

**THE MANGANESE MINES OF WEST
MERIONEDD.**

HISTORY DISSERTATION 1997.

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I affirm that this is my own work and that I give full acknowledgment to the sources used, both primary and secondary as listed in the bibliography and footnotes.

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THE MANGANESE MINES OF WEST MERIONEDD.

INTRODUCTION.

The basic concept for this study was to bring together whatever diverse information that there was to be found on the subject. This has proved to be of a much wider range than was at first conceived and has all of the ingredients which could lead to a far more detailed research. The inspectors of mines reports, from which much of the statistics have been obtained, show a remarkable degree of inconsistency. It would seem that the inspectors were more concerned with the safety, and conditions of work in the coal mines generally, and with the slate quarries in the region. It would appear that they relied on the owners returning annual reports which may not have been very accurate, and this was not always done. There is no mention of inspections being carried out. In the mid to late 1920's the inclusion of anything other than coal and slate is non existent in the reports.

*P*ractically all of the Manganese produced in Britain in the late 19thC and early 20thC came from two areas in Wales. This was from the western extreme of the Lleyn peninsula in Caernarfonshire around the Rhiw mountain, and in Merionethshire from around the area known on the geological maps as the Harlech Dome. There was also some production in the Bala area but this was on so small a scale as to be of no consequence. It amounted to around 60 tons. Reference must be made to the production from the Lleyn mines for

comparisons to be made as they had a greater output than the combined output of the western Merioneth mines. Comparisons of the outputs will be shown in the yearly output tables in appendix B. The Lleyrn mines were also brought back into production as a result of the Second World War and the consequent outside influences of this event on supplies from abroad, with loss of production and trade from countries which were occupied, and loss of shipping carrying ore by enemy action. Outside influences will also be seen to have had some control over the demand for, and the amount of ore mined. This investigation is in the main concerned with the western Merioneth mines and any reference to the other areas will be for comparison. Margaret Griffith has written a paper on Manganese production at Rhiw on the Llyn Peninsula. This was published in the transactions of the Caernarfon Historical Society vol50 1989. (The paper was part of a MA Philosophy Dissertation by her.) In this she has established that the Llyn mines operated from 1829/30 much earlier than those in Merionedd, that they were successfully worked in the 1840's with some decline in the 1850's due to high grade ore becoming available from Germany. Then a surge in production from 1880 through to th 1920's. This coincided with the activity in the Merionedd mines and throughout this period the helped the local economy providing up to 200 jobs. ore was shipped out from Abersoch and Aberdaron by sea, some of the boat owners also had an interest in the mines. There was no rail link this far west so shipping was the only means available. In 1905 a mr Wright from llanbedr in Merionedd leased a mine on the Llyn called Tyddyn Merion, this establishes a link between the two mineing areas. The only person called Wright in the records for the Merionedd mines is H.J.Wright. who had interests in the

Haffoty / Dyffryn An the Union / Tynllan mines. No other Wright has been found.

If this investigation had taken place some twenty years earlier it is possible that a more in depth report could have been constructed with first hand recollections taken from interviews with people who had worked or whose relatives had worked in the mines. But it has so far only been possible to trace three people who have recollections of the mines working. One person, he is in his mid eighties and has at the time of writing promised to assist though it must be appreciated that this may not be possible the others are even older and are doubtfull sources at this time. Past research interviews have been looked at and some reference has been found in them but only of a limited scale transcripts of the relevant parts of the interviews are used. Any inconsistency and possible errors in the spelling of Welsh place names is due to my useing the spellings as found in the sources used.

Use has been made of the following location facilities for this study.:-

1. The Library. Coleg Harlech.
2. The County Archives. Dolgellau.
3. The National Library of Wales. Aberystwyth.

CHAPTER 1.

1. WHEN AND WHERE THE MINES OPERATED.

The time scale of operation for these mines has proved to be a little indeterminate but the main period of major operation would seem to have been from around 1885 until 1928. References to the movement of ore from the area prior to the construction of the G.W.R. Cambrian coast line do occur. The earliest reference is for 1834 - 1840, and refers to the deposits in Cwm Nantcol on the side of Moelfra Mountain, and Mynydd Llanbedr. Reference has been found for this ore (Manganese Dioxide) being taken to Glasgow and used in the manufacture of bleach but only the exposed atmospherically altered ore was used. This would seem to be associated with shipping movements out of Barmouth and Pensarn, prior to the construction of the railway, and they were noted in the various journals written by travellers to Wales. The operation of the mines has been anything but consistent over the period, with mines being run and shut down as demand for the ore fluctuated, and as the price of ore on the open market affected the viability of the operation. Even when the price of ore was at its lowest point though, it was still possible to operate at a profit. It is not always clear as to which mines were operating as there is some inconsistency with change of owner and change of name, or in some cases more than one name for a mine identified at a particular location. This is shown in the list of mines, their names, area and O.S. map references given in **appendix A.**

With regard to the Caernarfonshire mines, it is of note that they only started production when there was a large demand for the

ore, that they remained open for a shorter period and that this opening was later than that of the Merioneth mines. Over this shorter production period however their output was much greater. The Caernarfonshire mines also operated at a time when the Merionethshire mines did not. This was during the Second World War, when their output over this 5 year period was substantial and no doubt was a result of the demands for war time steel production, when imports by ship were precarious, and under threat from enemy action, this would seem to have been the motive for the extraction of ore from the Merioneth mines during the First World War. The Caernarfonshire mines were opened and operated under the control of the Ministry of Supply(M.O.S.) from 1940 to 1945. In 1941 the M.O.S. commissioned a magnetometer survey to be carried out by a team led by A.G.Groves, in an attempt to locate further deposits of ore. The ore deposits at this location are different to those of Merioneth, and do not appear as well defined beds, but are spasmodic and lenticular, these can be up to 30,000 tons at any one location.

2. THE GENERAL AREA THEY OPERATED IN AND THEIR SPECIFIC LOCATION AND DESCRIPTION.

*T*he area which I am discussing stretches from Barmouth in the south up to Talsarnau in the north, a distance of approximately 14 miles and inland from the coast for up to 5 miles. It is here that the majority of the mines are located. Some to be found in the north east close to Trawsfynydd and again some in the south east, close to Llanelltyd. The terrain in which these mines are found can only be described as very difficult, mountainous, rough and boulder strewn. They are certainly not easily accessible. At the time they were operating it must have been difficult to reach

them, with no made up roads as we know them today. Even now, access into the general area is by way of roughly surfaced single track roads, whose only function is to serve the remote farms. It is very unlikely that this will ever change, as this area is now within the confines of the Snowdonia National Park. For this reason also, it seems unlikely that the large reserves of ore which are known to be left will be exploited, something which could be easily done with modern mining techniques. But even with modern techniques the ore yeild is probably too low to be currently profitable. The ore which was extracted was done so by removing that which was easily "*mined*", or removed by other methods. This has resulted in vast amounts which are left untouched.

When first compiling the list of all known mines a total of 73 names was arrived at. This came as a bit of a surprise, but on fitting O.S. grid reference locations to the names it became apparent that more than one name could be applied to the same mines. It would seem that when there was a change of owner or of the mine agent there was on occasion also a change of mine name. There would also seem to be some conflict between the local Welsh name and the anglicized spellings in mining records. There also seems to be some conflict in the parish names given as location area. These do not always tie up with modern map locations, and so can give rise to further confusion. The O.S. location method brought the number down to 41 confirmed mines together with 10 named mines for which I have been unable to determine exact locations. In the following list of mines I have included all known mine names, and so some O.S. points will occur more than once.

When considering the locations of the mines it is an advantage to start in the Barmouth area. The strata which contain the deposits are most prominent here, extending into the town, being clearly visible around St John's church. It is here that the strata beds are named, The "HAFFOTY SHALES". It will be seen from the geological maps that all of the mines in the area are located on the outcrops of this strata. These deposits are clearly defined on the maps. Plotting the locations of the mines on the Ordnance Survey maps locates the mines at similar elevations; those inland are all between 850' and 1000', those closer to the coast are at around 250'. This gives some indication of the way in which the beds are laid down, and the angle at which the beds now lie. Referring to the Lleyrn mines again, it has been suggested in the "British Regional Geology for North Wales" that the rock formations "The Mulfran Beds" in the area where the mines are located, are an extension of the Harlech Dome. This is not a complete extension due to faulting and over-laying of other rock sequences.

"Pg. 20. The preserved sequence is an attenuated representative of that occurring on the western flanks of the Harlech Dome".[B.R.G.]

This will be shown in map #6. The positions of the mines relative to the strata beds will be seen by looking at the line maps included in the text, but as these are only on a small scale it will be useful to view a 2.5 inch to the mile scale O.S. map in conjunction with the list of O.S. references.

Starting at Barmouth a very extensive group of mines extends in a northerly direction for about 3 miles. This group follows the

outcrop of deposits. The separation of the various mines is somewhat indistinct with some merging of the various workings. As these workings progress, they are extensive and distinctive enough to be marked on the O.S. maps as a prominent feature, and not just shown as old mine workings. This group of workings would seem to have been the most extensive. The first mine is the "Barmouth" situated by St. John's church, a prominent feature in the town. There are several entrances to extensive underground workings close by the church. Access to these is by way of a public footpath which is possibly the remains of a trackway serving the mines. This trackway can be followed northwards and will be found to link up with the "Cell Fechan", and then the "Cell Fawr" mines, past them and on to "Hafoty" mine and then down to join the main road at Llanaber.

The Barmouth mine was operated by a John Abraham from 1886 to 1892 and then closed for a period of 7 years. Over the period of operation it had a recorded output of 1265 Tons. In 1899 the Abrahams restarted mining operations further along the ore bed at Cell Fachen, this operated until 1908 and produced 876 tons by both surface and underground working. The northern extremity of the Cell Fachen mine ends in a steep narrow ravine, and it is possible that this limited the extension of the workings. The track does go round this ravine but it is most likely that the ore from only these two mines was brought out in a southerly direction to Barmouth railway station. On the northern side of the ravine, about 400 yds further on, is the Cell Fawr mine. This is a long shallow open cast working which extends for almost 1/2 mile. Access is poor and the only recorded output is for 1891 to 1892 when it was operated by the Dyffryn Mining Co Ltd. Trackways lead

down from this mine to the main road close by Llanaber church. This would have given easy access to the railway which is only 1/4 mile away.

The next mine to the north is the Hafoty. This name is the same as that of the farm about 3/4 mile to the south west. This is also the name given to the geological structure in which the manganese ore is to be found, "THE HAFFOTY SHALES". Some confusion over the name of this mine has occurred, and it has at times been referred to as the Barmouth mine. The Hafotty Mine operated from 1885 to 1894 and produced over 12,000 tons of ore over this period. This would seem to place it in the position of being the largest of the Manganese mines in Merionedd. Throughout its lifetime it was operated for The Dyffryn Mining Co. by agents in charge, J.S.Lancaster up to 1887 and then by H.J.Wright. The mine was taken over by Wright in 1896 but there is no record of any ore being produced. Due to the way in which the ore beds are laid at this mine, both extensive open cast and underground methods of extraction were used. The ore bed dipped at an angle of around 70deg, large open cavern type workings requiring timber supports were formed as a result. These are hazardous and should be approached with caution. The workings extended for about 1.25 miles with a tramway along their length, the ore being moved along this southwards to the Cell Fawr mine and then west to a aerial ropeway down to a point where it could be transported to Barmouth railway station. At its time of peak working in 1887, 37 men are recorded as working underground and 15 on the surface. This was more than any other mine in the area. Reference has been found to a mine to the north of the Haffoty mine, with the name Egryn being used. I have been unable to confirm this and it is possible that

confusion with the Egryn slate quarry 3/4 mile to the west has occurred. The length of workings credited to the Haffoty mine would seem to agree with this, it is also possible that this was the Bwlch Y Rhiwgyr mine. The Haffoty mine is the only one which has been found mentioned in the Inspectors of Mines Reports on accidents. This is in the 1892 report and concerns an explosion on August 26 at 10:30.am. two men were involved, two holes had been charged and the fuses lit, One burnt fast, men retired, charge exploded, men returned to relight second fuse but it was burning and exploded in their presence. One man, Edward Parry the foreman was bruised but did not lose time from work, the other Richard Thomas, a blacksmith had a cut right hand and was off work for 7 weeks.

Continuing to the north, there is a distance of 3 miles before the next mines are located. This is round the mountain known as Moelfra and into Cwm Nantcol. The next mine to be encountered will be Moelfre, and is easily accessible being close by the road from Cwm Nantcol to Dyffryn. This mine is one of the earliest, and it was from here that the Manganese oxide ore was mined in 1835-40. The mine was then abandoned until 1885 when it was reopened by the Dyffryn Mining Co. The original workings were open cast but this developed into underground workings with adits being driven into the hillside to follow the line of deposits. The Dyffryn Mining Co. worked along 1/2 mile of the beds by both methods. Later, when the mine passed on to other operators it was extended both north and south, and remains of buildings are still to be seen near to the mine. Ore was taken down into Cwm Nantcol then to Pensarn station for loading. The mine was finally closed in 1913.

Further on round the mountain and into Cwm Nantcol the next mine to be encountered is the Hendre on the east and the northern slopes of the Molfre mountain. Both open-cast and shallow underground adits are evident here, access is difficult with the remains of a trackway going down to the road on the valley floor. This mine is recorded as being opened in 1889 by the Harlech Mining Co. Ownership seems to have changed several times and operation of the mine has also been spasmodic, the mine was opened up in 1914 to supply war time demands with mining following the beds extensively. The final working was in 1923, and there are remains of buildings and some machinery to be seen here.

The next mines to be encountered on this side of Cwm Nantcol are Craig Uchaf and Rhinog. These are probably the most extensive of the mines in Cwm Nantcol, working an outcrop of ore bed over a distance of 1.5 miles using both open cast and underground methods, many large adits are to be seen at this location. Trackways with some evidence of rails, inclines, and the remains of aerial rope ways still exist, there is still the remains of buildings. These mines are reported to have been opened in 1886 by the Merioneth Mining Co., closed in 1887, then reopened by the Dyffryn Mining Co. in 1888. As with all of the mines, periods of closure occurred but again the First World War brought renewed demands for the ore and this mine is reported as having the largest output of all the mines in Merioneth at this time. Some years ago, I was told that barracks for the miners existed at this mine during the war but I have not been able to confirm this, nor is there any indication of them to be found, but they may have been of timber construction. However this is one of the more

remote locations at about 5 miles from the nearest village and so this is quite likely. The last reported operation was in 1923.

On the northern side of Cwm Nantcol is the mountain Mynydd Llanbedr, this extends to the east into Foel Wen and Foel Du. It is here that the outcrop reappears at about the same elevation on the opposite side of the glaciated valley. The first mine along this outcrop is Cilchychwyn which merges into Foel Wen then into Foel Du. There is a continuous trackway from them all leading down into Cwm Nantcol, and it would seem that the ore from all three mines was brought out by this way. There is also a series of inclines for trucks from Foel Wen mine down to Pont Cwm Nantcol, so in effect there were two routes for the ore to take. Substantial workings are evident here both opencast and underground. Operation of these mines would seem to have been between 1886 and 1892.

As we move on along this bed of ore the next mine is Cwm Yr Afon. This is on the northern side of the mountain. Access to this mine is poor and it is one of the more remote. Recorded details seem to be few for this mine and it is possible that the records do not show its true position. There is evidence to show that it operated during the First War and that it was large enough to warrant men being accommodated in barracks, and to have lodged at Cwm Yr Afon farm for the week. (Transcript of interview gives evidence for this) Ore from this mine was taken down into the Afon Artro valley by trolley, and then down to Pensarn G.W.R. station. Horses were known to have been used for this purpose. The mine was opened in 1889 by the Welsh Manganese Co. it closed in 1891 and seems to have remained closed until 1914 when it was reopened and continued operating until 1923. Both open cast and underground

mining was used and in the later years manganese oxide ore was extracted to a depth of 7ft from the surface. _____

Having now arrived at Cwm Bychan and the Afon Artro valley there are several mines to be considered. The most remote from Llanbedr, Cwm Mawr, is about 4.5 miles distant. Cwm Mawr is a valley down which a tributary of the Artro flows. Up this valley is a clearly defined outcrop of ore, which extends all the way up the valley to Llyn Eiddew Mawr. The Cwm Mawr mines extend up this valley along each side of the stream bed with both open cast and adit workings together with some stope workings at the higher end of the valley. In some places these adits were too close to the stream and as a consequence are subject to flooding making them unworkable. The mines would seem to have operated between 1887 and 1908 and to have been under the control of several owners, at one time being part of the Dyffryn Mining Co. Further up the valley comes Ffrydd Tyddyn Du. This was only a small operation and only worked for a short time and in a small way from 1896 to 1903. Continuing up the valley for about 2 mile we arrive at Llyn Eiddew Mawr, one of two lakes close together (now supplying water to the Harlech and Lanbedr area) from which the mine derives its name. This mine is about 2 mile from Talsarnau and it was to here that a track led for transporting the ore to the G.W.R.. Today this road is partly made up but the remainder of the track is difficult to pass over. At this mine there is a considerable amount of old building work remaining with examples of the various mining methods easily seen, and with areas set aside for the dressing of ore prior to transporting out. There is still some evidence of tramways. This mine is recorded as working from 1889 when it was

opened by the Welsh Manganese Co. Final working is shown to be 1901.(See plan for this site).

Continuing on past Llyn Eiddew the track leads to Llyn Dywarchen and the mines of this name. There are three sections to this mine due to the fact that the ore bed here is subject to faulting. The method of extraction here is predominantly open cast, with the ore having been cut from the vertical rock face. Much of the overhanging undercut rock has now collapsed. The mines are reported as being opened in 1892, and closing in 1897, with further reports of the mine closing in 1923, so it is likely that they were reopened for the first war. The area of mountain to the north side of Llyn Cwm Bychan has indication of trial digging in the manganese belt but there is no evidence to support extraction from here.

If we now look at the mines in the Harlech area it will conveniently follow the ore beds back to the Afon Artro and so have touched on all of the major workings. The Harlech mine situated only 1/2 mile outside of the town, and to the north on the main road is probably the easiest to gain access to. The adits to this mine are in the hill face at road level, with the workings following the ore bed at an angle up the hill side. Some of the openings have now been blocked with rocks, possibly by the local council working on the road. The working here was all underground. This mine is recorded as being opened by the Dyffryn Mining Co. In 1886 producing 3000 tons in that year and nothing in the following year, it was closed down the next year. There is then some confusion and it is unclear who was operating the mine. There is also confusion over the name and it is possible that it was called

either Llechwedd Du or Llechwedd Golew and worked until 1893. The woods in which the mine is situated are called Llechwedd.

Moving south from Harlech the next mine we come to is Penarth or Hafod Y Llyn. This is about 1.5 mile south on the road to Cwm Bychan. Records for this mine have not been found but it is reported that it operated from 1916 until 1923. The ore beds at this location dip at an angle of 15-20 deg and so mining has followed the ore bed down and stoping the undercut rock. This mine was close to the lake and as a result has now become flooded and in the main is inaccessible.

This now leaves a group of four mines in the Afon Artro area. These mines, Coed, Dolbebyn, Artro, and Llety Walter are situated on both sides of the river Artro, about 1.5 miles from Llanbedr. Again some confusion over names and exact location exists, Coed and Llety Walter exist close together with the workings merging, and there seems to have been some interchange of name here. The Artro would seem to have been situated on each side of the river with adits driven into the river banks and into the sloping ground leading down to it. There are certainly many adits and trial levels to be seen in this position. On the south side of the river opencast and underground workings exist from river level up the bank as far as the public footpath. The starting date for this mine has not been established but it is recorded as closing in 1887. There is a report of the mine operating again in 1923, with opencast stoped workings following the ore bed. On the opposite side of the river the Llety Walter/Coed mines are to be found. These mines run into each other. Llety is reported as working in 1869 and listed as a manganese and lead mine, but up to 1878 only Pyrites was produced, Pyrites is known to be in the beds

immediately below the manganese bed. At this time the mine was abandoned. It was reopened in 1886 and produced manganese ore up to 1889. In 1890 the name was changed to Coed/Llanbedr and worked to 1891 and then closed. The mine then opened again in 1901 to 1903 producing only small amounts of ore. Again, in 1923, there are reports of the mine working and ore being moved down inclines between the two sites. The method of extraction at the Coed/Llety Walter mine was both by adit and by following the bed of ore by opencast working and stoping the roof. This would then seem to be the end of any mining in this area.

CHAPTER 2.

THE GEOLOGICAL STRUCTURE OF THE AREA AND DEPOSITS.

This description is concerned with the deposits around the Harlech dome area, but some reference must also be made to the Lleyn Peninsular.

The Haffoty manganese shales form part of the Harlech beds which are part of the Cambrian system. Inclusion in the Cambrian system allows the deposits to be placed in geological time scale, around 600 million years in this case. This in turn allows their relationship to other deposits to be established. The Harlech beds (Harlech Grits) are divided into a series of identifiable beds, each given a name specific to areas around the Harlech Dome. These beds are identifiable at other sites in the area and so allow the sequences to be followed. In ascending order these beds are named.:- Dolwen, Llanbedr, Rhinog, Haffoty, Barmouth, and Gamlen. Together they extend to a depth of about 7000 ft.

In the Haffoty Shale's the manganese ore deposits which were mined occupy the lower portion of the beds, below this is a bed of Pyrites, This was mined at the Coed mine before manganese. All of the beds of the Harlech dome are sedimentary with only a few igneous intrusions on the western side. There was far more activity on the eastern and southern sides. It has been suggested that the manganese ore in the sedimentary deposits are a result of enrichment of a gel in shallow calm undisturbed waters. This would account for the wide area over which the deposits are to be found, this is a different method of deposit to that of the Lleyn Peninsular. A detailed description of the manganese deposits is

given in a paper presented by Prof.A.W.Woodhead at the Symposium on Manganese in Mexico in 1956.¹ This contains details of the chemical analysis carried out on samples from the different mine locations in Merioneth, and clearly indicates the poor quality of the ore when compared to other sources.

"The overlaying Manganese or Haffoty Shales 200-800ft thick, are distinguished from the Grits by their very fine grain. The beds are striped and banded green and gray mudstones with only occasional sandy layers of which the most prominent, occurring near the base, is the Manganese Grit reaching a thickness of 200ft. The Manganese ore that gives its name to the group occurs as a hard flinty band near the base: it is mainly composed, as Woodhouse has shown of Rhodochrosite, Diallogite, and Spessartire-Garnet, with some small amounts of Rhodonite and Pyrolusite. its red or purple colour is due to a small proportion of heamatite. the ore appears as to be an original deposit (although there has been some later chemical reconstruction) perhaps as a colloidal mixture of Manganese Carbonate with clay and Silica."²

These deposits are easily viewed in Barmouth at the St. Johns church, and exact locations are given in the B.G.S. handbook Geological excursions in the Harlech Dome. Routes given in Pg. 18 & 50.

¹ Prof. A.W.Woodland. The Manganese depoits of Great Britain. Paper presented at Symposium Sobre Yacimientos De Manganeso. Mexico 1956. Pgs 208-216.

² Smith & George. British Regional Geology North Wales. H.M.S.O. London1961. Pg18.

METHOD OF EXTRACTION

Extraction of the ore in Merioneth falls into three categories, all of which may be found at any one location. The exact method used depending on how exactly the ore beds are placed. The first known use of Manganese ore in the 1835-40 period only used open cast methods to remove the ore which had been exposed to the atmosphere and subjected to oxidation. This ore being found in outcrops which were easily worked. This method of working was used extensively at the Hafoty mines, and can be seen today as a long open scar, a very distinct feature on ariel photographs of the area. At the Hafoty mines the ore beds sloped down at about 70deg, this meant that the miners followed the ore down and along the length of the bed. This resulted in a long angled trench which had a roof which required supporting, this was called stoping. This method of working was also used at the Coed, Llety Walter, and Penarth mines. This only leaves the third method which was true underground working using tunneling to follow the ore beds. Access to the mines was by way of adits cut into the hill side. The roof was in general self supporting as the overlaying rock was strong and stable. Props were used at the entrances especially when these were from stoped areas. In other cases the roof was supported by leaving pillars of uncut rock and ore in place. This method was used in the Harlech mine. None of the Manganese mines in this part of Merioneth used vertical shafts to gain access to the workings. This is in contrast to the mines in Lleyrn where shafts were used to gain access to the ore bodies which occurred at depth.

WHAT USE WAS MADE OF THE ORE?

The use to which the Manganese ore was put has no doubt dictated when and how much ore was produced from the various mines, and at what times this was required. Economic and political circumstances must also have had some influence on production.

It should be noted that the quality and the concentration of Manganese in the ore mined in Wales was of a much lower standard than that of ore which could be imported. Being of a lower standard, then obviously more ore was required for a given application.

The records show that the first commercial use for the ore produced in Merionethshire was around 1835-1840.[Halse]. This was mined at the Nantcol mine situated on the western slopes of Moelfre mountain. These old workings are easily accessible today, being situated close by the road from Cwm Nantcol to Dyffryn. This was open cast mining, as the ore required was the top oxidized layer which had been exposed to the atmosphere. It was this oxidized ore which was used for the production of Chlorine from hydrochloric acid and its subsequent use in the manufacture of bleach. It is reported that this manufacturing process took place in the Glasgow area.[Dodd]. It would seem likely that the ore was transported by boat from Pensarn harbour, this being the closest harbour to the Moelfre mine. The G.W.R. coast line had not yet been constructed, therefore the only practical method of transport at this time was by sea.

There are also reports of the ore having been sent to St. Helens for use in the glass industry around 1919.[Dodd]. In the glass industry Manganese is used both as a means of colouring the

glass in shades from pale pink, through amethyst to almost black. It is also used as an oxidant to remove the green colour from raw glass, and to render it clear or with a very pale straw colour.[Weiss.S.A.].

By far the greatest use for the ore produced in Wales was in the iron and steel industry, this would seem to have been at the Mostyn Iron works. It is no doubt significant that the expansion of mining in Merioneth coincided with introduction of steel making at Mostyn. The Dyffryn Mining Co. was owned by the Mostyn Iron Co.

Manganese use in the iron and steel industries can be divided into three areas. :-

a. As an alloy in Ferro-Manganese, containing 80% Manganese, Silico-Manganese, containing 10% silica and 20% Manganese, and spiegeleisen containing 15-25% Manganese. In the 1880,s Welsh ore was mixed with richer foreign ores and used to produce a alloy with 40% Manganese. This was exported to the USA

b. The ore was also used as a direct charge into a blast furnace in the production of basic iron. In this case its was as a de oxidiser and as a de sulphuriser.

c. The third use was in the manufacture of Manganese steel, this contains 12-15% Manganese, has a good resistance to wear and was used extensively for railway lines.

As previously mentioned, Welsh ore was of a low grade with low Manganese content, this made it only suitable for use in the production of spiegeleisen. It was this factor, together with the large imports of high grade ore that was to bring about the demise of mining in Wales. When viewed against the total world production

and the amount imported into Britain, the amount mined in Wales was very small. Only at a time of great need, together with difficulty and uncertainty of imports was there to be any revival, as happened during the second world war.

"Before the large scale use of Manganese in the iron and steel industries world production was 100,000-150,000 tons/year, with British production around 1,000-8,000 tons/year, most of this from English mines. After the introduction of Manganese steel in the 1880,s production went up to 250,000 tons/year with British output at 12,000 tons, most of which was produced in Merioneth, a dramatic increase. This production was small when compared with the amount of imported ore, 30,000 tons in 1884, 140,000 tons in 1890 and 250,000 tons in 1900."³[Dodd].

CHAPTER 3.

TRANSCRIPTS OF INTERVIEWS WITH ELDERLY PERSONS.

These interviews were done by the staff of Coleg Harlech at the college.

The interviews were carried out in Welsh, it being easier for the old people who would feel more at home in the native tongue. This is a direct translation and no attempt has been made to correct the grammar. To have done so would have removed the authenticity.

Q. You mentioned the Mango works, and that there were small trolleys, and bigger trolleys. Can you talk about them?.

A. Yes, there were some small low trolleys, and ones that were bigger, up from the works,, to get them, and I remember they had been working on the road up from Cwm Y Afon up to the Mango works. The work on the boundary between us and Maesgarnedd, in a place we called Drysgol. The road was very bad, only stones put to make some sort of track to hold the trolleys. Then they would brake to come down, and we would hear the sound of the brakes screeching as they came down. I saw what was happening when it was very hot; the blocks, I think wood was being used by them, catching fire with all the weight.

Q. And when the small trolley had brought it to Cwm Yr Afon.

A. It had been done by Cwm Y Afon, to unload from it, and after there was a larger trolley brought up from Pensarn. I remember the old creatures that were with them. They weren't old; young people,`you see` well, it was war time , and after; they were not young people you see. Only that some boys; I remember some boys, very amiable staying in the "baracs" , being sent

to work in the Mango mines. I don't know if it is not fit, but they went anyway.

Q. Where exactly were the barracks?

A. Well the "baracs", the remains of the "baracs" are still there, they were there when I lived in Cwm Yr Afon, about 1/2 mile lower down than the works itself. It was not very big.

Q. Did they bring their food for the week with them?

A. For the week. I remember the old boys of course, we kept lodgers at Cwm Yr Afon as well. We had a house full, I remember about eight or nine. They brought their food with them. Large oven loaf, I am sure the wives made them at home. They very often bought their butter from us at Cwm Yr Afon. They were given potatoes and as much butter milk as they wanted. It was free to them. Did you know it was two shillings a week they paid for their place, for the bed, and for making food for them. Two shillings a week.

Q. But, there were stables, where?.

A. Yes, there were cow sheds and an old cart house altered to make stables for the horses that worked at the mines. There were two cart horses and a large shed. A cow shed, that being made into a stables for the horses.

Q. Can you remember something about the "Noson Lawen" that you had at Cwm Yr Afon?

A. Yes, most of them could sing, and there was an organ. My father bought it when I was six years old, from Mr. W.H.Raw from Porthmadoc. I could not remember whether it was new at the time, but there were what looked like imitation pipes on it, so many came along thinking we had a pipe organ. But it was imitation. But

anyway we all learnt to play as far as I know. Every one of us could play the organ, some of us better than others , but anyway we could all play. Well after there would be a small gymanfa maybe.

The above was from an interview given by Mrs. Ceridwen Jones of Y, Bwthyn, Talsarnau.

Q. When you were young what was the major work in the area?

A. Farming, the fashion I think, there was a man servant on every farm, more than one on other farms. The mango was during the war.

Q. What do you remember about that?

A. They would walk from Dyffryn, it is up and down all the way, and there were many others working there and lodging at the Hendre.

Q. Did anything special happen to you?

A. Yes, my uncle was killed at the Mango works.

Q. When was that?

A. 1917

Q. How did he get killed?

A. They were blasting the rock, and there was nowhere for them to shelter, he went somewhere to shelter but it was too close and he was killed.

Q. Do you remember anything else that happened at this time ?

A. In 1918 there was a flu epidemic and I lost two cousins within four days of each other.

The above was from an interview with Mrs. Cassie Pugh, Pant heulog, Dyffryn Ardudwy.

I have been unable to find any report of the above blasting fatality in the Inspector of mines reports for this year.

CHAPTER 4.

CONCLUSION.

It would seem that compared with other mining activities in Wales, mining for Manganese was only a very small scale affair, and was only brought about as a direct result of the demands of the Mostyn iron works. The fact that the owners of this works had the control of the Dyffryn Manganese Mining Co. would seem to be significant. However having made this point, the production of ore from Merioneth together with imported ores did go a long way towards the ending of extraction in England. The demand for the production of ore from Merioneth was also subject to outside influences, not only international as with the Russo Japanese war and the First World War, but also from within Wales. The opening of the mines in Caernafonshire meant that two mines alone on the Lley Peninsula could totally eclipse the output from all of the mines combined in Merioneth. The grade of ore produced from the Merioneth mines at only 35% Manganese also had an adverse effect, because imported ore was far superior in this respect. When the mines finally ceased production in 1928, vast reserves of ore still remained untouched, and a feasibility study at the start of the Second World War was carried out and estimates made of how much could be mined. This could have met a substantial part of the requirements if necessary, it was decided to go for the easier option of mining at the Lley mines, it was easier to extract the ore from here. By the end of the war all of the known deposits had been removed, and prospecting had not revealed any further ore bodies. The ore still remains in Merioneth and is likely to stay where it is, in an environmentally sensitive national park.

I am very much aware that this study has so far only scratched the surface, there is much detail yet to be extracted from the archives. In addition details regarding ownership of land and mineral rights, wages of miners and other social aspects, working conditions, transport, etc. all need to be recorded before it is too late. This must also include photographs of the mining sites before they crumble away and nature take over to hide the scars.

5.

Appendix A.

LIST OF KNOWN MINES AND THEIR LOCATIONS.SORTED BY O.S. LOCATION SEQUECE.

<u>MINE NAME.</u>	<u>PARISH.</u>	<u>O.S. LOCATION.</u>
CAPEL ENDEGI	LLANFAIR	590 310
BRONWEN	LLANDANWG	593 319
LLANLLEIDR	LLANFAIR	593 319
LLAN LLEITHDIR	LLANFAIR	593 339
PENARTH	LLANBEDR	598 288
ARTRO	LLANBEDR	604 282
COED	LLANBEDR	604 283
LLETTY	LLANFAIR	604 283
LLETTY WALTER	LLANBEDR	604 283
LLECHWEDD DU	TALSARNAU	604 333
LLECHWEDD GOLEU	TALSARNAU	604 333
HARLECH LLETTY	LLANBEDR	605 280
DOLBEBIN	LLANBEDR	611 279
BELLEVUE	LLANABER	613 161
CELL FECHAN	LLANABER	613 166
BARMOUTH	LLANABER	613 167
BARMOUTH MANGANESE	LLANABER	613 167
CELL FAWR	LLANABER	614 170
FFRIDD LWYD GURFAL	LLANFAIR	614 308
MOELFRE "LEAD"	LLANENDDWYN	615 255
HAFOTTY	LLANABER	617 178
HAFOTTY	LLANABER	617 183
HAFOTTY	LLANABER	618 190
BWLCHYRHIWGYR	LLANABER	619 200
PEN ISALCWM	LLANENDDWYN	619 205
CRAFNANT	LLANBEDR	621 291
CEFNTREVOR BACH	TALSARNAU	626 365
MOELFRE	LLANENDDWYN	629 255
HENDRE	LLANBEDR	629 256
CIL CYCHWYN	LLANABER	630 266
FOEL WEN	LLANBEDR	630 266
CWM MAWR	LLANBEDR	634 320
CAMBRIAN	LLANFAIR	634 322
FFRIDD TYDDYN DU	LLANFAIR	637 328
FOEL DDU	LLANBEDR	640 292
CWM YR AFON	LLANBEDR	642 288
LLYN EIDDAW	LLANFAIR	643 341

HENDRE CERRIG	LLANDECWYN	644 377
LLYN DYWARCHEN	LLANFAIR	653 348
RHINO	LLANBEDR	655 267
CEFN CLAWEDD	TRAWSFYNYDD	655 346
LLYN DUBACH	LLANFAIR	657 341
DIFFWYS	LLANABER	667 236
CWM MYNACH	LLANABER	680 215
CAE MAB SEIFION NE	LLANELLTYD	688 208
VOTTY AND DYFFWYS	LLANELLTYD	688 218
Y GARN	LLANELLTYD	700 230
UNION	LLANELLTYD	710 214
LLANYCIL	LLANYCIL	800 406
MOEL MOCHOWGRYN	LLANYCIL	800 406
MOEL LLECHOWGRYN	LLANYCIL	801 405
MOCHOWGRYN	LLANYCIL	804 403
NANT Y HELFA		832 401
BRYN FFOLT	LLANYCIL	859 392
MANGANESE ROYAL	LLANYCIL	860 393
BALA	LLANYCIL	864 398
MYNYDD NODOL	LLANYCIL	864 398
BRYN IFAN		
BWLCH CWMORTHIN		
FFRIDD DINAS	LLANBEDR	
FRON ALLT	LLANBEDR	
GARNEDDWEN		
LLANABER MANGANESE	LLANABER	
LLANENDDWYN	LLANENDDWYN	
MOEL LLYFNANT		
MYNYDD LLANBEDR	LLANBEDR	
PARK MINE		
PISTYLL GWYN		
ALLT GOCH		
ROYAL MANGANESE	LLANYCIL	
SGETHIN	LLANBEDR	
TRAWSFYNYDD	TRAWSFYNYDD	

6.

Appendix B.**OUTPUT STATISTICS .**

DATE	MER OUT	CAERN OUT	TOTAL.OUT	MER-VAL-CAER	
1873			8871 TONS		
1874			5778 TONS		
1875			3205 TONS		
1876			2797 TONS		
1877			3039 TONS		
1878			1586 TONS		
1879			816 TONS		
1880			2839 TONS		
1881			2884 TONS		
1882			1548 TONS		
1883			1287 TONS		
1884			1287 TONS		
1885			909 TONS		
1885			1688 TONS		
1886			12763 TONS		
1887			13777 TONS		
1888			4342 TONS		
1889			8854 TONS		
1890			12444 TONS		
1891			9476 TONS		
1892			6078 TONS		
1893			1336 TONS		
1894			1809 TONS		
1895			1273 TONS		
1896			1080 TONS		
1897			599 TONS		
1898	196 TONS		196 TONS	£182	
1899	328 TONS		415 TONS	£205	
1900	1004 TONS	318 TONS	1322 TONS	£512	£143
1901	1125 TONS	512 TONS	1637 TONS	£634	£260
1902	627 TONS	531 TONS	1158 TONS	£346	£260
1903	370 TONS	385 TONS	775 TONS	£370	£250
1904	282 TONS	8247 TONS	8529 TONS	£299	£3,904
1905	66 TONS	14286 TONS	14352 TON	£67	£11,428
1906	748 TONS	21990 TONS	22738 TONS	£778	£22,148
1907	838 TONS	15226 TONS	16064 TONS	£742	£15,740
1908	115 TONS	5937 TONS	6052 TONS	£140	£4,590
1909			2768 TONS		
1910	124 TONS	5343 TONS	5467 TONS	£149	£4,524
1911	178 TONS	4809 TONS	4987 TONS	£209	£3,788
1912	236 TONS	3934 TONS	4170 TONS	£235	£3,136

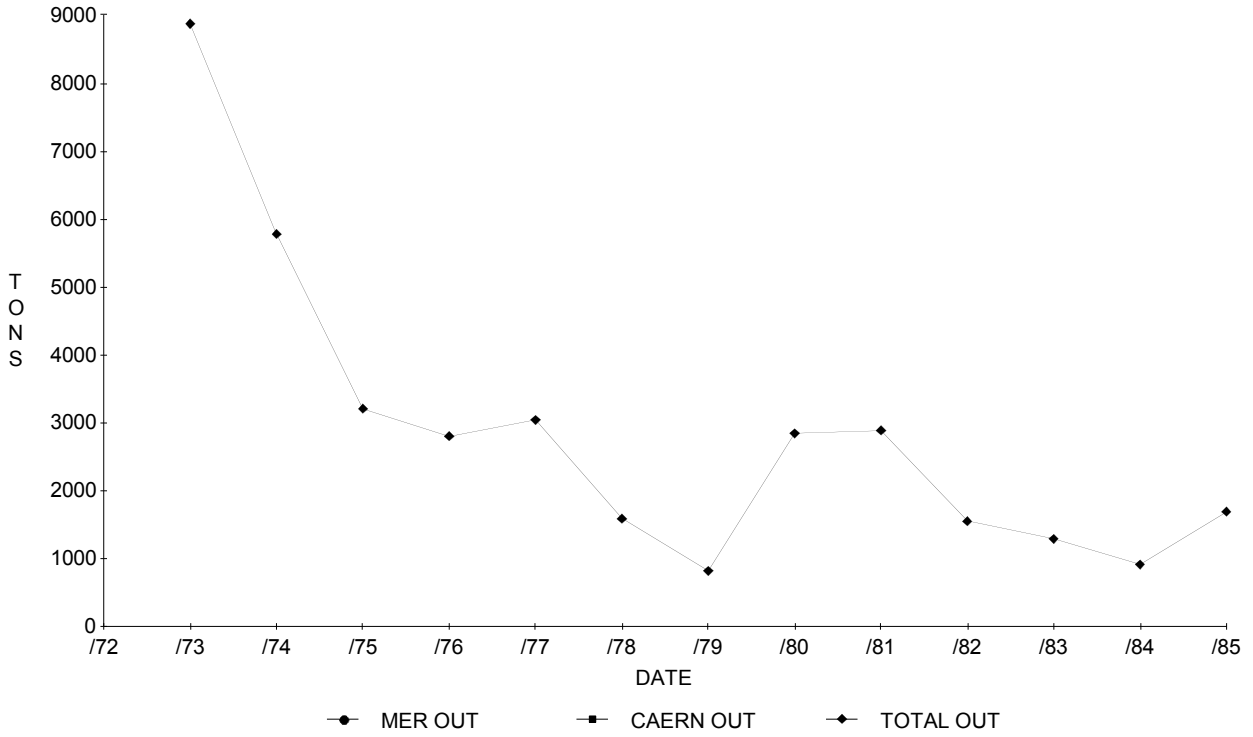
1913	102 TONS	5291 TONS	5393 TONS	£95	£3,977
1914	124 TONS	3313 TONS	3437 TONS	£127	£2,804
1915					
1916					
1917			5140 TONS		
1918					
1919					
1920	5793 TONS	7082 TONS	12875 TONS		
1921	514 TONS	0 TONS	514 TONS		
1922	250 TONS	0 TONS	250 TONS		
1923	1663 TONS	358 TONS	2021 TONS		
1924	1161 TONS	1296 TONS	2457 TONS		
1925	383 TONS	446 TONS	828 TONS		
1926	128 TONS	0 TONS	120 TONS		
1927	60 TONS	971 TONS			
1928	205 TONS	30 TONS	235 TONS		

* There is no mention in the reports by the Inspector of mines of any Manganese mining activity for this or any later years, nor is there any mention of mines having been closed down. The dramatic drop in output in the years 1921 and 1922 compared to 1920 should be noted. A general remark by the Inspector of Mines:-

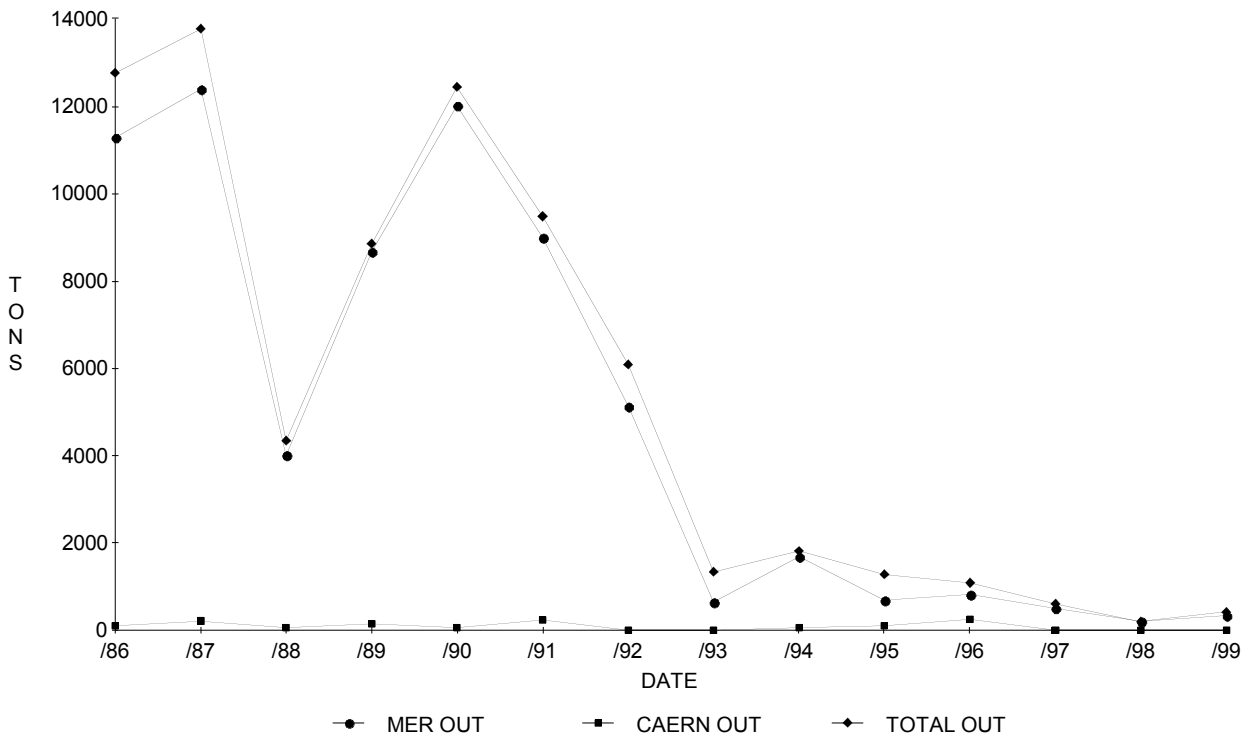
"Manganese mining is also almost non existent, owing to the low grade of ore compared with ores from foreign countries. The mines of Caenarvonshire cannot be worked to advantage except when foreign ores are not available."

(But they were worked to advantage during the second world war).

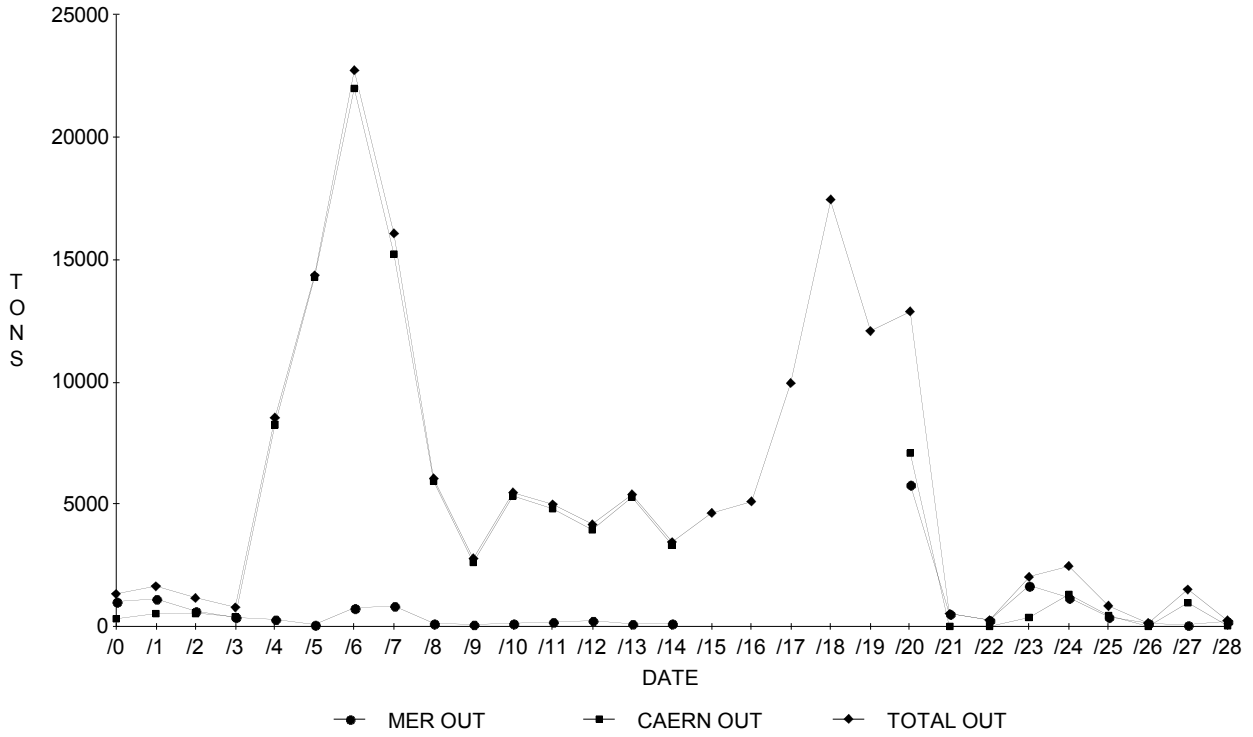
MANGANESE



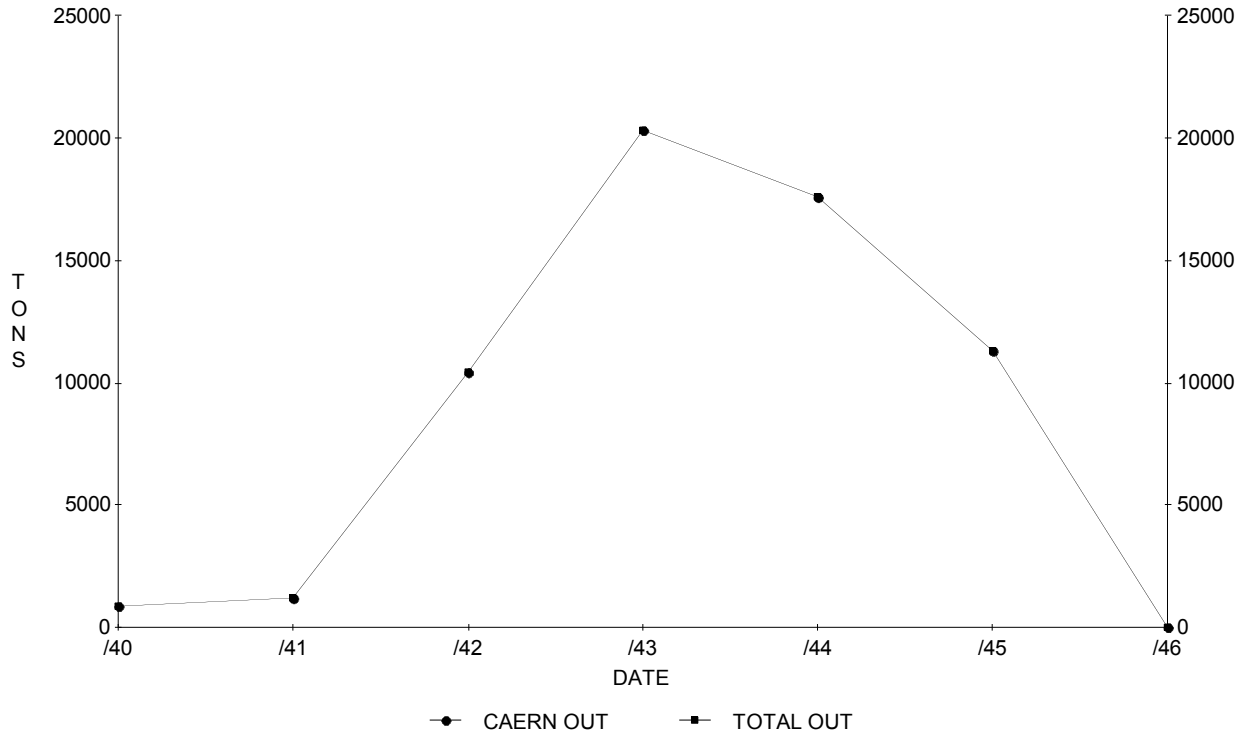
MANGANESE

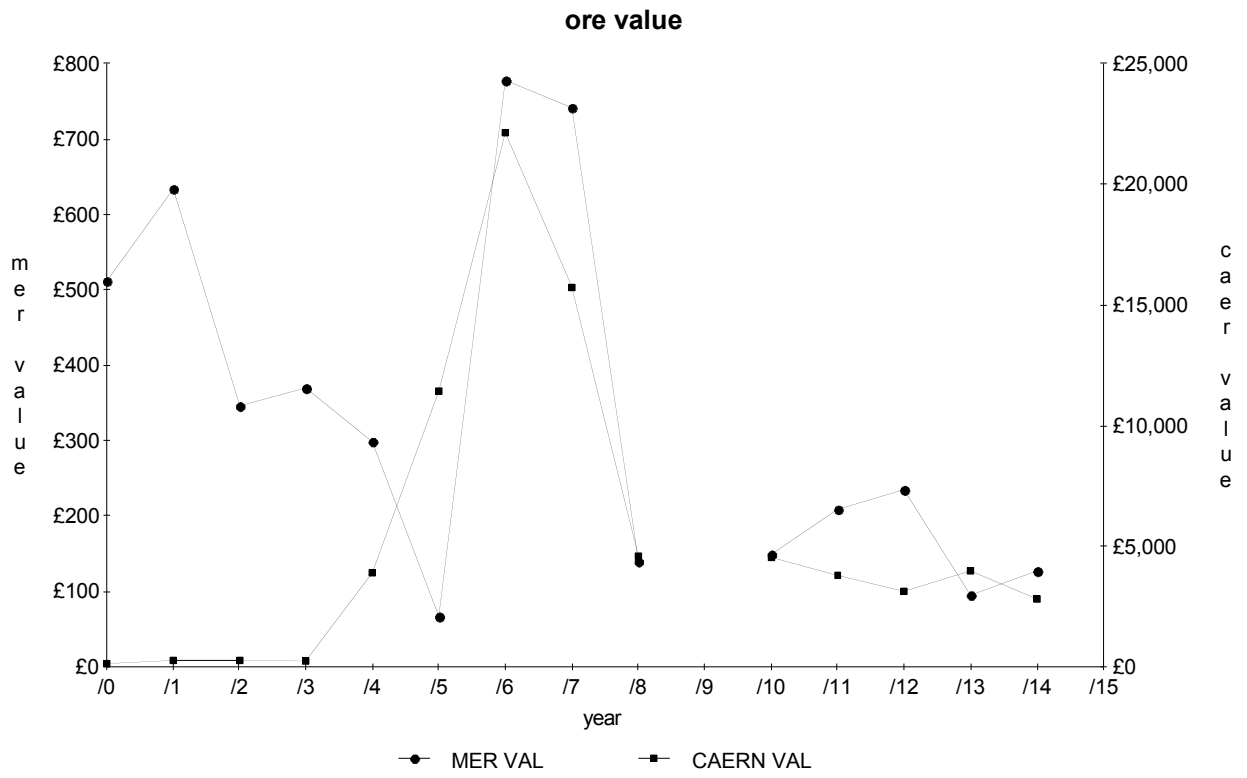


MANGANESE



MANGANESE





APPENDIX C.

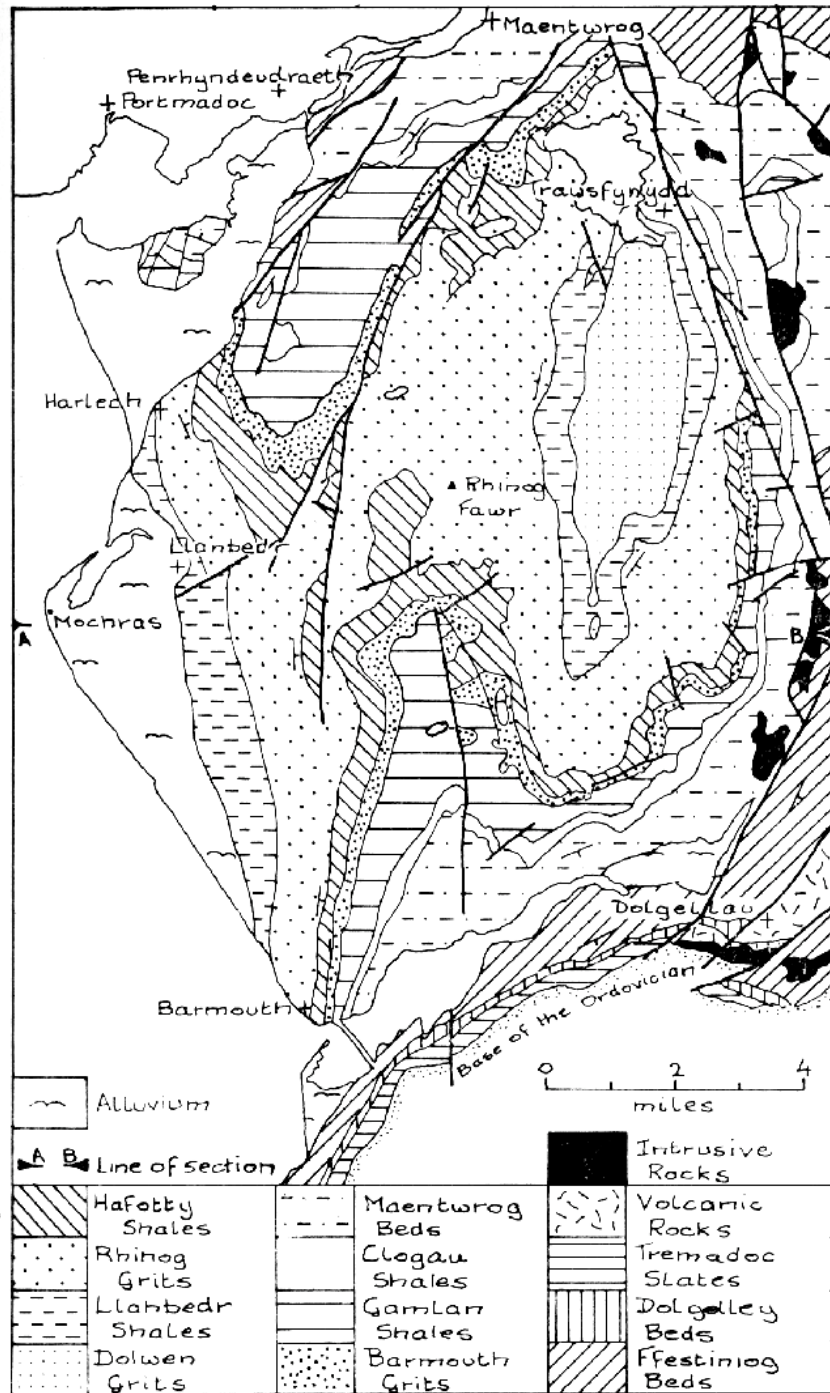


Fig 21 Geological map of the Harlech Dome (principally after Matley and Wilson, 1946)

Map # 1.⁴

⁴ J.Challinor & D.Bates. Geology Explained in North Wales. David & Charles. Newton Abbot. 1973. Pg69.

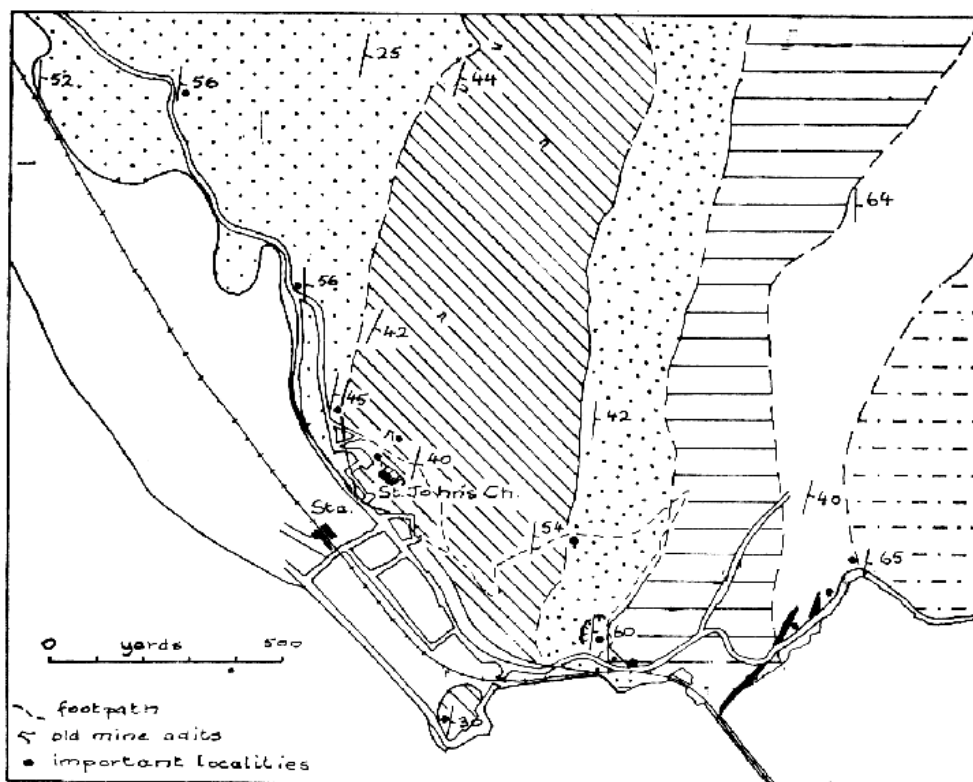
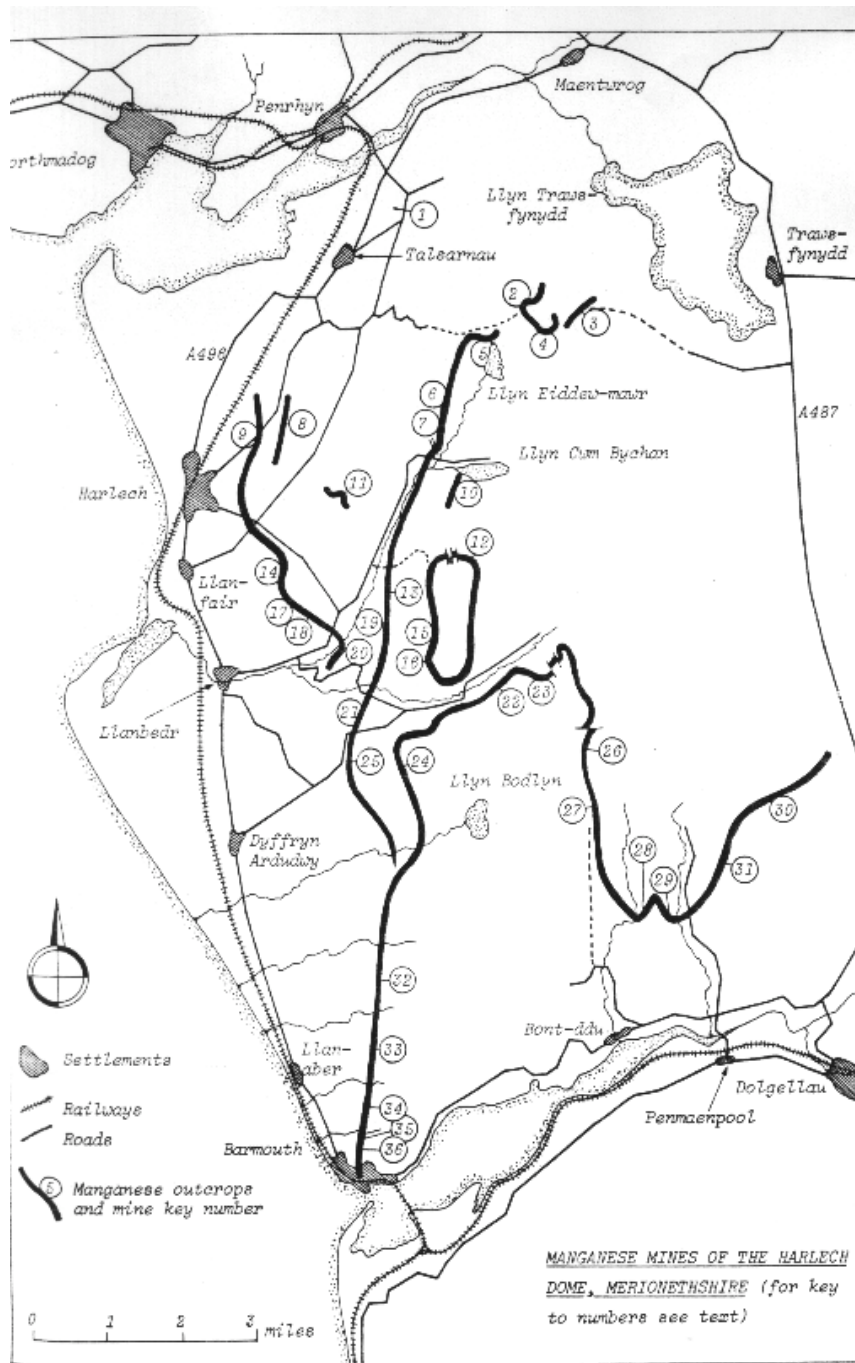


Fig 23 Geological map of the area round Barmouth town

Map # 2.⁵

⁵ J.Challinor & D.Bates. Geology Explained in North Wales. David & Charles. Newton Abbot. 1973. Pg72.
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Map # 4.7

⁷ C.G.Down. The Manganese Mines Of North Wales. Monograph. London 1980.

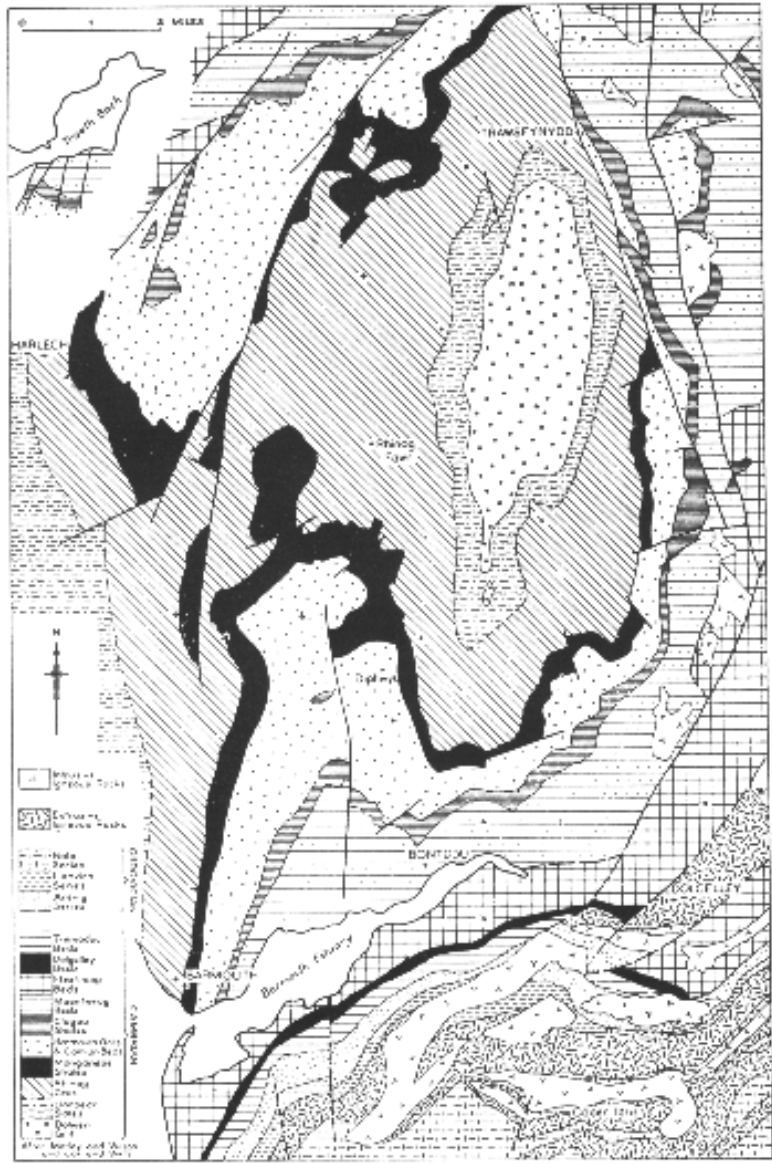


FIG. 6: Geological map of the Harlech Dome and the Cadair Idris range

Map # 5.⁸

⁸ B. Smith & N. George. British Regional Geology. North Wales. H.M.S.O. London 1961. Pg17.
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Key to map # 5.

1. Cefn Trevor Bach.
2. Llyn Dywarchen.
3. Cefn Clawdd.
4. Llyn Du Bach.
5. Llyn Eiddew Mawr.
6. Ffrydd Tyddyn Du.
7. Cwm Mawr No ! & 2.
8. Llechwedd Du.
9. Harlech.
10. Cwm Bychan ?
11. Ffrydd Llwyn Gurfal?
12. Cwm Yr Afon.
13. Crafnant.
14. Penarth.
15. Foel Wen.
16. Cilcychwen.
17. Coed.
18. Lletty Walter.
19. Llanbedr.
20. Dolybebin.
21. Pen Isa'r Cwm?
22. Graig Uchaf.
23. Rhinog.
24. Hendre.
25. Moelfre.
26. Old Diffwys.
27. New Diffwys
28. Votty.
29. Cwm Mynach.
30. Y Garn?
31. Cae Mab Seifion.
32. Egryn.
33. Haffoty.
34. Cell fawr.
35. Cell Fechan.
36. Barmouth.

8.

Appendix D.

Mines, owners, and outputs 1888 to 1896 from the Inspector of mines reports. These are the only years that include this type of report.

<u>Mine.</u>	<u>Owner.</u>	<u>Output and Value.</u>	
1888			
Barmouth	John Abraham.	49 tons	£30
Haffoty	Dyffryn Mining Co.	1407 tons	£746
Moelfra	Harlech Mining Co.	tons	£32
Mynydd Llanbedr	Richards and Pritchard.	20 tons	£21
Llechwedd Golau	D.Richards and Co.	143 tons	£50
Llety Walter	D.Richards and Co.	365 tons	£125
Cwm Mawr	Dyffryn Mining Co.	1889 tons	£746
1889			
Barmouth	John Abraham.	454 tons	£320
Haffoty	Dyffryn Mining Co.	2080 tons	£1728
Moelfra	H.C.Benkill.	68 tons	£51
Foel Wen	Foel Wen Manganese Co.	10 tons	£3
Foel Du	Welsh Manganese Co.	2 tons	£1
Craig Uchaf	Dyffryn Mining Co.	700 tons	£590
Bronwen	Hugh Jones.	100 tons	£60
Cwm Mawr	Dyffryn Mining Co.	2803 tons	£2403
Llyn Eiddew	Welsh Manganese Co.	1023 tons	£511

Lletty Walter	Dyffryn Mining Co.	388 tons	£225
Hendre No 1	Harlech Mining Co.	277 tons	£177
Harlech	Welsh Manganese Co.	675 tons	£337

1890

Barmouth	John Abraham.	70 tons	£70
Haffoty	Dyffryn Mining Co.	3946 tons	£1531
Moelfra	H.C.Bunkill.	183 tons	£225
Cilcychwyn	Leon and Carter.	800 tons	£1180
Foel Wen	Foel Wen Manganese Co.	34 tons	£14
Cwm Mawr	Dyffryn Mining Co.	982 tons	£410
Craig Uchaf	Dyffryn Mining Co.	3087 tons	£1043
Cwm Yr Afon	Welsh Manganese Co.	66 tons	£41
Hendre No1	Harlech Mining Co.	823 tons	£514
Llanbedr	Llanbedr Mining Co.	57 tons	£36
Llechwedd Goleu	Welsh Manganese Co.	132 tons	£89
Llan Lleidr	Hugh Jones.	372 tons	£298
Llyn Eiddew	Welsh Manganese Co.	769 tons	£538
Cwm Mynych	D.Richards.	155 tons	£88

1891

Barmouth	John Abraham.	80 tons	£75
Haffoty	Dyffryn Mining Co.	1157 tons	£1100
Cell Fawr	Dyffryn Mining Co.	652 tons	£456
Moelfre	H.C.Birlkill.	185 tons	£120
Rhinog	Dyffryn Mining Co.	578 tons	£433
Cilcychwen	J.N.Hogge.	560 tons	£392
Foel Wen	Foel Wen Manganese Co.	575 tons	£287
Craig Uchaf	Dyffryn Manganese Co.	2331 tons	£1515
Cwm Mawr No2	Samual Griffith.	107 tons	£70
Cwm Yr Afon	Welsh Manganese Co.	404 tons	£202

Hendre No1	Harlech Mining Co.	658 tons	£420
Llanbedr\Coed	Llanbedr Mining Co.	437 tons	£119
Llan Lleidre	Hugh Jonse.	40 tons	£20
Llyn Du Bach	Welsh Manganese Co.	558 tons	£391
Llyn Eiddew	Welsh Manganese Co.	224 tons	£151
Cwm Mynych	D.Richards.	30 tons	£18

1892

Cell Fawr	Dyffryn Mining Co.	302 tons	£189
Haffoty	Dyffryn Mining Co.	1663 tons	£1039
Rhinog	Dyffryn Mining Co.	889 tons	£556
Foel Wen	Foe Wen Manganese Co.	25 tons	£12
Craig Uchaf	Dyffryn Mining Co.	898 tons	£561
Hendre No1	J.W.McQueen.	147 tons	£71
Llyn Du Bach	Welsh Manganese Co.	1145 tons	£859
Llan Dywarchen	Ellis Pritchard.	50 tons	£37

1893

Rhinog	Dyffryn Mining Co.	128 tons	£55
Llyn Dywarchen	Ellis Pritchard.	314 tons	£188
Llyn Du Bach	Alfred Ferguson.	193 tons	£111

1894

Haffoty	Dyffryn Mining Co.	159 tons	£418
Rhinog	Dyffryn Mining Co.	1064 tons	£319
Llyn Dywarchen	Ellis Prithchard.	259 tons	£162
Lllyn Du Bach	Alfred Ferguson.	201 tons	£126

1895

Llyn Dywarchen	Ellis Pritchard.	108 tons	£67
Cwm Mawr	William Lewis.	200 tons	£90
Llyn Du Bach.	Alfred Ferguson.	374 tons	£234

1896

Moelfra	Ellis Pritchard.	180 tons	£112
Llyn Dywarchen	Ellis Pritchard.	192 tons	£110
Cwm Mawr	William Lewis.	373 tons	£205
Llyn Du Bach	Ellis Pritchard.	48 tons	£28
Ffridd TyddynDu	Ellis Pritchard.	20 tons	£13

4. WHO OWNED THEM, INDIVIDUAL MINE OUTPUT , No OF MEN EMPLOYED.

ARTRO.

1886. 2444 tons. 24+9 men

1887 0 tons. 13+4 men

Dyffryn Mining Co. 1886-7

BARMOUTH.

1886 21 tons. ? men 1887 500 tons. ?

1888 49 tons. 2+1 men 1889 545 tons. 0+3

1890 70 tons. 0+2 men 1891 80 tons. 0+2

John Abraham 1886-92

BRONWEN / LLAN LLEIDR.

1889 100 tons. 5+2 men 1890 372 tons. 4+0 men

1891 40 tons. 2+0 men

Hugh Jones. 1889-91

CEL FAWR.

1891 652 tons. 6+2 men 1892 302 tons. 4+4

Dyffryn Mining Co. 1891-4

CELL FECHAN.

1899 28 tons. 1900 277 tons.

1901 150 tons. 1902 80 tons.

1903 120 tons. 1904 90 tons.

1905 50 tons. 1906 100 tons.

1907 41 tons. 1908 40 tons.

Edith M. Abraham. 1899

Thos. Abraham. 1900-3

Mrs. Laura Williams 1904-8

CILCYCHWYN.

1900 800 tons. 4+15 men 1891 560 tons. 10+15 men

Leonard Carter. 1890

J.H.Hogge. 1891-3

COED & LLETTY WALTER.

1872 955 tons.

1873 179 tons.

1875 29 tons.

1886 1015 tons. 27+6 men

1887 1170 tons. 25+3 men

1888 356 tons. 4+1 men

1889 388 tons. 8+2 men

1890 57 tons. 10+0men

1891 437 tons. 9+10 men

1910 239 tons.

1902 144 tons.

1903 24 tons.

Pyrites only mined. Listed as Coed from this date.

Hope Jones & Co. 1869-71.

Edward Jones. 1872-78.

Merionethshire Mining Co. 1886-87.

Dyffryn Mining Co. / D.Richards & Co. 1888-89.

Llanbedr Mining Co.Ltd. 1890-91.

William Lewis. 1901-03.

CRAFNANT.

1886 19 tons. 7+2 men

1887 8 tons.4+0men

Merionethshire Mining Co. 1886-87.

CWM BYCHAN / CWM MAWR No 1 / or NANT STEICYN.

1887 0 tons. 6+2 men

1888 1889 tons.10+3men

1889 2803 tons. 22+3 men

1890 982 tons. 2+0 men

1891 0 tons. 0+4 men

1892 0 tons. 0+2 men

1893 0 tons. 0+1 men

1894 0 tons. 0+1 men

1895 200 tons. 0+1 men

1896 373 tons. 5+0 men

1897 130 tons.

1898 40 tons.

1899	5	tons.	1900	12	tons.
1901	300	tons.	1902	96	tons.
1903	24	tons.	1904	31	tons.
1907	440	tons.	1908	29	tons.

Dyffryn Mining Co.Ltd.

1887-90

William Ryder.

1891-94

William Lewis.

1895-04

Edward M. Turner.

1907-08

CWM MAWR No 1.

1890	0	tons.	1+2	men	1891	107	tons.	6+1
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1892	0	tons.	2+0	men
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Smmual Griffith.

1890-96

CWM MYNACH.

1886	779	tons.	36+9	men	1887	148	tons.	6+4
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1890	155	tons.	0+4	men	1891	30	tons.	0+2
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1906	501	tons.
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Merioneth Mining Co.

1886-7

D. Richards.

1889-91

West Manganese Co. Ltd.

1906

CWM Y AFON (or DROSGOL) & FOEL DDU.

1889*	2	tons.	0+2	men	1890	66	tons.	0+3
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1891	404	tons.	0+6	men
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* Listed as Foel Ddu.

Welsh Manganese Co. ltd.

1889-91

Australasian Alkaline Reduction & Smelting Syndicate Ltd.
1891

DYPHWYS NEW & DYPHWYS OLD.

1886	0	tons.	5+17	men	1887	0	tons.	13+10	men
Dyffryn Mining Co.					1886-87				

FFRIDD TYDDYN-DU.

1896	20	tons.			1898	71	tons.		
1899	148	tons.			1900	600	tons.		
1901	210	tons.			1902	232	tons.		
1903	99	tons.			1907	175	tons.		

Elis Pritchard.

1896-1903

Edward M. Turner.

1907

FOEL WEN.

1889	10	tons.	0+2	men	1890	34	tons.	0+15	men
1891	575	tons.	4+8	men	1892	25	tons.	0+2	men

Foel Wen Manganese Co. / H.L.Haigh. 1889-93

GRAIG UCHAF.

1886	40	tons.	0+5	men	1887	731	tons.	0+4	men
1889	700	tons.	0+30	men	1890	3087	tons.	14+21	men
1892	2331	tons.	8+10	men	1892	898	tons.	5+15	men

Merionethshire Mining Co.

1886-87

Dyffryn Mining Co.Ltd.

1889-94

HAFOTTY or DYFFRYN.

1886	1378	tons.	35+4	men	1887	0	tons.	37+15	men
1888	1407	tons.	14+4	men	1889	2080	tons.	22+20	men
1890	3946	tons.	22+12	men	1891	1571	tons.	12+6	men
1892	1663	tons.	4+4	men	1893	0	tons.	0+2	men
1894	159	tons.	0+2	men					

Dyffryn Mining Co.(Ltd.- After 1888) 1886-94

Samual Pope. & H.J.Wright.

1896

HARLECH.

1886 2871 tons. 28+7 men 1887 0 tons. 6+2 men

1889 675 tons. 11+0 men

Dyffryn Mining Co. 1885-87

Welsh Manganese Co.Ltd. 1889

HENDRE No 1.

1889 277 tons. 0+7 men 1890 823 tons. 12+2 men

1891 658 tons. 8+5 men 1892 147 tons. 6+2 men

1898 85 tons. 1899 147 tons.

1900 115 tons. 1901 226 tons.

1902 75 tons. 1903 115 tons.

1904 161 tons.

Harlech Mining Co. Ltd. 1889-91

J.W.Macqueen. 1892-94

F.B.Haigh. and William Simon. 1898

F.B.Haigh. 1899-1901

William Simon. 1902-04

LLECHWEDD GOLEU or LLECHWEDD DU.

1888 143 tons. 2+2 men 1890 132 tons. 5+0 men

D.Richards & Co. / E.Pritchard 1888

Welsh Manganese Co.Ltd. 1890

Australasian Alkaline Reduction & Smelting Syndicate Ltd. 1891

LLYN DU BACH.

1890 542 tons. 0+1 men 1891 558 tons. 0+8 men

1892 0 tons. 0+10 men 1893 193 tons. 0+2 men

1894 201 tons. 0+3 men 1895 374 tons. 0+4 men

1896 48 tons. 0+1 men 1897 58 tons.

Welsh Manganese Co.Ltd. 1890-92

Alfred Ferguson. 1893-95

Ellis Pritchard. 1894-97

LLYN DYWARCHEN

1892 1145 tons. 0+2 men 1893 314 tons. 0+4 men

1894 259 tons. 0+4 men 1895 108 tons. 0+2 men

1896 192 tons. 0+2 men 1892

Ellis Pritchard. 1893-97

LLYN EIDDEW.

1889 1023 tons. 0+12 men 1890 769 tons. 2+10 men

1891 224 tons. 0+5 men

Welsh Manganese Co. Ltd. 1889-91

MOELFRE.

1886 2553 tons. 21+3 men 1887 368 tons. 14+3 men

1888 112 tons. 0+2 men 1889 68 tons. 7+0 men

1890 183 tons. 0+6 men 1891 185 tons. 6+1 men

1892 0 tons. 3+2 men 1896 180 tons.

1897 161 tons. 1905 16 tons.

1906 145 tons. 1907 182 tons.

1908 46 tons. 1909 80 tons.

1910 124 tons. 1911 178 tons.

1912 236 tons. 1913 102 tons.

Dyffryn Mining Co. 1885-87

Harlech Mining Co.(Ltd.) 1887-88

H.C.Bunkill. 1889-92

Ellis Pritchard. 1896-97

William Simon. 1905-13

MYNYDD LLANBEDR.

1886 123 tons. 11+5 men 1887 50 tons. 3+1 men

1888 50 tons. 0+1 men

Merionethshire Mining Co. 1886-87

Richards & Pritchard/Mrs.Haigh. 1888

PEN ISA'R CWM.

1886 13 tons. 0+6 men

Merionethshire Mining Co. 1886

RHINO.

1891 578 tons. 0+25 men 1892 889 tons. 5+15 men

1893 128 tons. 0+2 men 1894 1064 tons. 0+2 men

Dyffryn Mining Co.Ltd. 1891-94

H.J.Wright. 1895

UNION or TYNLLAN.

1893 0 tons. 8+3 men

H.J.Wright 1893

Tynllan Manganese Co. 1894

MOEL MOCHOWGRYN or MOEL LLECHOWGRYN.

1887 15 tons. 11+5 men 1888 0 tons. 2+2 men

1889 0 tons. 2+0 men 1890 0 tons. 0+2 men

1891 0 tons. 2+2 men 1894 0 tons. 0+2 men

Daniel Smeadly. 1887-91

Allsop, Jones & Evans. 189

MYNYDD NODOL or MANGANESE ROYAL.

1867 33 tons. 1868 50 tons.

1885 ? tons. 12+0 men 1886 29 tons. 12+23men

1906 2 tons.

Great Northern Manganese CO.Ltd. 1867-71

C.Herbert Stokes. 1877-80

H.Hands. 1885-86

G.A.Claughton. 1906

NANT.

1902	80	tons.	1904	300	tons.
1906	17300	tons.	1907	7814	tons.
1908	2991	tons.	1911	4809	tons.
1912	2934	tons.	1913	5291	tons.
1918	9306	tons.	1923	358	tons.
1924	1296	tons.	1925	446	tons.
1926	0	tons.	1927	971	tons.
1928	30	tons.			

* Includes output of Benallt mine.

Fred Hall. 1902

North Wales Iron & Manganese Co. Ltd. 1904-1925

BENALLT.

men	1886	60	tons.	1+1	men	1887	158	tons.	2+0
	1888	55	tons.	2+1	men	1889	47	tons.	2+0 men
	1890	53	tons.			1891	35	tons.	2+0 men
men	1892	0	tons.	2+0	men	1893	0	tons.	0+0
	1894	59	tons	2+0	men	1904	600	tons	
	1905	4828	tons.			1906	17300	tons.	
	1907	5014	tons.			1908	2946	tons.	
	1909	1901	tons.			1910	5028	tons.	
	1911	4809	tons.			1912	3934	tons.	
	1913	5291	tons.						
	1940	863	tons.			1941	1186	tons.	
	1942	10432	tons.			1943	20333	tons.	
	1944	17607	tons.			1945	11299	tons.	

[Operated by The Ministry Of Supply throughout the war.]

* Includes the output of Nant mine. It is possible that some production from 1923-28 was included in the Nant mine records.

Benallt Manganese Co. / Isaac Roberts & Owen Williams. 1886

Isaac Roberts & Owen Williams. 1887-95

North Wales Iron & Manganese Co.Ltd. 1904-25

The Benallt Mine was operated for the government by The Ministry Of Supply from 1940 to 1945 as part of the strategic supplies for war program. I have been unable to find information regarding the state of the mines when reopened by the ministry, but thirty years closure must have had a detrimental effect.

RHIW.

1886	39	tons.	2+1	men	1887	50	tons.	3+2	men
1888	0	tons.	4+1	men	1889	100	tons.	4+2	men
1890	0	tons.	5+1	men	1891	200	tons.	3+1	men
1892	0	tons.	3+1	men	1893	0	tons.	4+1	men
1894	0	tons.	3+0	men	1895	100	tons.	2+2	men
1896	246	tons.	3+1	men	1900	318	tons.		
1901	521	tons.			1902	451	tons.		
1903	385	tons.			1904	7347	tons.		
1905	9462	tons.			1906	2894	tons.		
1907	1083	tons.			1909	717	tons.		
1910	315	tons.							
Laura Jones	James	Fagan.			1886				
James Fagan	/	G.J.Snelus.			1888-96				
Evan J.Evans.					1900-02				
British Manganese Co. Ltd.					1903-10				

Manpower numbers are underground + surface workers.

12. A.W.Groves. Magnetometric Survey of the Benellt Mine.

B.G.S.

13. Interviews Held by Coleg Harlech staff.

14. Personal Knowledge of the Area.

R.A.SMITH. WORD COUNT=10609.