere to dump the detritus of modern living.

We have but a scant trace of the toil and effort which went into creating these mines except for a few names attached to the mine shafts themselves Tackler's, Cloud, Cameron, the Lemon, Jones and Western shafts.

How many visitors that have ever been to the little bay called Porth Bach (Six-penny bay) have seen the drainage adit coming from rear the corner, tucked away as it is behind an outcrop of rock ?

It is scarcely possible to crawl in and yet that very tunnel goes straight to and below the tower house some several hundred yards away and a very good many fathoms down, will we ever know who it was who dug that tunnel, through solid rock a century or more ago ?



It is perhaps ironic that Edmund Hyde Hall 1809/11 commented on his visit to Abersoch, that the area was so remote and unknown that he doubted that it had scarce seen an outside visitor. But within his sight would have been an extensive mining industry and yet so little remains of that thriving industry, whilst conversely in the Gwydyr Valley near Conwy, nearer to civilisation than here on the Llyn a whole mining complex complete with buildings and machines which was found abandoned in the woods is now open as a visitor centre !

Background

Of all the mining activities lead and its associated ores and minerals have probably had the most chequered history. Vast fortunes have been made and quickly lost in the search for and the extraction of this base metal.

It has long been known that silver can be extracted from lead or that silver deposits sit comfortably with lead (& copper) in the same vein.

The silver content can vary from as little as 1/2 % to as high as 26% depending upon the quality and type of ore.

The method of silver extraction was, for many centuries by "Cupellation" a method used from before the Romans to the 18th, cent, when the Belgian Furnace (a modified glass furnace) was itself modified and called the Reverberating Furnace

The system of identifying and working the vein did not materially alter for several centuries and any changes in the industry were largely due to the introduction of "engines" which were used to drain the mines and raise the ore from the deep pits.

Discovery of the lead minerals was often due to a chance find through soil wash, landslip, or ploughing or an observation of soil colouration and dry areas, and occasionally the shine on the patches of ground which became visible during heavy frosts. Or the appearance of barren patches on the hillside due to the "vapours" which destroyed vegetation,

The system of mining was called the Roman way and is described by Agricola, a 16th cent German mining engineer, in his writing "De Re Metalica":- A trench was dug along the seam and was followed along the lode down into the ground. This trench was about 100 yards long & 20 yards wide and 18 inches deep, it was often called the sun vein, it being a generally held belief that the best minerals were to be found on the side of the hill that was exposed to the suns beneficial rays. Sometimes the mine could be driven into the side of the hill as an adit.

The principal method of extraction was by hammer and wedge, If difficult obstructions were found, they would be removed by fire setting, putting a fire under the stone and pouring water onto the hot stone causing it to crack, some times a mixture of water and vinegar was used. Another method was to put lime into a crack then wet it causing the lime to expand and split the rock.

It was generally believed that the deeper the mine the poorer the ore quality would be, since it would be further from the suns rays. It was also believed that if a seam was left fallow for some years it would somehow regenerate itself and this was supported by the discovery of new veins in old workings. The methods described by Agricola were still widely used 300 years later. The rate of progress & change being very slow. Although gunpowder was used by the Germans in 1670 and it was first recorded being used in Wales 1671, it was not in general use until 1740.

History

Following the departure of the Roman Legions the working of mines in general fell into a parlous state and were worked sporadically over the centuries until the reign of Elizabeth the Ist., when it was decided to try and establish a native copper & brass industry especially for the production of cannon etc. and in 1564 a charter was granted to the German mining family of Hochstetter, to search for copper.

It was the discovery of argentiferous copper in Northumbria, which led to a challenge to the Crown over the right of access, exploration and extraction on private land. The Judges ruled that the Crown (ELIZABETH) had the right to grant charters to search for minerals in all the lands of her subjects & that if a metaliferous ore contained silver or gold in sufficient quantities to cover the cost of extraction and refining then that mine would become A MINE ROYAL. In order to see that this ruling went unchallenged on 28 May 1568 a charter was incorporated forming " The Society Of Mines Royal " This society was to become a form of Mafioso and scourge of both landowner & mine owners alike, denying any right to exploit the mine on private land and then selling leases to the highest bidder or third parties. This system lead to eventual stagnation of development and progress.

The act was effectively repealed after a successful challenge in Wales , this released to the landowner the right to work their own mines, but any bullion extracted was to be turned into coin and sold to the royal mint and on 8 February 1693 the Mines Royal were privatised !

A new company was now formed 'The Company of Mine Adventurers' who had 23 mines in England and 12 in Wales. 20.000 bonds or shares were floated on the market at £5 each. With a lottery for 700 benefit bonds to share in the profits, plus a guaranteed sale price. £25,490 was raised on the first day of issue ! and the prize draw was held on the 8th March 1699. Predictably most of the mines were unable to meet the outrageous claims made for the quantities and quality of ore, nor make any profit. It was to try and meet the exaggerated claims that improvements had to be sought, and this lead to the introduction of drainage adits, drainage pumps and forced ventilation and the development of deep shaft techniques and later blasting and crushing stamps.

In August 1758 at the Fairchance mine Aberystwyth an engine, variously called a pressure engine or pillar engine was installed, its weight was 15 1/2 tons and was of such immense bulk that the local horse teams could not move it and extra teams had to brought in to transport the engine to the site. The engine was eventually erected at the mine by a Mr Cole, but he proved to be

"unsatisfactory" and was replaced by another engineer who was recruited to sort out the problems which they were encountering with the engine, but he absconded ! because he found the area and the life so hard. Eventually the engine was installed and after sorting out its many problems it was put into operation and performed its duties thoroughly.

The importance of good pumps can be realised when we see that when this same pump was out of action for just 12 hours, the water level rose 30 feet and took 4 days to pump it down with a resulting loss of output.

Penrhyn Du

The lead mines which are under review are in the parish of LLanengan and are located on the headland which overlooks Abersoch bay, this area was owned during the 17th & 18th centuries both singly and jointly by the Herberts of Powys Castle Montgomeryshire and the Bagnalls, Baylys. and Padgets of Plas Newydd. Anglesey, later to become the Estate of the Marquis of Anglesey, also holding lands in the area was the Vaynol (Faenol) Estate and much of their land adjoined that of PLas Newydd. It is in the later stages of the mining activities we begin to find some confusion of identity and this is compounded by occasional joint ventures by both estates, and that some of the managers and supervisors work on both estates but for different leases & mine owners .

The mining for lead and other ores on the peninsula at Penrhyn Du is believed to date back to at least the Roman period, or earlier, and whilst little evidence for this can be offered (some Roman Artefacts are known from excavations on St. Tudwals Island) The fact that EDWARD I granted a charter for the mineral rights at Penrhyn Du to the Monks of Cymer Abbey in 1284 in recompense for the war damage they had suffered, shows that knowledge of the ores and presumably the mines not only existed at this time but, were being worked. The monks of Cymer also had iron workings at Dolgellau (there are references to other mines in the south of Wales c1069).

It is often the case that where a mine exists or was known to exist in the early Medieval period it is a continuance of practises from antiquity

The Records are silent now until 1637 when Thomas Bushel, a mine adventurer, friend and secretary to Francis Bacon, was asked by King, Charles I, to inspect and report on the prospects for Welsh Mines. In his report of that year Bushel states "*That at Pottherly* [*sic*] *there is a vein which has never been wrought though known about these twenty years*"

Thomas Bushel is credited with advancing mining in Wales by his discovery of smelting both hard & soft ores together, the one acting as a flux for the other, this had the dual benefit of not only making the smelting of hard ores easier but also increased the yield. He was also instrumental in introducing the drainage level and the adit to great effect. He was an entrepreneur of the highest order and personally held the leases to many mines in Wales to such an extent that in 1642, he had permission to MINT silver at Aberystwyth,

He was reputed to have had an output of £40,000 of silver from Cardiganshire. (The average yield of silver from lead in the UK is about 1/2% against 21/2% in Spain)

Due to the serious shortage of labour locally Bushell Petitioned the Crown for permission to allow him to impress labour for his mines, as had Sir Hughe Middleton in 1625.

Permission was granted and in 1640 some 27 condemned men had their sentences commuted to 5 years hard labour mining in Wales! These men were sent by the Assize judge from Norfolk.Although there is no record of such practices in north wales .

A reference in 1656 indicates that mining was started on the Herbert Lands in Caernarfonshire. Penrhyn Du being their only holding in the County and in Feb. 1661 a Roger Birkenhead was in charge of "Cousin Bagnall's lead mines. These are probably the mines which Thomas Fuller in a comment of 1662 described as being the best in all Wales "So near the sea they can cast their ore directly onto the ship" The Parish register of Llanengan for that year shows 70 miners working at Penrhyn Du.

Roger Birkenhead was replaced in 1668. And in that year the Manager of the mines was one Mark Anthony and he details some of the difficulties he was having, in a letter to his employers Lord Herbert of Cherbury & his Partner a Mr Bagnall ." 80 tons Have been sold for £420 and the money disbursed to the miners and the country folk for commodities and supplies some debts going back 18 months. But some of the ore remains in the store house awaiting shipping

(A sale of 50 tons of Smytham and a shipment of 20 tons of Ore are also refereed to but are still awaiting payment) But he adds "*The best works are drowned and will have to be cleared before mining can resume*"

The joint working of the mines by the Plas-Newydd -Powys estates was given over to adventurers. Henry Archibald of Lichfield and Richard Myddleton a merchant from London acquired a lease June 9th 1671 [but no records exist as to their activities at Penrhyn Du.]

[A rental note 1696 for the Vaynol (Faenol) Estate records John & Thomas Wheldon holding lands in the Llanengan Parish and another note makes oblique reference to Mr Wheldon having been mining there some time before 1630. This is the first indication of mining on the land of the Vaynol estate].

The next mention of the mines at Penrhyn Du appears in a report dated 1716 "The old works done heretofore in Penrhyn Du lay north east from the sea which is now 30 fathoms deep. the levels of the water course brought up from the full sea mark ********(illegible comment on lease) and now may be brought up, but it is

necessary to clean the old works. at a probable expense of £300, and a further £200 in making the new Heads.. The old works having decayed for the last 20 years, the bottom of the pits have a good ore being 3/4 of a Yard broad & 1/2 yard deep but the bottom of the pits is not known as the works are again flooded due to their not being worked properly, Also to the fact that Mr Bagnall would not grant any Lease in his Lifetime. He being deceased the property is now in the power of Edwards / Baylys. There is reputed good Ore from a foot to a half a yard."

(After survey trials Edward's fled and left the men unpaid).

In the summer of 1732 the Plas-Newydd and Powys estates considered another joint venture to work the mines themselves and they agreed to an initial expense of \pm 500 and in 1733 Hugh Evans (Miner) was dispatched to Cardiganshire to purchase tools and equipment and by the 19th Sept. 1734 some \pm 780 had been spent.

Work was now proceeding on two shafts under the direction of a Mr Barker, with an output of 28 tons 3 cwt. of ore, 10 tons waste sold to Mr Barker for £359 14s and 20 tons of waste ore awaiting sale.

It was estimated that a further £1000 investment was required to make the mine viable and on the advice of Hugh Evans and Robert Jones it was decided to try and lease the mines off.

The Penrhyn Du Mines begin to show some promise again after considerable expenditure by Christopher Butler in 1734.

James Griffith took a lease on Penrhyn Du 21 June 1736 and reputedly spent £600 on an "engine" to drain the mine. The records show that he shipped over 288 tons of ore between October 1736 and August 1737 plus 15 tons lost when the "Amelia" went down.Their manager John Paynter was replaced in 1748 by John Roose* (A friend and colleague of Paynter) but later in that year Lewis Morris reported in his survey "The mines are once again flooded" he also adds that " A good dry harbour for small vessels might be made by running a stone pier northwards from Penrhyn Point" he further states that "Penrhyn Du Lead mine hath been worked to good profit formerly, it now lies under water but is recoverable with a good engine"

It was about this time that discussions were being held by the Vaynol estate and the Plas Newydd -Powys estates with a view to joint exploration. and that a satisfactory system of drainage should be found, and a new partnership should be formed.

John Cartwright of Ashton Under Lyne is the next adventurer on the scene, with a lease on the Vaynol Estate Jan. 1759 and another on the Plas Newydd estate shortly after with a 21 year lease from 29 Sept. 1761 (\pm 10 p.a for the Penrhyn Du Farm) and was to engage 4 miners and spend \pm 200 in the first two years opening up the old pits, making good The Old Water Wheel and setting up two Stampers as near the mouth of the old level as high water

would allow.

But he only managed to raise and sell 10 tons of ore for £70 & 50 tons of waste @ £4 to £6 per ton and surrendered his lease in 1763 for £140 compensation to Messrs Roe & Co. of Macclesfield (& later Conwy) who tried to drain and work the mines. Their retrospective lease required them to employ no less than 10 miners and to drive the mine 10 yards deeper. Jonathan Roose* was put in charge, and operating two 'Whimseys' they raised about 155 tons of good ore plus various amounts of other material, potters, white ore and waste, but by 1766 having succeeded in raising only a further 19 tons of ore they departed, claiming to have spent over £800 in the first year alone.

Messr Roes formerly surrendered the lease on 18 Dec. 1768 but were accused of illegally removing equipment, including some of that previously installed by Grifith in 1736.

John Cartwright now re-appears on the scene [it is possible that he only relinquished one of his leases] and designed a 30' water wheel to be set up as near the lower level as high water would permit. The estimate for this was £2000, a later detailed estimate by a local millwright one Henry Parry was for £637.8.4d including all the accessories, but there is little evidence that this was ever built !

Note

John Paynter From Derbyshire is an interesting character. described as scheming and a man with social ambitions , he was appointed manager to the Penrhyn estate 1736/1744 but left under a cloud having been accused of not keeping proper records of accounts and in 1748 he was replaced by John Roose *.

We next meet John Paynter at Cwmswlog mine 1748 as the manager for William Cobbet .

We now see an interesting shift as Lewis Morris, [Mines Superintendent] himself comes under investigation from the Treasury for Account discrepancies as some 1516 tons of ore were missing at an estimated value of circa £2910-£3680.

Under the influence of Lord Powis, John Paynter was appointed as Auditor and although he appears to be initially favourable towards Lewis Morris he subsequently presents an unfavourable report and Morris was Dismissed as superintendent.

John Paynter was Appointed mines superintendent in his stead in 1756. Paynter was then appointed manager at Esgair myn in 1757 owned by Lord Powis and where Lewis Morris was an overseer / Partner.

Paynter was appointed Magistrate in 1760

We also see many references to John Paynter in the management of several copper mines in Snowdonia along with his friend John Roose *.

John Paynter died 1772 and his family were recorded living nearby in 1773.

Later in 1768 John Cartwright and three others having erected an engine ? managed to obtain 39 tons of ore. . In 1769 John Cartwright died and the lease was recalled, whence it was then reissued to John Western (who had been a Co.- lessee with Cartwright) and one Thomas Western.

Lease : 24 June 1769. Western to give up the lease assigned to John Cartwright deceased : : Lord Powis & Sir Nicholas Bayley grant a new lease to John Western of Lambeth, Benjamin Barraclough of Gloucester, William Moore, Physic also of Gloucester & William John Kemitt. dated Michaelmas. 1769 for 21 years, with liberty for tenants £10 per annum for the farm,

Royalties of 12/- per ton for the ore (lead) when made merchant able and in the bin, and 10/- all other ores. They are obliged to build a machine and lay out no less than £1000. in the one year, to sink a shaft 20 fathom deeper than the deepest shaft and with at least 20 miners employed. They are also to employ a working banker, not from Caernarfonshire, or Anglesey. And not connected with Mining. If the output does not net £50 per anm. then a dead rent is set at £100 for the mines:

Hugh Ellis an Attorney from Caernarfon was called in, in 1775 as [Thomas] Western had decamped owing money, leaving his poor wife to face the many creditors including £41.10s to Lewis Peters, Mariner and a number of local people, who were plundering the site for recompense of the £240 which was variously owed to the miners, smiths, carters, local farmers and other local suppliers.

And in a report by a Powys agent concerned about the rent arrears, he states that "the Mines Are silent and have been for some time".

C 1778.The Vaynol Agent report for Tyddyn Talgoch farm at Penrhyn Du states that The lands have suffered very much by the Mine Company of Penrhyn Du who sunk several shafts in it and left them open and heaps of rubbish delved from them ,not being heaped or levelled .

An attempt was made in the 1770s, using a Boulton and Watt steam engine to drain the workings but, in the words of Pennant 'the expenses proved superior to the profits'

It was in 1779 that a contract was agreed with Boulton and Watt for the construction of a Steam Engine ,with a 27ins Piston to pump out the water. The construction was to prove a long and protracted saga with the engine finally being finished Aug 1780. In the 'Premium List' of Sept 1782 it is shown as working but in need of repair.

John Western seems to have managed to keep possession of the mine and in March of 1789 he shipped out 18 tons of ore But In Nov 1789 Weston remarks that " I think that the Engine will soon be destined for a coal mine and unless I find things strangely altered for the best, this will take place in the spring" According to the records of the Vaynol estate there was no mining activity on their holdings for the year 1799

In the late eighteenth century, Evans mapped a small cluster of houses near the mines, east of Marchros.

The Antiquarian writer Hyde-Hall refers to the abandoned old Lead mines in his survey of 1809-11 and also refer to the tower's abandoned state !

In The year 1822 a lease was granted to Messrs Jones & Wilding of Anglesey for Penrhyn Du at £25 Pa & 1/16 royalty.

The Williams Family of Gwenap Cornwall, a mining dynasty who held over 12 different leases in Wales, moved into the Area in 1830 and although they were a very efficient organisation and in spite of bringing Cornish men into the mines, the high cost of maintenance here and the slump in prices the mines closed again by 1839.

There were just five lead miners and two miners widows listed in 1861 #

A new owner now appears on the scene, John Taylor, who is considered to be the most ablest miner of the century and in 1869 after an outlay of £11,000 on draining and exploration in the area, good workable lodes were found at St. Tudwals (Assheton mines?)

In the same year of 1869 the Vaynol estate leased land at Bwlch Tocyn to John Thomas Campbell on a 34 year lease at £25 per rent .

On Boxing Day 26 December 1868 John Cambell treated 100 workers from the Penrhyn Ddu Mine to a splendid Christmas feast at the Ship Inn Abersoch They were serenaded throughout the day by the Llanaelheaarn silver Band.

We now begin to see a series of mine reports being published in the national press. These shareholder reports are very revealing as they show the very capricious nature of mining and the often exaggerated expectations, and the often short life of the company.

When realisation dawns and the the high cost of the equipment and preparation required to begin extracting any ores suddenly outstrips any profit to be had from the enterprise. The hope then is that by "talking up" the as yet un-recovered ore the enterprise can be sold on .

Invariably the mine is under water and in need of strong pumps to make the mine workable.

The Caernarfon & District Herald of 1870 Tells of the excitement at the discovery of a good vein in the area

Extract :" The old Penrhyn mines when worked gave employment to hundreds of poor people, and it may be stated that in so isolated a portion of the County the boom was of immense value. For about the last 20 years however little has been done with the mines and the towering chimney stacks and old engine house almost alone remain to tell the tale of happier and palmier days. But within a few months fresh courage has been shown at that place. Treasures the value of which none dare to calculate yet remain. Since midsummer last 1869 property from which, sources a few years ago, were considered worthless, have now been granted to comparatively poor men. one of whom sold his interest a few months ago (July) for £6,800, and that property is now represented on the London stock exchange for £114,000 and discovery has also been made at the Assheton (formerly old Penrhyn Du) which is valued at £60,000 and here it may be remarked is employment for many of the poor, probably within a few years many such mines will be at work, which will lead to a similar result as that which is enjoyed by Aberystwyth, where within a radius of about 14 miles pays about £12000 per year.

1870 Penrhyn Mine Report

The following report from their agent has been by received by the Directors of Penrhyn Mining Company (Limited)

I have very carefully looked over this property, both underground and at surface, as far can be seen

The Adit level on the north And South lode is cleaned out some 60 or 70 fathoms. The lode in the end is $1\frac{1}{2}$ feet wide, good saving work. This will driven with all speed to open out some good paying ground.

The following report from their agent has been received by the directors of the Penriryn Mining Company (Limited) ----- I have very carefully looked over this property, both underground and at surface, ise far as can be seen. The addit level on the north and a surface, ise far and the seen. The addit level on the north and south look is cleaned out south of 0.07 to Matson. The look in the end is high, while, rood maxing work. This will be driven with all speed to pennous some good paying ground. Here we whall have about 50 futhoms of back to stope away. In this bottom of this level, in various places, there is a good look. I would propose similing a winne to prove its value, and for the future of endpreset of the mine, we have drawn up from this end some pool lead to day. All the other looks are shoreing good lead. The yeard lands and ing wroperly. I would recommend the evention of the engine at once, with all necessary plavar, to as the struct with we represent and have been to be the shareholders.--Mark Wittrroot."

Here we shall have about 50 fathoms of back to stope away.

In the bottom of this level, in various places there is good lode. I would propose sinking a winze to prove its value and for future developments of the mine. We have drawn up from this some good lead today. All the other lodes are showing good lead/ The strata and composition is all that can be desired. This in my opinion, is a very valuable mining property.

I would recommend the erection of an engine at once, with all the necessary pitwork, so as to get the water out as early as possible and when done, I have no doubt in stating it will be very remunerative to the shareholders. MARK WHITHFORD #

A year later the Directors are full of optimism, which will quickly become dashed as the reality of the expense in running the mine overtakes the rewards.

1871 Penrhyn Mine Report

The following report from their agent has been by received by the directors of Penrhyn Mining Company (Limited)

We are lengthening the engine shaft below the 30. the lode standing in the side named in our last report is producing good stopes of lead ore. About 30



fathoms east of shaft we have cleared up the bottom for about three fathoms in length, left off by the former workers, which is down about five feet below the level.

It is very gratifying for us to report that the lode is worth 20 to 25cwt lead ore per fathom. About three fathoms further east a shaft is clear from the surface and how deep below the level we cannot tell. The same being full of stuff and water below : and judging from the workings

east and west of shaft there is reason to believe we shall find good lode at the bottom, and in order to see this we shall drop a lift of pumps and attach a wire rope to the engine to pump out the water. The adit level on the north and south lode is producing saving work. On the east and west lode driving from the cliff we have put the men to cross cut, to see the other lode. We are very pleased with the appearance of the lode seen in the bottom of the mine.

All good things come to an end

Barely three years since the flotation of the Penrhyn mine, it was to be wound up. Shares which were sold for £5 were now worth about 3s to 5s[shillings]

#I have no doubt in stating it will be very remunerative to the shareholders MARK WHITHFORD

Nov 22nd 1873 Penrhyn Mine Report : The Morning Post

An extraordinary general meeting of the Penrhyn mining Company was held at the offices of Bartholomew House,

This day-Mr H.W.Lindow in the chair. The chair and the state of the st

continued sinking the engine shaft, which would cost £70 per fathom, the agent hoped to come upon lead in paying quantities, If this should not be the case, he recommended the abandonment of the enterprise.

The chairman said that he had a not very pleasant task to perform. They thought they had got a good mine, but this had not proved to be the case, and they had met together to decide upon what was the best course to adopt.

The amount of cash in hand was £1,550 which at the rate of cost for sinking mentioned by the agent would cost about £100 per month. They would therefore have sufficient funds to last for another 12 months.

If they agreed to voluntarily wind up at the present time, the return to the shareholders would probably be 2s, 6d to 3s, 6d per share. But in 12 months they would have spent the last 1d. !

The directors recommended that they should at once wind up, particularly as two competitors for the plant and machinery were in the field.

They might expect to obtain about £1,500 for the plant and machinery, which with the cash in hand would give them £3,000.

The voluntary winding up of the company was agreed to.

December 26 1873. John Frazer leased from William Duff Assheton Smith (Vaynol estate) a life tenant. 42 acres on a 3 year lease (option for 21 years) for £12 p,a & 1/16 royalty. £12 dead rent.

1875 . Lease to John Williams. :Ditto.

May 1874 A new company was floated. The Port Nigel Lead Company .Llanengan



The Port Nigel Lead Company (Limited) is announced, with a capital of $\pounds 20,000$ in 10,000 shares of $\pounds 2$ each.



PROSPECTUS.

This Company has been formed to purchase and work extensive miveral rights, situated in the parish of Llanengan, in the county of Caraarvon, together with all the plant, machinery, and materials now on the property, which is in the immediate vicinity of the Tan y Bwich Mines, and containing the same rich and productive lode. The latter mine is daily opening out very large quantities of lead ore. The importance of these discoveries can scrucely be over-estimated, and it is confidently believed that, in the event of this Company cutting the lade as rich

in the event of this company cutting the lode as rich is the adjacent mine (the Tan y Bwich), the Directors will be in a position to make handsome returns to the shareholders.

A portion of the property, comprising the valuable vents and minerals under Glen y Morfa, together with certain cottages and lead in Llanengan, is freehold, and the remainder is held under a lease for twenty-one years, subject to the moderate royalty of 1-rofth.

The lode is large, continuous, and strong, embedded in highly mineralized ground, and has yielded from one ton to right tons of lead per fathom.

The mine has not to go through the tedious and costly process of being opened up, this work is already done, and its productiveness has been proved at a considerable expenditure of time and money, over £8,000 having been laid out during the last three years in developing the property, and preparing

handsome returns to shareholders,

Prospectus,

This Company has been formed to purchase and work extensive mineral rights, situated in the parish of Llanengan the county Carnarvon, together with all the plant, machinery, and materials now on the Property which is in the immediate vicinity Of the Tan y Bwlch Mines, and containing the same rich and productive lode, The latter mine is daily opening out very large quantities of lead ore,

The importance of these discoveries can scarcely be overestimated. and it is confidently believed that, in the event of this Company cutting the lode rich as in the adjacent mine (The Tan y Bwlch), the Directors will be in a position to make

A portion of the property comprising the valuable veins and minerals under Glan y Morfa, together with certain cottages and land Llanengan, is freehold, and the remainder is held under a for twenty-one years, subject to the moderate royalty of 1.16th.

The lode is large, continuous, and strong. embedded in highly mineralized ground, has yielded from one ton to eight tons of lead per fathom. The mine has not to go through the tedious and costly process of being opened & this work is already done, and its productiveness has been proved at considerable expenditure of time and money, over £8,020 having been laid out during the three years in developing the property, and preparing it for regular and extensive workings'

The engine shaft has been sunk 44 fathoms from which depth a level has

been commenced to intersect the lode, which, effected will doubtless lead to further open up rich deposits of lead

The 34 fathom level has already been driven east of the shaft 17 fathoms, and the lode at this point is yielding 11/2 to 2 tons of lead per fathom. A great deal of work has also been done at surface, engine and crusher houses, offices, materials house, and smith's and carpenter's shops having been built, and dressing floors made.

There are also on the property a double horizontal steam engine with two boilers. pitwork, crusher, pumping and winding gear, tramway, capstan an shears, with a large quantity of mining and other tools, iron, timber, and other useful materials. All of which are included in the purchase.

The only contract entered into on behalf of the Company is a contract dated the 30th day of April 1874 and made between Richard Mitchell, of the one part ; and Sydney William Jackson, for and on behalf of the Company, of the other part A copy Of the said contract and of the Memorandum and Article; of Association may be seen at the offices of the Company. or at the offices of the Solicitors.

19 May 1874 - Pall Mall Gazette - London,

Advertisements & Notices Acts, 1862 and 1867. Capital £20,000, in 10,000 Shares of £2 each. Deposit £1 on application, and £1 on allotment. Directors. Thomas *Gundry*, Esq.#, 75, Old Bond-street, and Torirey, Cornwall. M. Crowe, Esq., Royal Colonnade, Bristol. J. E. C. Matthews, Esq.,

Thomas Gundry was also a director of the Porth Nigel Lead Mine

02 December 1876

Tan y Bwlch Lead & Copper Mining Company

This company has been formed to acquire the Tan y Bwlch mines in the parish of Llanengan near Pwllheli .The leases are for forty two years and the royalties are 1-6th. The company proposes to acquire the property for £62,000 and it is stated that the profits for August and September were on average £832 per month, so that it is in a well developed condition. The present

TAN-Y-BWLCH LEAD AND COPPER MINING COMPANY. —This company has been formed to acquire the [Tan-Y-] Bwich mines in the Parish of Llaningan near Pwilledi. The leases are for forty-two years and the royalites 1-6th. The company proposes to acquire the property for £02,500, and it is stated that the profits for August and September were on an average £332 per month, so that it is ma well developed condition. The present monthly output is 100 tons of lead, 10 tons of copper, and a small quantity of blende, and this, according to the favourable report of Mr John Roberts, a member of the Mineralogical Society, is capable of being increased. The capital is £14,000 in £5 shares, and a considerable portion has been privately subscribed. The allotiment list closed on Wednesday.

monthly output is 100 tons of lead, 10 tons of copper and a small quantity of blende and this according to favourable report of Mr John Roberts, a member of the Mineralogical Society, is capable of being increased. The capital is \pounds 14,000 in \pounds 5 shares and a considerable portion has been privately subscribed. The allotment closes on Wednesday.

But it was not all plain sailing !

In 1877



A report by P Train. stated that the Pant Gwyn Mine in the possession of Messr's Grundy, from Cornwall was at the time "Idle" the reason given was that at the 30 fathom the lode was interacted which yielded good stones of lead, copper blende ores samples of which were at the surface.

A large stream of water was met with which overpowered the small engine.

The water was now being drained by the Tan Y Bwlch Mine engine .and there is is every prospect of their opening out a very profitable mine with little or no water to contend with.

Sadly tragedy was awaiting



IN MEMORY OF JOHN DAVIES, BAYVIEW TERRACE ABERSOCH. WILLIAM ELLIS, ABERSOCH OWEN JONES, TRWNYGARREG LLANENGAN WHO WERE DROWNED BELOW HERE IN THE PANT GWYN MINE DISASTER 1885 The Caernarvon and Denbigh Herald reported the following fatalities 21st Feb 1885

THREE MEN DROWNED AT 'THE PANT GWYN MINE' ABERSOCH.

Last Tuesday evening a most serious fatal accident took place at the Pant Gwyn Lead Mine, Abersoch, the property of Mr.Gundry #. There are two shafts at the mine, the old and the new.

There were three men working at the bottom of' the new one on Tuesday when water suddenly burst in upon them from the old shaft, and drowned the three.

By Wednesday, there were between 30 and 40 fathoms of water in the submerged shaft. As there are no engines strong enough at the mine to pump the water out, it will he necessary to connect the engines of the other mines before the shaft can he cleared, and even by this combined means it is feared that the water cannot be removed for at least five or six weeks.

The names of' the unfortunate men who were drowned are John Davies, Bay View Terrace, Abersoch (a wife and five children). William Ellis, Abersoch (a wife and three children) and Owen Jones, Trwynygarreg, Llanengan (a wife and four children).

Quite a gloom has been cast over the usually quiet village of Abersoch by this deplorable accident

But there was more to this tragedy than the brief news article shows

1885 Welsh News [Translation]

Many years ago there were five lead mines operating in this neighbourhood all quite close to each other The Penrhyn, Assheton, Tanybwlch, Pantgwyn, and Deucoch Mines but the Penrhyn Mine had stopped due to insufficient reserves of ore. The Assheton and Deucoch Mines were also closed due to price reductions in the ores However, the Tanybwlch and Pantgwyn Mines continued operating because of their abundance of lead and copper. The Tanybwlch had to use two large steam engines to raise water, while Pantgwyn managed with one small machine. Tanybwlch felt their expenses were being borne by Pantgwyn and tried to negotiate an agreement, but Pantgwyn refused to discuss the matter. Unable to reach a mutual understanding, Tanybwlch decided to stop using their machines, leading to the flooding of Pantgwyn's work. In response, the company decided to construct a large steam engine and began digging a new shaft. They completed a house for the engine, and the new engine shaft reached a depth of seventy yards. Twelve men worked four eight hour shifts to maintain the operation. The accident occurred on the afternoon of Tuesday the 17th when Owen Jones, John Davies, William Ellis, and Griffith Parry were working in the shaft. The Shaft was being dressed and carefully cleaned from the surface to the bottom. A frame of eight inches square timber placed within twenty inches of each other, and planked behind them with an inch and a half timbers. At around seven O'clock Grifith Parry went up to the top to get more timbers from the top man, having sent them all down, Griffith Parry stopped for refreshments but suddenly heard a strange noise. They rushed to the shaft. Calling out but they received no response from the bottom of the shaft. Water had entered the new shaft with tremendous force, burying the three men.

After making a search it was discovered that the water had made its way from the old shaft to the new, and that with such tremendous force that it dragged enough earth to fill the new pool for several tens of yards, and kill the three men at work at the bottom, It was believed that the wood they were using did not turn through at the bottom.

The three men left behind families. Owen Jones is survived by a wife and five children, John Davier is survived by a wife and one child , and William Ellis is survived by a wife and three children.

Recovering their bodies would take several weeks as the mines needed to be dried. The owners and government inspector have not arrived at the scene yet. The community anxiously awaited their response.

Efforts to recover the bodies would not begin until the new engine was ready for work, causing further delays.

There were rumours that Tanybwlch had loaned their machines to aid in the recovery. The neighbourhood had expressed great relief if these rumours turned out to be true.



National Library of Wales, Aberystwyth photographic collection reference Ml 162

The workers at Pantgwyn mine c1890.

According to a description accompanying the photograph "the women of the neighbourhood worked in the shed where the lead ore was washed".

The lead was carried to the beach by local farmers, then small ships took the loads to smelting works at Mostyn and Chester".

Profitable discoveries were made at Llanengan between 1870 & 1892 and of the 20,000 tons produced in the area 9000 tons came from the Tan Y Bwlch. mine

Slaters directory of 1880 lists three mining companies for Abersoch, The Assheton : the West Assheton. : & The Tan y Bwlch. But they were all closed by 1886

According to the 1881 census : Thomas Gundry 51 Managing Director Lead mine, was lodging at Plas Sarn, Abersoch.

Thomas and William Gundry were Cornishmen who were Stockbrokers and Mine agents for several of the local Mines In 1890 they were jointly charged with offences under the Mining Act !

In 1890 The Caernarvon and Denbigh Herald reported the following.

a piece of iron:

Thomas Gundry. William Gundry. H D Browne and John Craze, Pantgwyn mine Llanengan Were charged by Dr. Neve Foster with committing four breaches of the Act. Dr Foster for whom Mr Cartwright appeared. Said the defendants had added to the weights on the lever of the steam engine with a piece of iron: timprisonment without the option of

They had not the usual platform at the proper distance in one of the shafts

There was no proper protection to one of the levels and there was no fence in the pumping shaft.

Mr Most Roberts solicitor, Caernarfon appeared for the defendants ,several witnesses were called for the defence.

12 July 1898 - Y Genedl Gymreig - Caernarvon, Caernarfonshire,

We understand that Mr Gundry, the owner, is in correspondence with ?? And very rich and well known in South Caernarfonshire, with the objective of co-operating with the resumption of the works. Many years ago the Mr Gundry would have a hundred workers...

Some other Cornishmen were also Agents or Trustees .

A Transcription from the The Caernarvon and Denbigh Herald 1 August 1890

METALLIFEROUS MINES REGULATIONS ACT. HEAVY FINES, -Dr. Le Neve Foster, for whom Mr. Cartwright, Chester, appeared charged George James Snelus and Hugh John Jones, Manganese Works, Rhiw, with storing gelatine dynamite on the works and with allowing a surface shaft unfenced, and with allowing another shaft unfenced underground. Mr. Snelus, whilst acknowledging slight contraventions of the Act, said it was all by inadvertence, and as soon as he had been informed of what had happened, he telegraphed to the manager about it. –Dr. Foster said that when he went down the works he had to be cautioned respecting the shaft underground or he might have fallen into it. – Fined £2 for each of the three offences, with costs.

The Chairman showed the seriousness of the offences, which might be called inadvertence by some people but which would be called by other people culpable negligence. William Gundry Thos. Gundry, H. D. Browne, and John Craze, of the Pant Gwyn Mine, Llanengan, were charged with four contraventions of the Metalliferous Mines Regulations Act.

Mr. Cartwright appeared for Mr Foster, the prosecutor, and Mr Mostyn Roberts, of Carnarvon, for some of the defendants.-Thomas Gundry not having been served with the summons, the charge against him was not proceeded with.

Dr. Foster said that u» inspected the mines on June 27th, and went down to the level between the top and bottom of a working shaft. He found it in a dangerous condition, and without a fence. The pumping shaft in the 100 fathom level was un fenced. There was no platform in the 120 feet shaft. He had a conversation with Craze about the platform, when Craze said he had no time to read the Act. The boiler had a proper water gauge, and the lever had the weights provided by the maker, but in addition to those weights there were some pieces of iron added, increasing the pressure. It was a dangerous thing to add anything to the original weights on the lever.

Mr. Cartwright was going to put in a letter to the defendants but Mr. Mostyn Roberts objected on the ground that Mr. T. Gundry had not received it in time. — The bench decided upon adjourning the case, but, after consulting with same of the defendants, Mr Mostyn Roberts waived his objection, and the case was proceeded with. — Dr. Foster was cross- examined minutely as to the safety valve, the platform, &c., and Mr Mostyn

Roberts, in defence, said that the company were not responsible for any wilful acts of the workmen, and if the safety valve had been tampered with the workmen could be proceeded against, and not the company. – In reply to questions, the man in charge of the steam engine stated that having put back the ball on the lever more than 1.1/2 inch before putting on the loose weight, the audition could not have increased the pressure. – The bench said that the charge was that of tampering with the lever, whether that tampering increased or decreased the weight. – Alfred Evans, the secretary of the company, said that the rules and regulations bad been published -Cross-examined: Had been cautioned before Two men were drowned at the works earlier this year. Had not proceeded against the man in charge of the engine, though he thought the iron. should no have been used. He admitted that a boiler exploded at this mine a short while ago, but that was in consequence of a defective fitting on the boiler, which could not have been discovered beforehand. – As to the platform, William Jones- was called, and he said he worked as shafts-man in the mires. He worked there on June 17th, They were just finishing sinking, and the placing of the pumps necessitated the removal of the planks, &c. There was a platform in the place where prosecutor said there was none, and the men had used it all along when working there. - In crossexamination, witness said the platform was now longer than when Dr. Foster was there. There was about 2ft. space from the ladder to the platform, leaving plenty of room for a man to fall through. Twelve or fourteen men worked there. Re- examined If timber was placed across the 2ft.. space the men could not go down.Thomas Hughes, another shaftsman, corroborated last witness, bur added that there was an open space near the .side of the ladder. -John Davies, timber man, deposed to taking part in making the platform in question, and to there being sufficient room for a man to fall through. – Mr. Cartwright replied to Mr. Mostyn Roberts's legal points, and said that the company had, in addition to publishing the rules and regulations, to enforce them.-The case lasted for over three hours. – The Chairman said that the charges were very serious ones, and should such cases come on again lie would vote for imprisonment. The bench agreed to impose a fine of £10 in each case, making £40 in all, with all the costs. – The bench complimented Mr. Mostyn Roberts upon his efforts to prove what really was an impossibility.

Some Pictures of the unguarded mine shafts



The Lemon shaft



The whim shaft



The whim shaft



Pant Gwyn Adit?





Some Assheton Miners

When I set out to study the local lead mines, one of my objectives was to try and identify the people who worked there and made up the local community.

During the second half of the nineteenth century the lead mines were in operation again. A Cornish engine and engine house was installed in the late 1700s-early1800s.

There were only three lead miners listed on the Cilan headland in 1861. But by 1881 there were 109. Across the parish as a whole there were a total of 212 miners, dressers, washers and engine drivers working in the lead mines of Penrhyn Du, Bwlch tocyn, Tan y Bwlch and a number of smaller operations. There were also 31 miners living and lodging on the periphery of the parish and on the north bank of the Afon Soch, all of which would have worked the Llanengan mines but Penrhyn Du and Tan y Bwlch were probably the most productive.

The contrast between the mining industry and traditional occupations was marked and brought with it social implications. Houses and lodgings were required for the workers and, in particular, the influx of industrial labour during this period. One hundred and six men, women and children arrived from Devon and Cornwall, alone. Others came from Cumbria, Dolgellau and other mining regions. Immediately adjacent to the Cornish engine house at Penrhyn Du, six of the ten cottages in Cornish Row were occupied by six Cornish families and three lodgers, totalling 16 mine workers. In all 21 mine workers occupied the entire terrace.

The year of 1881 was a census year and the returns for this area show us the Joseph Garland was the mine manager at this time and was living with his family at the "Assheton Office"

Also at this address was Thomas Bwyzo : mine agent, both of these men came from Cornwall as did the majority of the mining families living in Cornish Row. Altogether there were forty seven people in residences here, with 14 of the families coming from Cornwall .1 from Devon and 3 from Montgomery. John Piper and Thomas Hanke are given as "Engine Drivers"

Although it is possible to break down the indices for the Abersoch and Llanengan parishes and identify most the lead miners and their families in the district, it is only possible to be specific about the miners at Cornish row since this was a dwelling site on the actual Assheton Mine site itself. Many of the other miners listed could be working in Llanengan at the Tan Rallt site or other sites nearby.

It is interesting to observe from the census how many of the local people were also working in the mines.

Our principle interest though is in the lead miners at the Penrhyn Du site and the majority of those workers lived at " Cornish row" this site is now occupied by a large new bungalow. But in 1881 the little row of dwellings housed no less than 8 families and lodgers a total of 47 people.

Thomas Penaluna aged 27 was from Cornwall and he married a local girl called Elizabeth from Llanengan and they had two children, Thomas aged 2 and Evan John aged 3 months.

John Martin aged 36 was from Camborne in Cornwall he is listed as a Copper miner, widower, he had four children aged between nine and two, The elder three, John 9, Bertha 7 and Elizabeth Mary 5 were born in Cornwall and George Henry 2 was born in Llanengan.

Robert Jones 30 and his wife Hannah 29 were from Amlwch their daughters Hannah 6 and Ellen 3 were born in Asheton , Lancashire but their son Robert , age1 was born locally in Llanengan.

George Cook 46 his wife Mary Anne 42 and his family all came from Marazion in Cornwall his sons George H 21, John E 19 and William 14 were also Lead miners but their daughter Mary 15 was a scholar.

From Montgomery as were David Tudor 33 and his family Anne 29. Humphrey 12, Evan 9 , Caradog 7 Lewis 4 and Hannah 2 . Their lodger was Lewis Meredith 25 .

Also from Montgomery, [Darowen] was Hugh Jones 29 and Sarah 31 and their children Sarah Anne 8 Issac 6 John 3 and their Lodger John Hughes 21.

Richard Cary 53 came from Hartland ,Devon he has no wife listed but the children Elizabeth Ann 2,1a cook and John 14 a lead dresser are from Landigloes ,Cornwall . there are three lodgers living in the household William Pilkington and John Jones lead miners and John Piper Lead mine Engine Driver .

William Carton 66 his wife Sarah and Daughter Martha Anne 15 are from Cornwall also resident is their granddaughter 8 from Cardigan.

Nanny Hooper 59 is a widow and five of her children , James 22, Helen 19, Reginald 16 Frederick 12, and and Henry 9, were all born in Cornwall but 5 yr old Alfred was born in Llanegan

Another Engine Driver was Thomas Batten Hanke 56 his wife Elizabeth 52 their nephew John 11 and Lodger John White 21 are all from Cornwall

Meanwhile at the Assheton mine Thomas Bwyzo 44 is listed as Mine Agent [Lead mines] Also registered at the Mine are George Cross 56 and Richard James 21 and wife Lydia 24

Living at the Assenton Office are a much travelled family.

Joseph Garland 41 from St Agnes, Cornwall, England . Manager of Kutalififerous Mines, his wife Matilda Mary 41 from Lewbienchard, Devon, and their family and household . Children Frederick Joseph 10, born Rheinbruthaer Klrussh, Prussia. Tillie Louise 9, and Charles H.D, 7, born Limberg Nassan, Germany. Clara Winnifred ,4 born Oberbruchern Nr Bonn (BS), Germany, Mary Beatrice 3, Gunnislake, Cornwall, England .His Mother In Law. Mary Davey [W] 72, Milton Abbot, and their nephew Horace William Garland.10 London, Middlesex, England

Anne E. Graves 19, Styomp, Nottingham, England, Governess, Margaret, Ellis Llanllyfni, Caernarvon, Wales, Domestic Servant

We can see how Cornwall was a prime location for theses miners, the areas from which they came were well known for their Tin Mines and it was their expertise in mining techniques which made the Cornish miners much sought after

Machines & Mechanisms

Engine Houses and Towers.

With the arrival of the Cornish miners in the area and especially the William's of Gwenap, There was a Cornish look to the skyline in the shape of the engine tower at Penrhyn Du and at Llanengan we begin to see a change in the mining techniques and the distinctive tall chimney and smelting flues.

The absence of records make it difficult to accurately date the building of the engine house however it may be possible to come close, by speculation based upon known dates for the introduction and development for the various engines and the changes of ownership & management and the known expenditures which were associated with these changes. We can say with certainty that the engine house existed at the time of the plans (XAMP2) 1846, since the engine shaft is shown and it is commented that the Whin shaft draws water to assist the engine. It is also shown on the plan (XAMP1) 1854.

The engine tower at Penrhyn du appears to be of the house built style, that is to say that the engine was built into the fabric of the tower this type of engine was usually manufactured locally by a millwright using imported cylinders.

We know that Christopher Butler made considerable expense in 1734. And later in 1768 John Cartwright & Co. erected an engine, possibly a Waterwheel driven pillar engine within the shaft.

A contract was agreed between Boulton and Watt and the 'Western Group' for the construction of a Steam Engine ,with a 27ins Piston to pump out the water. In 1779 Plans were drawn up The construction was finished Aug 1780. But in the 'Premium List' of Sept 1782 it is shown as working but in need of repair. It is possible that Taylor had the engine transferred to another mine , but since this was a "house built engine" it would have been considerably costly and unlikely to have been a viable proposition. Hyde Hall refers to the towers abandoned state in 1808-11

John Taylor [1869] is credited with draining and exploring the mines at a cost of £11,000 The tower house at Penrhyn Du shows evidence of reconstruction, principally at the front of the tower and internally, which could indicate that the Boulton and Watt engine was removed and the building altered to take the improved 'Cornish' engine of Richard Trevithick A crucial factor is that the engine of Trevithick was far more efficient with substantial savings in running costs and tremendous output was by now widely available.

Shortly after the death of Newcomen, James Watt patented the separate condenser, this and other technical changes gave the opportunity to operate with increased efficiency to the engine .

The next stage in the development of the engine was a substantial increase in the steam pressure. This was achieved by Trevithick with a radical new design of engine which was free standing on a cast iron A frame. Originally the engine and haystack boiler was built into the tower, if this was ripped out and this new engine installed, considerable changes would be made to the building, this again seems to be evident at the front of the building and is revealed in the blocked lower opening of the beam platform when the trammel rod seem to have been replaced by parallel motion panto graph beam and the window blocked. The boiler was enlarged and housed in the new separate boiler house. This engine could have been made by Harvey of Hale.

All the engines operated a beam which was centrally pivoted and connected to a rod driven, plunger style pump, whose function was to raise water from the sump pit to the drainage adit

Engines: One of the principal problems is that any form of motive power is usually referred to as an "Engine", be it a water wheel driven rag & chain pump, a simple piston and plunger pump known as a pillar engine or if more sophisticated a beam engine.

We need firstly to look briefly at the history of the development of the steam engine in order to establish a chronology of development, which will help us to place Penrhyn Du in context.

The earliest form of steam engine was by Capt. De Savery c1695 this was a simple cylinder with a piston which was expanded by steam pressure and a rapidly cooled by pouring cold water over the outside of the cylinder this caused a vacuum which pulled back the piston, this was in fact the working stroke. This was a very basic engine and at best could only raise Water 25- 28 feet .

Around the time of De Savery, Thomas Newcomen in Cornwall was also working on a steam engine, but he was restricted by the fact that De Savery held all the patents for fire engines, as they were known.

Following the death of De Savery, Newcomen launched his engine in 1712. This engine was a considerable improvement and was widely used throughout Europe as well as the UK. and proved to be the standard engine for some 50 years until about 1762.

This engine also used low pressure steam to expand the piston for one cycle, but by closely controlling the spray of water, a more rapid cooling of the steam was achieved and a subsequent faster contraction by vacuum of the piston .

This was achieved by injecting the cooling water directly into the cylinder, and by linking the injection system to the moving beam, he was able to time the injection to the best possible position of the ascending piston .





Engine house Penryhn Du

Possibly one of the oldest surviving Boulton and Watt engine house.



Engine house Penryhn Du [detail]





The remains of some wooden drains possibly from the Buddling floor SH322261





Newcomen was also credited with the invention of the Haystack Boiler (diag, 1) which was originally made of copper with a lead top, this was redesigned in 1725 and made of wrought iron (diag 2)

The Newcomen engine was built integrally into the fabric of the engine tower house (diag 3). [house built]

A typical cost for a house built engine c 1733 would be £845, of which some £150 would be for the cylinder, usually made of brass and with a hand polished bore .

The Newcomen house built engine with a single beam working a plunger pump via flat links, became the standard throughout the mining industries for pumping and raising water .

We now see a further important development of the steam engine by James Watt in 1773 who revised and radically altered the beam by introducing the parallel motion and pantograph mechanism. and the steam condenser, separating it from the cylinder, this had the dual effect of improving efficiency and reducing running costs, coal consumption fell by up to 1/3. This was of vital importance to areas like Cornwall who had to import all their fuel, which was the same situation found here at Penrhyn Du.

James Watt the Scottish engineer in conjunction with the engineer Boulton founded Boulton & Watt and between 1773 & 1800 built 114 engines in the UK. and virtually replaced all the Newcomen engines in Cornwall. The tower house appears to be No 35.

Richard Trevithick had been working upon a high pressure steam engine for some time but was constrained by the fact that Watt was totally opposed to the use of high pressures and as he held all the then patents for steam engines, blocked any progress.

Following the death of James Watt in 1819, Trevithick was able to introduce his radical new design of 1812. This engine was separated from the boiler, and mounted upon a cast iron A frame and run with a new design of boiler, A long cylindrical shape with a fire box at one end and the fire tubes passing through the length of the boiler, this arrangement substantially increased the water temperature and the subsequent pressure, The increased pressure acted upon the piston and drove it along, which meant that the piston now did useful work on both strokes.

The introduction of a Trevithick engine would have meant a major reconstruction to the house built towers, to rip out the old haystack boilers and engines and level the floor to anchor the " A" Frame, along with a new separate boiler house .

These engines were usually built by Harveys & Hale Co. 1860 -18

Some typical outputs for the various engines

As calculated by 'Leans Engine Reporter' giving a 'Duty' of engines which measured the number of pounds of water , raised one foot high by using one bushel of coal

Newcomen engine : 6 million Ft/lbs @ 10 .p.s.i per 84 lb. of coal (1 bushel)

Watt engine : 20 million Ft/lbs @ 10-20 .p.s.i per 84 lb. of coal (1 bushel)

Trevithick engine ; 125 million Ft/lbs @ 50 .p.s.i per 84 lb. of coal (1 bushel



Radical change was to come in 1893 The Entire Mining Complex was put up for SALE.

Wheatly, Kirk, Price And Goulty are instructed to SELL BY AUCTION in detail, the whole of the Mining Pumping and other PLANT and MACHINERY. at the Copper and Lead Mines known as "Port Nigel" "Daugoch""Pantgwyn" Tanybwlch" "Bwlch Tocyn" and "Asheton" Mines,

Messrs Wheatly Kirk,Price And Goulty ENGINEERS, IRONFOUNDERS,COPPER AND LEAD MINERS, BROKERS AND OTHERS.

Wheatly Kirk, Price And Goulty are instructed to SELL

BY AUCTION in detail, the whole of the Mining .Pumping

Most of the plant and Machinery was sold By Wheatly,Kirk,Price and Goulty Auctioneers,in 1893 This advertisement from the Mining World Journal gives some details of the range of equipment being sold

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A	bou	t 100	tons	of Car	st-ire	n Pig	388.		
Т	ruc	cs, Ba	r Iro	n, Sm	ithy	Tool	8.		
. 4	bou	t 60	tons	lof	Cast	and	Wro	ught-i	ron
SCR	ap,	tc.							
. h.	ori	drthe	r pa	rticuli	rs s	ee ca	talogu	les, to	be
Alb	ant	Saus	a ap	Innal	on	to ti	10 A	ictione	ers,
Vic	tori	Stre	et. 1.	ondor	E	; B	ng 4	o, Qu	nee
N	K.B	-Pre	vious	to the	8	le, ar	Tange	mente	for
the	trat	afer	of the	Sever	al le	ases o	nady	Antage	0018
ter	mş (an t	e m	ade.	For	this	DUTT	088 64	rly
app	lica	tion s	houle	d be r	nade	to t	he Au	ictione	ers.
1	leleg	rams	: " 1	ndicat	or. h	fanch	ester	P 0.98	

We shall never know who bought any of the equipment or what became of it as the auctioneers went into liquidation soon after

and other PLANT and MACHINERY at the Copper and Lead Mines known as "Port Nigel" "Daugoch""Pantgwyn" Tanybwlch" "Bwlch Tocyn" and "Asheton" Mines, Abersoch near Pwllheli,North Wales.Upon the said premises on WEDNESDAY,THURSDAY and FRIDAY the 14th,15th,and 16th days of IUNE 1893, commencing each

The catalouge will include:-

day at 11,30.a.m

Two 60 inch Cornish Pumping Engines.

One 50 inch Ditto	Ditto
One 40 inch Ditto	Ditto
Two 36 inch Ditto	Ditto and

Several Sets of Pumps and Gearing belonging to thereto.

Ten Horizontal and Two double -cylinder Portable Engines, as geared for Winding and other purposes

Six Pit head frames

Eighteen Lancashire and Cornish Boilers

Sifting, Washing, Lifting, and Conveyor Plant.

Shafting ,Gearing ,timber Work.Floors, Galvanised Sheds.

Forty tons of Tram Rails. About 100 tons of Cast Iron Pipes

Trucks, Bar Iron, Smithy Tools

About ? tons of Cast and Wrought Iron Scrap &c

For further particulars see catalogue . to be obtained on application from the Auctioneers, Albert Square. Manchester: and 40 Queen Victoria Street , London E.C

n.b Previous to the Sales arrangements for the transfer of the several leases on advantageous terms can be made , For this purpose early application should be made to the auctioneers/Telegrams: "Indicator,Manchester"

The catalogue will include:-

Two 60 inch Cornish Pumping Engines.

One 50 inch Ditto	Ditto
One 40 inch Ditto	Ditto
Two 36 inch Ditto	Ditto and

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Gwynedd Archives

X/POOLE/5155 c1716

'A copy of Sir Richard Grosvenor's lease of his lead mines; a copy of the lead mine adventure near the Silver Rake; and a copy of the opinion and description of the lead mine of Penrhyn Du; and a copy of Wheldon's advertisement of the ore sent by Sir Edward Bayley, Bart., to Plasnewydd, per Jas. Roony who brought the originals back with him to Ireland'.

1) Sir Richard Grosvenor of Eaton co.Chestcr, Bart.

2) William Grosvenor the elder of Chatsworth, co. Derby, Esq., Robert Piggot of Eaton, gent., and Jonathan Robinson of Chester City, gent.

COPY LEASE for 21 years of the mines and old workings of lead on Halkin mountain, co. Flint called Cheneys Rake with full mining rights. The profits are to be shared between William Grosvenor, Robert Pigott, Jonathan Robinson (in the proportions of 2 : 1 : 1). Royalties 30/- per ton. 1716

b) Accounts of the lead mine adventure near the silver rake.

c) Explanations of mining terms, measures, etc. and mining rules.

d) Description and opinion of the lead works at Penrhyn Du. Describes the old workings very briefly (the old works will involve about £300 in expenditure as they are very decayed and have not been worked for 20 years).

e) Copy of Wheldon's advertisement: A lead mine at Penrhyn Du, Caernarfonshire, has stood unworked for some years because Richard Bagnall, Esq., refused to grant a lease. Now he is dead the property has passed to Edward Bayley, Esq. It is a rake work, with good ore. Carriage charges are 6 pence to the seaside and 12 pence boatage to the ship. Adventurers should apply to Thomas Wheldon, who lives on the site. He is prepared to clear the site on reasonable terms. Other discoveries have been made in the area, especially ore belonging to Sir Richard Fleetwood in Staffordshire. Edmond Edwards of Highton near Liverpool prospected for ore there, but later fled and left his men unpaid. The lease is offered on reasonable terms.

Gwynedd Archives

X/POOLE/5156 circa 1779

COPY PROPOSALS and agreement of John Weston and William Moore with Sir Nicholas Bayley and the Earl of Powis for a lease of Penrhyn Du mine (formerly leased to John Cartwright, 1769).

X/POOLE/5159 circa 22/05/1822

LETTER: Thomas Jones of Bryntirion to Poole, Lord Anglesey has agreed to grant a lease to a mining company at Penrhyn Du. Asks Poole to draw up the lease.

X/POOLE/5160 circa 30/06/1822

COPY LETTER: Poole to John Sanderson discussing arrangements for the Penrhyn Du lease. They must consult Robert Welding, Esq., of Powis Castle, Montgomeryshire, on behalf of his employer who owns one moiety of the property. He considers that it is not Lord Clive but the Earl of Powis his father who is the owner of the moiety of Penrhyn Du.

X/POOLE/5161 circa July 1822

PROPOSALS of Hugh Hughes, John Evans, David Cartwright, Robert Roberts, Elizabeth Hughes, Griffith Davies, John Lloyd, Rev. Hugh Hughes of Caernarfon, and Owen Jones of Penrhyn Du, for a lease of Penrhyn Du mine, co. Caernarfon (with clauses re working of the mine, etc.). Proposed term 21 years. Proposed royalties to the Marquis of Anglesey: 1/8t

X/POOLE/5162 circa July 1822

OBSERVATIONS on the proposals for working Penrhyn Du mines.

X/POOLE/5163 circa 20/05/1822

LETTER: J. Sanderson of Uxbridge House to Thomas Jones, Esq. All local land business is to be transacted by the resident solicitor without reference to Messrs. Lowe in London. The draft of the lease is to be sent to Mr. Poole. He must inform Lord Clive of the proposal and the terms approved by Lord Anglesey (re Penrhyn Du)

. X/POOLE/5164 circa 1822

COPY PROPOSALS for a lease of mines at Penrhyn Du made by Hugh Hughes, John Evans, David Cartwright, Robert Roberts, Elizabeth Hughes, Griffith Davies, John Lloyd and Rev. Hugh Hughes of Caernarfon and Owen Jones of Penrhyn Du and Thomas Jones, miners to the Marquis of Anglesey. Proposed royalties 1/8th; clauses for the operation of the mine, etc.