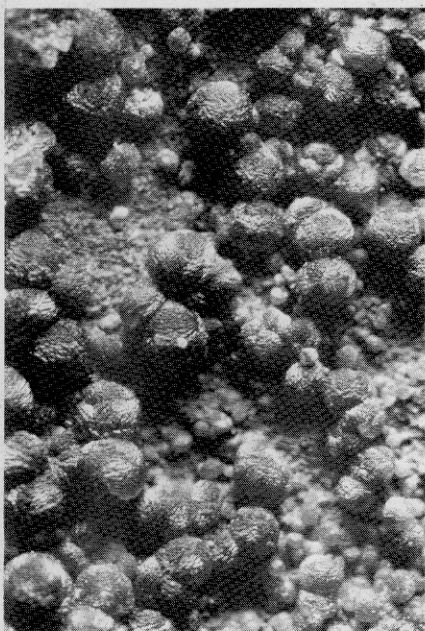


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*issue no. 9 · spring - summer 1991*



**COVER PHOTO:**

Bayldonite. Penberthy Croft mine, St. Hilary, Cornwall. Globular aggregates to 0.5mm diameter.

N. Hubbard collection.  
Photo: Mick Cooper.

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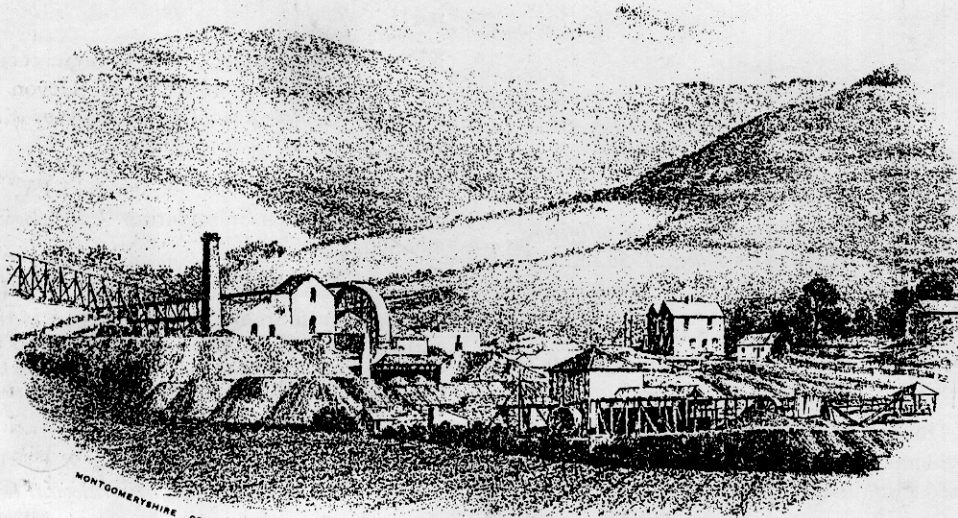
#### CLASSIFIED ADVERTISEMENTS

# The Van Mine

LLANIDLOES, POWYS, WALES

S.J.S. Hughes  
Talybont, Dyfed.

*The Van Mine was the largest lead producer in Mid-Wales and for many years the most productive and valuable lead mine in Britain. Although generally mines in Mid-Wales have been well documented the Van mine has not received the attention of mines historians commensurate with its importance and although this article is not intended as a definitive review it will introduce this interesting and historical site to the reader.*



MONTGOMERYSHIRE COLLECTIONS, VOL. V., TO PAGE P. 28

VAN MINES (CIRCA 1870)

**T**HE Van lode was first discovered in the early eighteenth century at the Bryntail and Penyclun mines situated to the west of what was to become the Van mine (SN 942878). Interest in the Van lease began in 1850 when the Plas Machynlleth estate granted a prospecting licence to William Lefeaux and partners to enable them to search for lead ore to the east of Penyclun and the sum of £700 is reputed to have been spent on this work over the following two years including the driving of an abortive cross-cut north from the stream behind Manledd Isaf.

In 1854 Van was revived under the management of Captain William Williams Snr. of the Penyclun Mine. After the expenditure of a further five shillings a lode was discovered by pitting and interest in the site was revived. William Lefeaux's partners, Messrs Morris & Howell, then employed two men for a further period of three years and were on the point of abandonment when Captain Williams offered to superintend the work at no cost on condition that the two men were retained. This offer was taken up and the work continued. (Hamer, 1873). Howell's name has also been seen to be spelt Howel and as he is described as an iron founder of Hawarden he was almost certainly the proprietor of the firm which later supplied the 50 foot "Mary Emma" waterwheel to the mine in 1866.

By late 1862, two adits had been driven along the course of the lode and an air shaft sunk to communicate with the end of the deeper of these drifts. A winze had been sunk about seven fathoms to connect the upper adit to the lower one and another winze was sunk about ten fathoms below the lower adit. This winze was entering productive ground when the influx of water became so great that it caused the suspension of the sinking. However, it had shown that there was some good ore in the lode and that the prospect was now too good to abandon. (Liscombe, 1870).

The original adit, which had been commenced by Lefeaux as a cross cut in about 1850, was suspended in 1852 after 70 fathoms of unproductive ground had been cut. Following the flooding of the winze in 1862 - 1863, Captain Williams decided to continue driving the original adit, and after a further 90 fathoms, the main part of the lode was cut in August 1865 at a depth of about thirty fathoms below the outcrop. The miners found a course of ore 60 feet wide which was described as an "Alladin's Cave." The total cost of the prospecting work from 1850 to 1865 is recorded as being £1680, (Foster, 1879), roughly equivalent to £200,000 in present day terms.

The first ore was sold in 1866 amounting to 240 tons of lead concentrates. Output increased dramatically to 4525 tons in

1870 and reached a peak in 1876 of 6850 lead ore and 2,000 tons of zinc.

The share value of the mine reflected this early growth:

1868	£4-5s-0d	(12,000 issued)
1869	£30-0s-0d	
1870	£83-0s-0d	

The need to move substantially increased output of concentrates and incoming supplies of coal and other materials in the late 1860s led to the registration on the 9th of June 1870 of the Van Railway Company with the purpose of constructing and running a single line railway between Caersws and the Van mine, a distance of just over 6 miles.

The first train load of concentrates moved by rail was on the 14th of August 1871 with a later passenger service operating in the period 1873 to 1879. The railway's viability was enhanced when David Davies of Llandinam suggested selling dump material to the Cambrian Railway for ballast and the fines as a weedkiller. The idea was successfully implemented and in 1889 20,000 tons were sold with a similar quantity moved each year for the next 35 years. Ownership of the railway eventually passed to the Great Western Railway who ran the last train on the 4th November 1940 and lifted the rails in the following March.

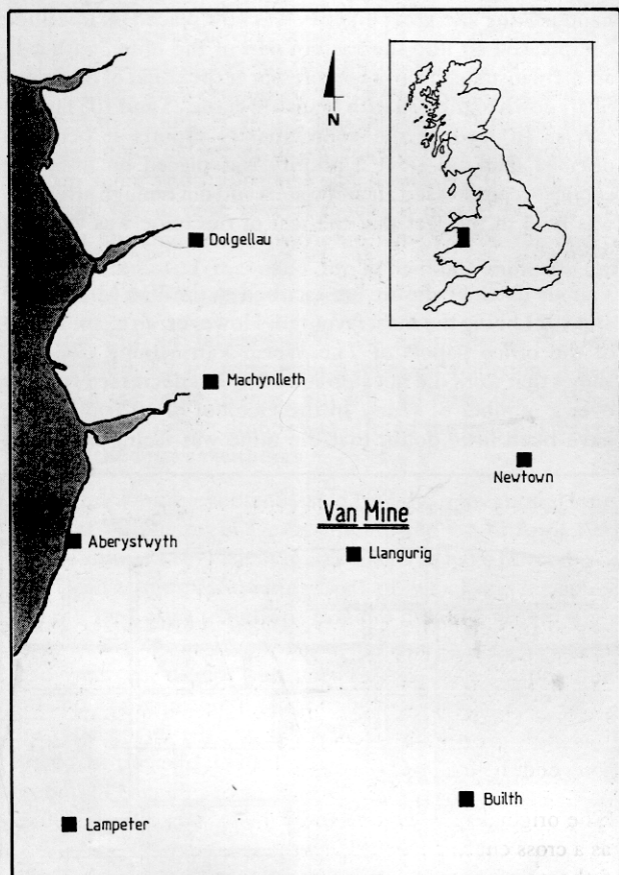


Figure 1. Location Map.

During Van's most productive period two main shafts were in use: Edward's sunk to the 150 fathom level and Seaham's shaft sunk down to 120 fathoms. The later was started in 1868 as a replacement for the Engine shaft which although itself only started 2 years earlier had rapidly become obsolete. Eventually Edward's shaft ran in during 1905 and Seaham's shaft became increasingly expensive to maintain as being driven towards the hanging wall of the lode severe bulging and scaling occurred in the shaft.

After 1876, output declined but a series of interesting discoveries in the next few years ensured the mines survival into the twentieth century.

About 1877, a long cross cut was driven south from the 120 fathom level near Edward's Shaft and after 50 fathoms a new lode was cut. This was named the South Lode and to the east it divided into two distinct branches the northern one being known as the No. 1 and the southernmost as the No. 2. It was far more compact than the Van lode and was usually about 5 to 6 feet wide. Although not as rich as the Van lode it was reported to have contained about 25% ore and was stoped from the 150 up to the 100 level with the richest part occurring between the 135 and the 110 fathom levels (Phillips, 1918).

In 1884 the 120 fathom level, between Seaham's Shaft and Edward's Shaft revealed that the lode had become somewhat disordered and had changed dip to become a small flat. Shortly afterwards the company was reformed but the mines viability continued to decline as metal prices grew weaker. In 1891 there was a complete restructuring of the company and its management was entrusted to Captain John Paull. However by 1893 the mine closed because of a slump in metal prices. These recovered sufficiently by 1894 for the mine to be reopened.

At the west end of the mine a new drift at the 100 fathom level off Edward's Shaft came into the bottom of another flat which was found to be more richly mineralized than the one discovered in 1884. The nature of the lode was difficult to account for as nothing similar had been encountered in the area. To Paull it appeared that the lode had changed its dip from 75 degrees to 15 degrees and this was believed to be the case for about twenty years. This discovery of 1895 or 1896 became known as the Upper Flat and proved to be far richer and larger than the Lower Flat and provided the greater part of the mill feed after 1900 (Davies, 1904).

During the first quarter of this century the Van Mine passed through the hands of five companies, the last of which was The Welsh Van Mining Co. Ltd. owned by Thomas Miller who had been appointed mine manager to the Llanidloes Mining & Machinery Co. Ltd., the previous owners.

Miller's company was formed in 1916, presumably to take advantage of the rising price of zinc and also the government incentives to increase domestic production of that metal. In a report he states:-

*"The object for which the Company is formed is to acquire and take over, as a going concern, the business of the Llanidloes Mining & Machinery Co. at the Van and Penyclun Mines at Llanidloes in the county of Montgomery."*

In the 130 fm level a shoot of ore 400 feet long by 20 feet wide was found left standing almost to the surface. Assuming a specific gravity of 2.8 grams per cubic centimetre the theoretical yield of such a shoot would be some 550,000 tons of ore containing 60,000 tons of lead and zinc concentrates. By the description of the shoot, it would seem to have been in Miller's Lode to the north west of the flats. A capital grant was made to the Welsh Van Mining Co. to develop the mine and install a plant with a 1200 tons per week capacity but this appears to have come to nothing. References from this period also suggest another 100,000 tons of ore available on the South Lode with maybe 400,000 tons as an inferred reserve. Four reports on Van Mine were commissioned by the Department for the Development of Mineral Resources during 1917 and early 1918 but their present whereabouts has not been discovered.

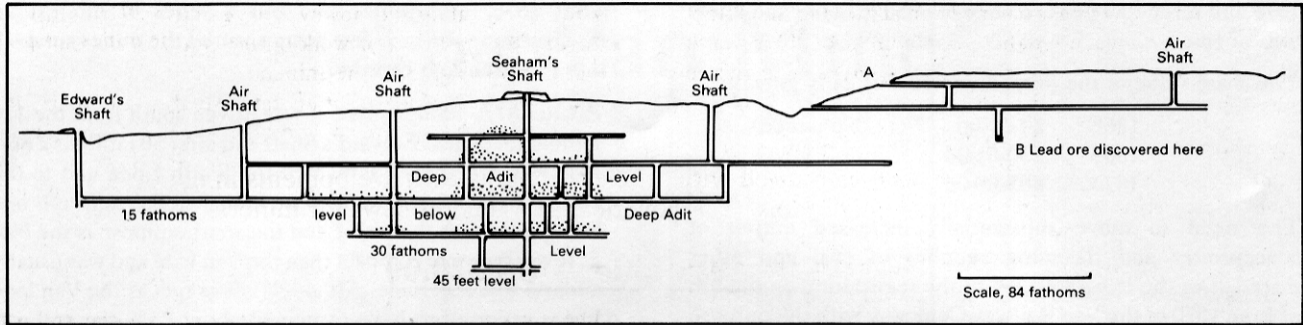


Figure 2. Van Mine Section (Circa 1870) After E. Hamer.

The Government's involvement at Van during the years 1916 to 1918 is briefly described in the Phillips Report, from which we learn that during 1916 the output was 326 tons of lead and 18 tons of zinc concentrates. In October 1917, a subsidy of 1/6d per adult and 9d for boys was paid per shift in an effort to entice miners to stay in that profession, with the result that the average wage of a miner rose to 6/- per shift. At this time Miller employed 40 men underground and another 37 on the surface. Upon cessation of the War, the subsidy was immediately lifted and the price of zinc fell back from £63 per ton to its pre-war level of about £22 per ton with little hope of recovery. Although various Ministries advocated that metal mines should be assisted by government grants, this advice was not heeded and almost every mine in mid Wales closed by 1925.

Fortunately many of the other records of the Welsh Van Co. are preserved and illustrate the insurmountable hardships facing all lead and zinc mines at this time — rising costs and falling prices. It is worth noting that the same company also ran the Nant Iago Mine until about 1925.

In 1918 Miller experimented with processing dump material. Despite analyses showing these contained 14% total Pb the existing gravity mill could only produce a 3½ to 4% sulphide concentrate. To increase the head grade to the mill he examined the possibility of adding primary ore to the dump material but the old mine was by now in a dreadful state and



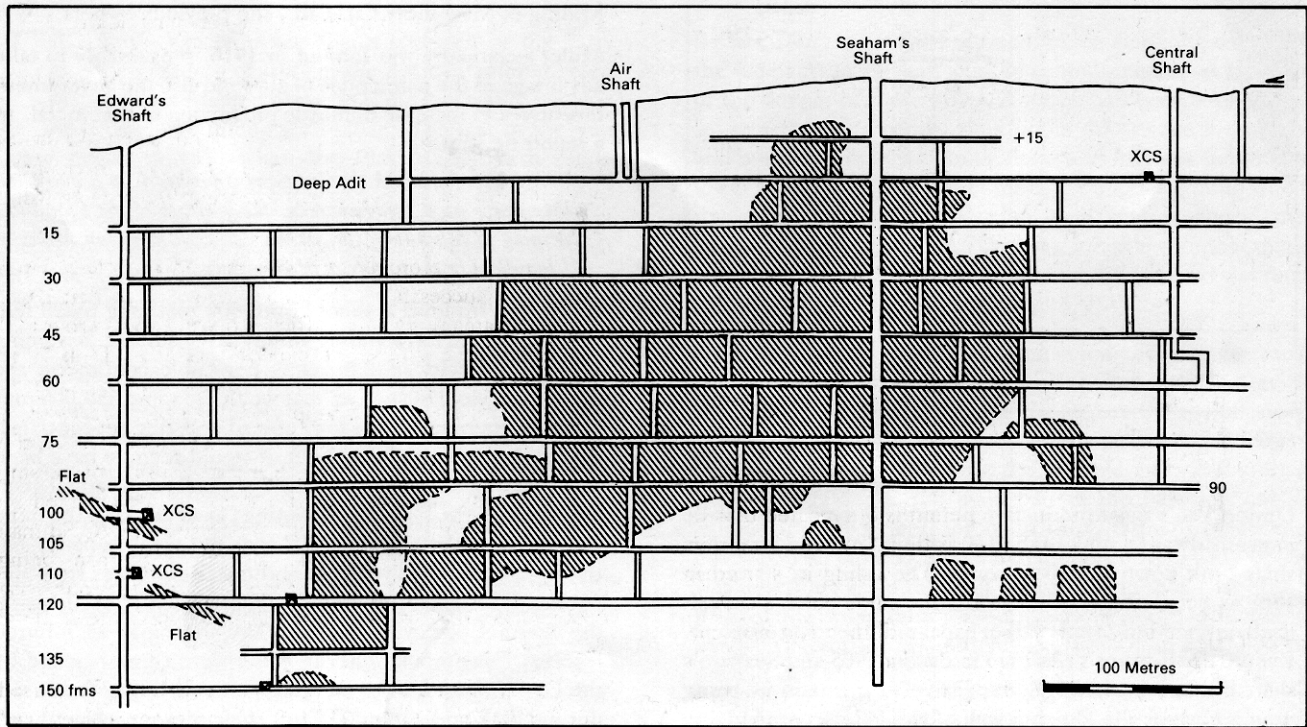


Figure 3. Section along the main lode at Van Mine.

partially flooded. Many of the levels, particularly the 120 fathom, had squeezed up so badly that they were now too small to allow the passage of a tram waggon along their course. The workings which were examined with a view to bringing them back into production were the 75, 105 and 120 fathom levels.

O.T. Jones visited the mine on several occasions whilst this work was being done and noted the great quantity of blende which had been left standing, some occurring in solid ribs up to seven feet wide (2.13 metres) (Jones, 1921).

The old stopes in these levels had been worked entirely by hand jacking and great urgency was now placed on installing compressed air into the eastern part of the mine, with a 4" air main installed from a compressor at the collar of Seaham's Shaft down to the 120 with branches at the 75 and 105 fathom levels. In reading the contemporary reports it becomes obvious that too great a priority was placed on installing services (compressed air and water) and not enough attention was paid to the fact that the rest of the mine was virtually worn out.

Various dates of closure are ascribed to the Van Mine, 1920 and 1921 being the most favoured. However, an examination of the office papers of The Welsh Van Mining Co. Ltd. shows that work did not stop suddenly but decreased steadily over a number of years. In the October of 1920 there can have been little doubt that the mine was facing imminent

closure with the workings having been allowed to flood from the 120 fathom level up to the 105 fathom level. This would appear to have been due to the low lead grades, zinc blende forming the major part of the orebody below this depth.

By maintaining the water at the 105, it was still possible to gain access to the back of the South Lode on the 100 fathom level and to get into the greater part of the mine. When the pumps were stopped on the 5th of April 1921, the water level stood 15 feet below the 100 fathom level and did not rise as quickly as expected. The last inspection took place on the 22nd of April 1923 and showed that the water level had only risen to 22 feet above the 45 fathom level suggesting that it did not reach adit level until the spring of 1925.

In 1923 Captain Miller produced a final stocktaking record and no further work was done underground. Curiously, no abandonment plan was lodged at the Mining Records Office — maybe this was an indication that the mine was considered to be suspended because of ore prices rather than fully abandoned without any hopes for the future.

In 1939 the Government, as in the First World War, investigated the mine as part of their policy of increasing domestic production. However, the situation had changed, the mine being by now dismantled and flooded. Dr. David Williams, of the Royal School of Mines, and H.G. Dines, of the Geological Survey, conducted a brief examination of the mine and sampled the dumps on behalf of the Larke's Committee. However, their findings were non committal and led to nothing. Laporte also showed an interest in the area as a potential source of barytes and they appear to have put up some venture capital which enabled the late Isaac Jones of Van to raise several thousand tons of barytes and about a hundred tons of witherite. As in 1918, the end of the War removed the need for indigenous minerals and interest in the site abruptly ended.

On the 25th of January 1951 the remnants of the Plas Machynlleth Estate were put up for sale by auction. These included the mine dumps, but not the mine itself. When the lot including the dumps was offered the only bid was for £5, and the lot was withdrawn.

The dumps were eventually sold by private treaty to Henry Klein of Willington in Derbyshire on the 9th of April 1951 for the sum of £101. Klein then appears to have formed The Van Lead Mining & Smelting Co. Ltd. which was registered in June 1951 but their efforts came to nothing. Henry Klein was also involved with various metal-recycling firms and for many years the dumps were used to store bales of aluminium foil and as a convenient place to burn the paper backing off the type of foil used in cigarette packaging. This activity ceased in the mid 1970s and in 1984 the site was sold, at auction in London, to an Egyptian, Oncy Anwar Nathan for £5,000.

Initially, Nathan appeared to be a prosperous businessman with financial connections in the Middle East. A number of firms were commissioned to prepare reports on the dumps and the mine and, being the most local of these, I was appointed his agent. After a few months it appeared that all was not well and it was suspected that Nathan's intention was to overvalue the property before selling it at a great profit. The asking price rose to eight million pounds and he claimed that he not only owned the dumps but also the mineral rights over some 1500 acres of land. His deeds failed to confirm this claim and after the expenditure of a few tens of thousands of pounds his finances became so overstretched that the Official Receiver had to be called in.

The Nathan affair did however have one benefit in that it financed a great deal of work on the mine and established that the ownership of the minerals was still vested in the heirs of the Plas Machynlleth Estate. After years of believing that these rights had been sold off in small lots the Estate found that they still owned the mine and have recently granted an exploration licence to permit a full re-examination of the area.

## MECHANIZATION AND PROCESSING

The initial motive power at the Van Mine was provided by a waterwheel which is well illustrated in an engraving that appeared in Volume 5 of "Montgomeryshire Collections" (See title page). This 50 foot diameter by 4 foot breast wheel known as 'Mary Emma' was purchased in 1866 from Messrs L & G Howell of the Hawarden Ironworks, also known as the Bagillt Foundry. Prior to the installation of the beam engine in 1875-1876, the wheel would have pumped the old Engine shaft and probably performed the same duty at Seaham's Shaft. It appears to have remained at Van, eventually driving a crusher before it was scrapped in the mid 1920s.

A great local landmark erected in 1875 - 1876 was the enginehouse for the St. Austell Foundry 70 inch pumping engine. For such a wealthy company, the Van Mining Co. were quite frugal purchasing the beam engine third hand from the short lived Blencowe Consols Mine after it closed in September 1874 (Barton, 1967). The engine had originally been supplied to East Polgooth in the 1850s, was then moved to Great Wheal Busy and sold to Blencowe Consols in about 1870 (Barton, 1966).

Other landmarks were the multitude of octagonal, yellow brick chimneys with their fluted cast iron caps, made by Mill's Foundry at Llanidloes. Two poor examples still survive, one at Seaham's Shaft and another at East Van. Originally, eight such chimneys stood at Van.

Five engines are known to have been erected between 1868 and 1870, and by the turn of the century there were at least 13 steam engines working at Van, which were listed as:-

- 1 x 70" x 120" pumping engine. At Seaham's Shaft.
- 1 x 48" x 18" winding engine. At Seaham's Shaft.
- 1 semi portable winding engine, size unknown. At Edward's Shaft.
- 2 horizontal air compressors, steam driven, size unknown.
- 8 engines, various sizes, described as beam, horizontal, vertical and portable types. On Dressing Floors (Van Mine report, 1901).

Processing of the ore at Van does not appear to have been particularly successful. The annual reports show that Capt. W.H. Williams senior was sufficiently concerned about mill losses that he sanctioned an expenditure of £1111.6s.1d in 1876 on a dump processing mill. The mill is known to have utilized a steam driven stamp amongst other processes, a unique device in Mid-Wales. In 1902 a company called the Mine Tailing Company became interested in reprocessing the dumps, its associations with the mine determined by connections within the Sulmen family with E.A. Sulman being the then mine agent and H.L. Sulman being instrumental in forming the Mine Tailing Co. along with another company involved in metal recovery, the Mineral Separation Co.

In 1912 the Mine Tailing Company built a plant at Van based on a modified version of a recovery process they had patented, the adaption for Van involving dissolving the

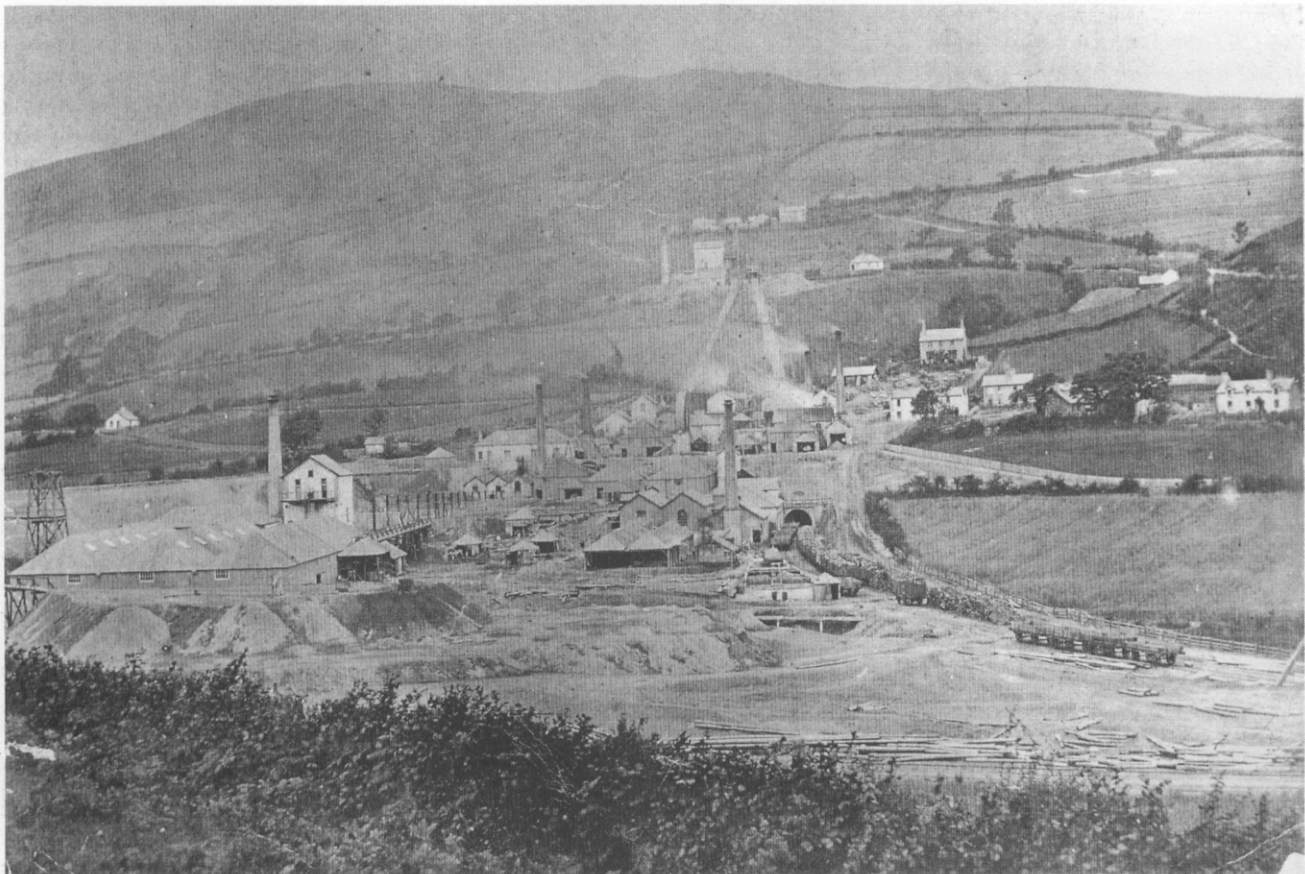


Figure 4. General view of the Van Mine 1890.



Figure 5. Mine Staff (Circa 1904)

greater part of the lead fraction in a hot brine solution and then converting the lead chloride to the oxide. This method was originally tried at Broken Hill in 1902. Called the Delprat Process it was the forerunner of one of the many froth flotation technologies. However, the process only worked if the brine was kept at a temperature greater than 70 degrees centigrade. A considerable amount of power and reagents were consumed by the brine process and whilst it was marginally commercially successful during the Great War, the lower lead prices that prevailed during the 1920s forced the plant into closure after the production of some 1500 tons of crude oxide. Whilst the original Delprat process was used to recover zinc from tailings at Broken Hill, the Van plant only appears to have recovered lead salts.

However, this was not the end of the brine plant and it was not scrapped along with the old gravity mill in the 1920s. In the 1930s the process appears to have been revived in a modified form by a Mr. Partridge who produced a very durable though highly toxic grey paint until about 1939. The concrete foundations of these works are still discernable alongside the road near the slimes dumps (M. Mills, *Pers. Comm.*).

## OUTPUT SUMMARY

The mine commenced production in 1866 with 40 tons of 77.5% grade lead concentrate carrying 150ppm/Ag which was sold in April and followed by a further 200 tons during that year. This began 57 years of almost continuous production.

When the mine was abandoned in 1923, the ore shoots at Van Mine had yielded over 97,000 tons of lead concentrate and some 29,000 tons of zinc concentrate produced as a by product of dressing the lead ore (Burt, 1985), (Burt, 1990).

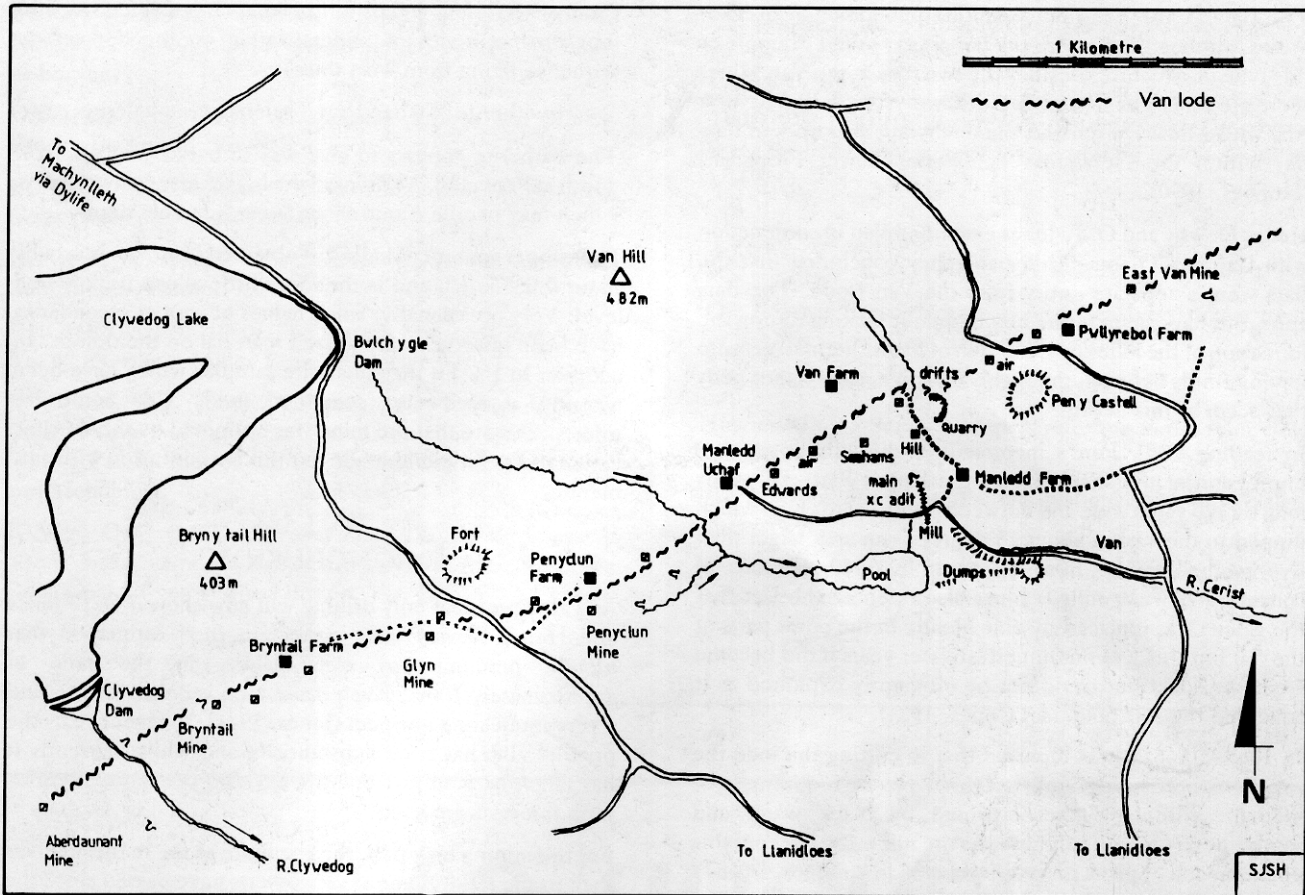


Figure 6. Surface details of the Van Mine and surrounding area.



This makes it one of the largest lead mines in terms of output in Britain. Allenheads mine produced over 250,000 tons of lead concentrate; Mill Close 407,000 tons, whilst the greatest output in North Wales came from the Westminster Lode which is estimated to have yielded about 100,000 tons of lead concentrates (Hughes, 1959).

## MINERALIZATION

The mineralogy of Van is considerably simpler than other ore shoots worked in this orefield. It appears that the main lode is of a regionally late stage mineralization which accounts for the low silver content of both the sphalerite and galena. Assays of the former suggest that 70 to 90 grams per ton is typical and the galena assays bear out O.T. Jones's bulk value of about 240 grams per ton.

In reading the few available volumes on Van, it is easy to believe that there were only two lodes and one flat at Van but this is not so. The mine records and miscellaneous correspondence show that there were several other lodes including Blende lode, Miller's lode and North lode which were not worked on account of their low lead content at a time when zinc was not worth mining.

It is worth noting that all of these ore shoots were blind deposits, that is to say that they do not carry ore at the surface due to the geological conditions and it can be seen that if it had not been for the vigilance of Captain William Williams Snr., the Van Mine might never have been discovered. A limited amount of diamond drilling took place between 1905 and 1918 in an attempt to prove further reserves of ore but most of the pertinent data regarding these cores have long since been lost, and it is possible that there are other blind shoots which still lie undiscovered.

The flats at Van were not a unique phenomenon in Mid-Wales, although they were the largest exploited example of this type of structure. Besides the two flats at the Van Mine, there are other grit-hosted flats at Cwmystwyth and Bryn yr Afr, whilst East Darren and Llanerchyrour also worked flats but within the Derwenlas sandstone (Lower Frongoch) (Hughes, 1990).

Henry Dewey and O.T. Jones examined Van in conjunction with Captain Thomas Miller and they concluded that the flats were a separate entity from the Van Lode. The flats appear to have been formed by hydraulic jacking during the formation of the lodes by the action of hydrothermal pressure forcing fluids between the highly resistive massive grit beds that occur at this depth.

In reading O.T. Jones's memoir it is difficult to gain an impression of the sheer size of the Upper Flat; 350 yards long by 120 yards wide and between 6 and 7 yards high which dipped to the east at about 15 degrees - an area larger than five football fields, from which at least 10,000 tons of concentrates were milled. Jones also refers to the fact that the galena was replaced by zinc blende in the outer parts of the flat but this was not mined. In later years it did become a zinc prospect but could not be efficiently exploited as it straddled the sett boundary (Jones, 1921).

In 1865 - 1866, it was reported that in cutting the lode the miners experienced small but high pressure outbursts of methane (fire-damp) accompanied by black water and sometimes hydrogen sulphide. As the mine grew deeper this phenomenon appears to have increased in strength. In 1879 and 1894, Le Neve Foster noted this and commented that it was also a feature of Mill Close in Derbyshire and Holway Consols near Holywell. Both these mines suffered fatalities due to gas explosions and the Snaefell Mine, on the Isle of Man, also experienced a similar problem. Furthermore, Le Neve Foster notes that between 1883 and 1892, the total number of deaths in British metal mines due to explosions of methane amounted to six persons and that this phenomenon therefore accounted for 1% of all deaths at metal mines for that period (Foster, 1879). At Van Mine, it was the Main Lode that was usually associated with this minor gas problem and it had never caused any more than singed hair and whiskers until the 13th of December 1908 when a stronger than usual outburst of gas took place on the North or New Lode. There followed an explosion in which three men were burned, one so seriously that he had to be transferred to hospital in South Wales for several months. For the following two years parts of the mine appear to have been declared safety lamp areas and daily checks were made on the methane content of the air, although, after two years the routine was abandoned.

Considering the tonnage of minerals extracted from the mine, very few samples of sulphides remain on the dumps. To the east of the site occasional lumps of sphalerite, galena and pyrite can be found in the proximity of old workings and trials whilst to the west the barium mineralization can produce some collectable specimens.

Quartz is the predominant gangue mineral with calcite occurring sporadically. In the western parts of the mine, minor quantities of baryte are recorded and it must be presumed that the ratio of barium minerals to others in the deposit increases westwards, the largest values occurring in the Bryntail shoot near the farmhouse of the same name. It was here in the 1930s that the late Isaac Jones worked a solid rib of baryte which varied in width from 18" up to 6 feet. At Penyclun Mine witherite is common as a gangue mineral.

From observations and historical data it is possible to identify four distinct zones of mineralization on the deposit the sequence being from west to east:-

witherite      baryte      galena      sphalerite

The witherite appears to give way to baryte and galena in depth at Penyclun. At Bryntail the baryte gives way to galena which may overlie a zinc shoot at considerable depth.

The copper content of lodestuff obtained from Van is usually about 0.030% Cu and is therefore little above background level. Very occasionally, small haloes of copper secondaries have been observed on oxidized material on the dumps. In addition to 1% Fe the sphalerite samples which have been recently assayed also contained 0.4% Cd. Some lay references state that the mine was examined by the wartime Government for pitchblende but this is a confusion with zinc blende.

## CONCLUSION

As a zinc prospect only drilling will now show if O.T. Jones and Henry Dewey were correct in their estimation that blende predominated over galena in the ratio of approximately 100:1. Even if the ratio is only 10:1 it is still a very interesting prospect (Jones, 1921). In recent years the price of zinc has risen substantially and whilst currently it has fallen back to just under US \$1200 per tonne the long term forecasts are good.

For the mining historian, there is more to see in the archives than in the field. Some seventy years have passed since the abandonment of the mine and all that remains are about 100,000 tonnes of jig tailings and fines strewn across some 25 acres. All of the shafts have run and the adits are no longer accessible. It is proposed that these dumps be tidied up over the next five years in order to reduce the pollution of the River Ceryst. The base-metal pollution has been compounded by the quantity of aluminium foil buried in the dumps, the salt and grit stockpile, and several hundred tonnes of gasworks waste which were dumped after the closure of Aberystwyth and Towyn gasworks in the early 1960s.

## ACKNOWLEDGEMENTS

I would like to thank the staff of The National Library of Wales and the British Geological Survey, both in Aberystwyth, for their assistance in providing me with archival material for the preparation of this work. I also thank the landowners and residents of Van for the kindness and understanding that they have shown, and also for the great quantity of information that they have given me over the last twenty two years of site visits.

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