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**THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE,
EAST CORNWALL**

R. Shambrook

Synopsis

The chief mine and also the most productive, in the Phoenix Group of mines, was Phoenix United, one mile north west of Caradon, where two lodes in close association....., one of copper and the other of tin, – have been worked to a depth of 250 fathoms – 1,500 feet from surface, and are an unusual instance of lodes being telescoped and therefore occurring side by side.

Mining, as opposed to surface working, began in 1836, operations first being conducted by Cornwall United Mines. About 1843 the mine was restarted as Phoenix United Mines and rich ore was found at the 100 fathom level. Rich copper shoots were found in the 1850's and these continued to yield large tonnages of copper until 1866 - 1867, when tin became the major project.

Between 1877-1897 the amount of tin ore raised annually ranged from 34,000 tons in the period 1877-1888, to 22,000 tons 1895-1897, the average yearly recovery being 40 lbs of black tin (2%) to 27 lb per ton (1.35%) respectively.

Restarted in 1907, Prince of Wales Shaft of Phoenix United was ultimately sunk to the 200 fathom level (1,200 feet) and further development was carried out in the bottom eastern part of the mine where at the 1,250' west, and 1,485' east of the shaft, winzes (internal shafts) were sunk on the lode. From the former, short levels were driven both east and west at the 1193' level, 1250' and 1360' below the shaft collar, values on all these drives being low except the first 65' west on the 1250', which ran at 63lb of black tin. (3.1%) – rich lode over a width of five feet.

Examination was subsequently made of the eastern part of the old workings, some levels being extended short distances, and a limited amount of cross-cutting carried out mainly on the 200 fathom level, where only occasional patches of payable ore were found, the mine consequently closing in 1914.

An examination of Phoenix United Tin Account reveals that production from 1880 to 1883 was fairly constant averaging 418 tons of black tin per year. In the following years 1884 to 1885 production dropped approximately 50%, although with a temporary increase to 679 tons in 1886 – value £32, 732.4.0 (one of the most profitable years in the mines history) much of this production coming from Trelawney lode, the tin standard at this time being £103.92. After this date (1886) – possibly the high water mark in tin production from Phoenix, production fell steadily (1887-1892) then more pronounced (1893-1909) so-much-so that total production for the 10 years 1900-1910 amounting to 229 tons was less than 1 year's production for the corresponding period 1880-1890, indicating a severe drop in lode values. Moreover, the bottom levels in Prince of Wales shaft (started in 1907) proved disappointing, the lode still well-defined, but ore bodies were subsequently found to be small and sporadic.

THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE

An appraisal of Phoenix United Mine's reports, suggests that had sound financial forecasting been coupled with wise and informed management in this period of activity 1907-1914, the mine might well have proved an extremely viable undertaking. Moreover the premature abandonment of the adjoining [46] East Phoenix Mine amply illustrates this view, the inability to interpret correctly the local factors controlling ore deposition; also an examination of Phoenix United longitudinal section suggests that East Phoenix workings were not sufficiently deep enough to penetrate the 15° easterly pitch of the ore channel to any great extent, the apparent poverty of the Lodes leading to that mine's subsequent abandonment.

21st February 1874 -

Sale of Materials at East Phoenix Mine in the parish of Linkinhorne.

56" pumping engine of 9' stroke and one boiler; 24" winding engine of 7' stroke; drawing cage and boiler; 24 heads of stamps.

Catalogues may be obtained from the Northumberland Foundry, Launceston (West Briton, Truro).

Another contributory factor in the closing of East Phoenix was a dispute over a question of mineral rights.

East Phoenix Mine was much larger than is generally realised, employing some 100 men 1865 - 1874.

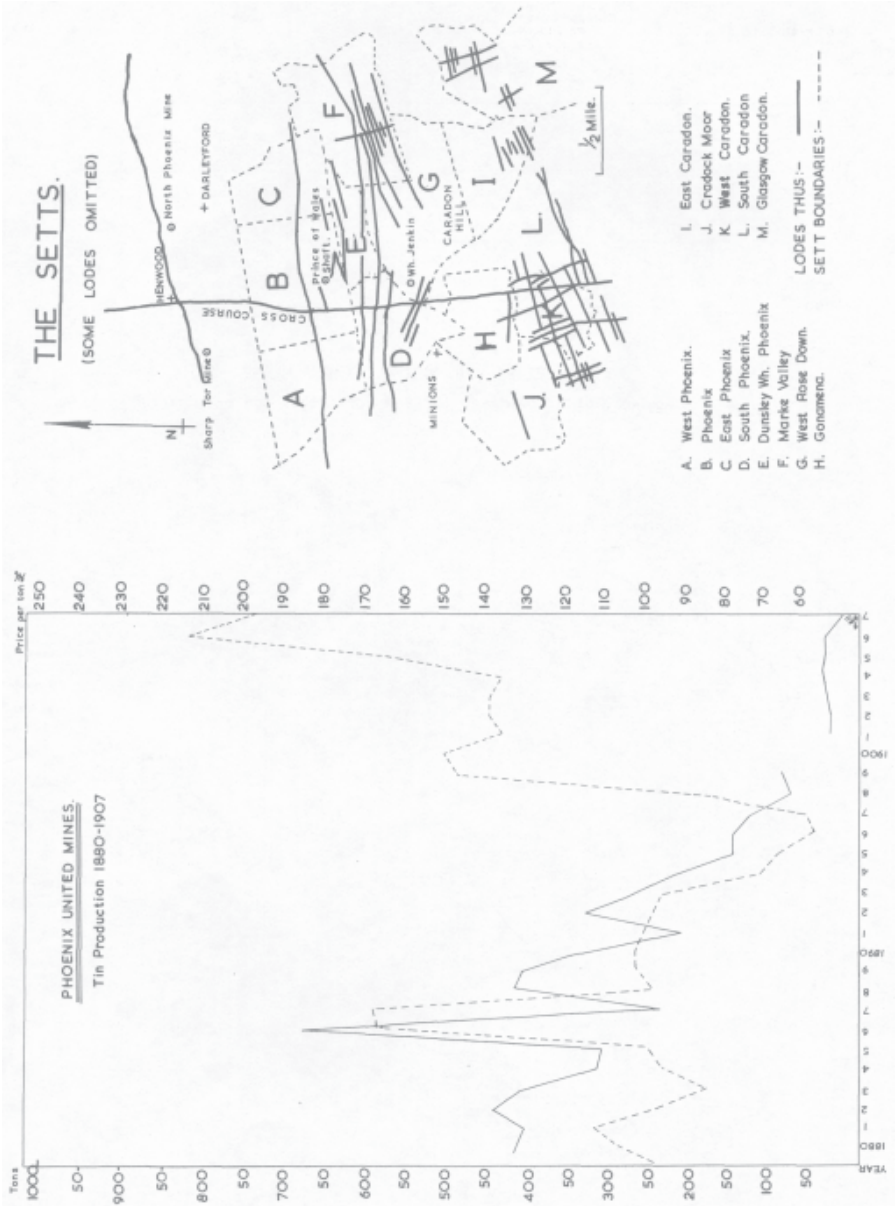
In the Clannocombe portion of the sett, east of the great north-to-south crosscourse, gossan-hydrated oxide of iron was found to a depth of 200 fathoms, with some grey copper ore – tetradhrite $\text{Cu}_{12}\text{Sb}_4\text{S}_{13}$, where the lode was found to be 12' wide. Near surface, the lode consisted of jasperoid iron ore and limonite $\text{HFeO}_2 \cdot n \text{H}_2\text{O}$ with drusy quartz and chlorite, with both tin and kaolin ore, either as veins or mixed. This was in turn veined by amorphous black copper ore-melaconite CuO green carbonate of copper, chalcocite Cu_2S iron pyrite FeS_2 vitreous copper ore - copper chloride-chrysocolla $\text{CuSiO}_3 \cdot n \text{H}_2\text{O}$ massive and crystallised cuprite Cu_2O and chalcotrichite.

Cavities of cellular quartz were frequently found to be lined with malachite, oxides, and arsenates of copper, also native copper. Moreover the copper lode was quite distinct and had a separate matrix from that of the tin lode.

Phoenix United Mines (Cornwall) Ltd registered with the Registrar of Companies on the 14th June 1909 by Birbeck, Moreton, Thompson & Co. of 20 Cophall Avenue, London EC3 with an Authorised capital of £160,000 £1 shares. The objects of the company were inter-alia to acquire the leases of Phoenix United Mines from the Duchy of Cornwall and other mines and properties; to adopt an agreement with the Cosmopolitan Co. Ltd and Hannah's Proprietary Co. Ltd. and to carry on the business of tin and general miners etc. The first Directors of the Company were – Chairman, John H. Gretton; Directors, C.C. Baker, R.J. Hoffman, H.J. Moir, Horton Bolitho, F. Harvey; Secretary, H. Milner-Willis (who also became a director of the West Somerset Mineral Railway Co. Ltd, in 1916). Director's Share Qualification:- 500 £1 shares; Director's Remuneration, £1000 per annum and 5% of the net profits remaining after

a 10% dividend had been paid on the ordinary shares; Minimum Cash Subscription 100 shares of £1 each fully paid.

A report of the re-starting of Phoenix United Mines and the sinking of Prince of Wales Shaft in 1907 appeared in the Mining Journal: Cosmopolitan Proprietary Co.



THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE

Ltd. The Ordinary General Meeting of Shareholders of the Cosmopolitan Proprietary Co. Ltd. was held on Wednesday”, at Winchester House, London E.C. Mr. John H. Gretton (Chairman of the Company) presiding.

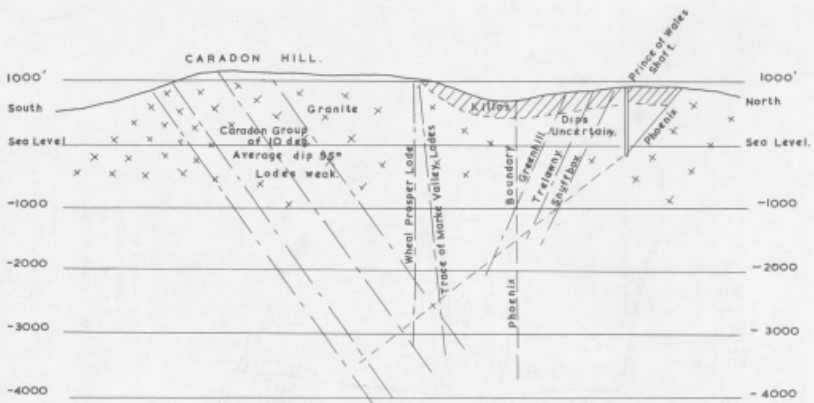
The Secretary said ‘That at our last meeting we stated that we had [47] taken up a lease of a property in Cornwall, belonging to the Duchy, which entailed delicate and protracted correspondence. We had the advantage of being able to investigate the old records of the mine which was in full swing in 1896, and it has produced as much as £1,300,000 in tin and copper, although very little capital was ever put into it by the old owners in the way of plant, who worked under the Cost Book System. The mine paid to the adventurers no less than £230,000 in dividends, unfortunately the late company made little or no provision for replacement of plant.’

We conclude that we have one of the biggest mines in the country, and I would like to give you a calculation of the profit we can make. In your report we calculate this as £100,000. Tin is rather low in price today being £78 per ton. We have obtained a recovery of 36 lbs per ton (1.8%). We plan to haul 12,000 tons per month to bring in £7,500 per month or £90,000 profit per annum. Our new shaft (Prince of Wales Shaft) is now down 335' from surface, and has already gone through a lode 3 feet wide which looks most promising, and we have in the meantime been clearing out the adit level, from which our mine manager informs us that there are larger reserves of valuable ore. To give you some idea of the quantity of ore there must be in the mine, the main lode is from 10-30 feet wide, and it has an average milling value of over 9 feet.”

Mr. Derry - a Cornish Miner, who said he knew the mine thoroughly stated that the old company had failed through lack of working capital and the replacement of machinery. He believed that as they got lower down it would become richer.

At a following Ordinary General Meeting of shareholders, the Chairman, Mr. John H. Gretton said “I would point out that although we show a balance on the wrong side, it is principally made up by wear and tear and depreciation of plant, machinery, buildings, tools, etc, the balance being £5,805 against which £5,115 represents depreciation of plant. In round figures we have £5,500 available in cash and in ‘Consols’ (Government Stock), and in addition to that you have your interest in the Phoenix Mines. You have obtained through the Phoenix Company £32,500 fully paid shares as a profit, and you are entitled to (A) £27,000 in the fully paid up shares or (B) cash in return for your share of the money expended up to the time the company was formed. (This would now require disclosure under Sections 52 and 195 of the Companies Act 1948; as replaced by Sections 27, 28, 29 and 31 of the 1967 Companies Act.) The total capitalisation of your company is £160,000, so that your interests represent approximately 3/8th of the company”.

“Then to summarise our position to date:- We formed a company to take over Phoenix Mine, with a capital of £160,000, of which £100,000 is reserved for working capital. Something like £40,000 or £50,000 has already been spent in putting up machinery and opening out the ground. We are sinking a main vertical shaft 19 feet by 9 feet



Cross Section through Phoenix United
 showing dips at adjacent lodes so far as they can be ascertained.



THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE

overall, and 17 feet by 7 feet within timbers; the shaft is now down 580 feet. We have a parallel lode through which the shaft should intersect at this depth. Between the parallel lode and the main lode we know there is a cross-cut through which water will percolate, we can therefore keep the mine dry. Our large pump is ready, and the main permanent hoist is also working. We have opened out one of the old shafts and timbered it to adit level; we are also putting in foundations for the treatment plant. We have dug out a larger reservoir for water.”

An account of the re-opening of Phoenix Mines, was reported by the [48] City Editor of the ‘Globe’ in its issue dated 2nd October 1909, wherein it stated that the mining investor has not to look ahead for an attractive speculation. “The shares of the Phoenix Mine in Cornwall appear to be as sound as any to be found in the Mining List. The old company left nearly 500,000 tons of ore in the stopes. The main lode at the deepest point previously touched showed a value of 44 lbs per ton (1.2%) over a width of 12 feet, and work was conducted at 12/6d per ton, profits of £90,000 should be realised annually when the plant is in full work enabling the company to pay dividends of 30%-40% per annum. At first it is expected that 6,000 tons will be treated monthly. There should be a splendid return on the share purchase at 1/16th premium.”

This letter from the Editor of the ‘Globe’ brought forth the following reply from the Mining Journal:-

“Will the writer of the above kindly note¹ that nobody knows what the old company left on the stopes² the prospectus issued on June 15th assumed a future output of 12,000 tons of ore-stuff per month at a profit of 12/- per ton or £93,600 per year.³ That to produce such output means a crushing capacity of 500 tons per day.⁴ That at an average of 3 tons per haul per 24 hours a 170 stamp battery would be required.⁵ That Dolcoath Mine since 1895 has only on four occasions - 1902, 1904, 1906, 1907, crushed over 100,000 tons during anyone year; and that only on one occasion - 1906, has it made a profit of over £80,000, and that with an average price of £109.11 .0. per ton for black tin as against today’s price of £80 per ton.

That Phoenix is a good property, no one denies, but it is still a long way off paying 5% dividends, let alone the assumed 30%-40% per annum. Anyone who knows anything of Cornish Mining and its problems would assume that a profit of £93,600 can be secured on a working capital of £100,000, and of which something like £40,000 to £50,000 has been spent in putting up machinery, and opening out the ground.”

Mining Journal 6 November 1909

The prospectus issued by the Cosmopolitan Proprietary Co. Ltd on 15 June 1909 to raise additional capital for developing Phoenix Mine, did not receive the unqualified approval the promoters had anticipated. A correspondent writing in the Mining Journal a few days later stated that the estimate of future profits were entirely taken from or based upon Mr. Nance Williams - the Mine Manager - report dated the 1st June. The correspondent observed that as Mr. Williams was the Manager of the Mine, one might reasonably have expected a second and entirely outside report - if only to

confirm Mr. Williams report which assumed that with a recovery of 25 lbs black tin per ton (1.25%), the mine “should return a profit of at least 12/- per ton or £93,600 per annum. That had assumed working costs of 13/- per ton, and at an output as had been pointed out by a mining expert at that time - of 56% more than Dolcoath, and working on ore values 15% less, would make profits over 7½ times as great as those as had been realised by Cornwall’s premier mine. Moreover when it was considered that the new company would start operations with an available capital of just over £50,000, it was difficult to imagine how that sum would bring into production – and revenue earning a mine such as Phoenix.

The much vaunted prospects of Phoenix United Mines, were questioned by more than one authority. A correspondent writing in the Mining Journal on the 8th August 1908, stated that to quote ‘John H. Gretton, the Chairman [49] of the Cosmopolitan Proprietary Co. Ltd and Hannah’s Proprietary Co. Ltd is entitled to the thanks of all Cornish Mining men for the admirable speeches he made at a meeting of the two companies, dealing with their joint interest in Phoenix Mine.

It is however, open to question, whether in these speeches – enthusiasm did not outstrip logical deduction, when Mr. Gretton stated that it was expected to haul 12,000 tons per month; that Phoenix Main Lode was from 10-30 feet wide, had an average milling value of over 9 feet, and a continuous strike for over two miles.”

The same correspondent also observed that Dolcoath raised 101,000 tons of ore of less than 38 lbs per ton (Sn) giving a net profit of £58, 176.9.2d, whereas Phoenix proposed to wind 144,000 tons of ore of 36 lbs per ton – but showing a net profit of £90,000 per annum.

Phoenix United Mines – MJ 27/3/1911

“The successful tapping of water in the old Phoenix Mines from the cross-cut at the bottom of the new shaft, 125 fathoms by diamond drill installed by Messrs. Isler & Co. of London should do much towards securing the recognition of the value of utilising the diamond drill in Cornish Mines. Hitherto, and that in spite of Well Attested evidence from foreign mining camps, the diamond drill has had no part in our economy, but now – although somewhat late in the day – its claims appear likely to receive some consideration.”

MJ 12/5/1911

“The draining of Prince of Wales Shaft in April, has exceeded all expectations, the water-level being 341' from surface, thus leaving dry all the larger stopes in Stowes, to a point well below the 300 feet adit level.

The cutting down of the vertical portion of Seecombe’s Shaft has been completed. Arrangements are now being made for skip-roads and connection thereof with the underlay.

The 180' level is the first level of importance which is to be cleared; this will be taken in hand directly the skip roads are down to that point.

THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE

The self dumping arrangements in the headgear on Stowes Shaft are fixed in position. Everything in this shaft is clear to 90 feet below adit level. It is not expected that it will be practicable to attack the other reserves in the stopes of Stowes Shaft until the 300 feet, or 360 feet levels are cleared and put into working order.

Tin Sales in April were 3 tons 13 cwt 21 lbs value £390.7.3.

MJ 8 July 1911 - Saturday

During the past four weeks, the second bore-hole in the 720 foot level in Prince of Wales Shaft has been completed, water being cut at 87 feet, making a total footage drained of 738 feet. The western skip-road in Seecombe's Shaft has been fixed a further distance of 131'. Excellent progress is being made in clearing and securing the shaft below this point, whilst the 180 level west has been cleared to the Old Sump Shaft, and stoping will commence on a large section of ore ground in the back of this level which is 12 foot wide. The contract for the concentrating house has now been placed and will be erected within six weeks.

M.J. 9 Sept. 1911 Saturday

Within the past few weeks, a further drainage from the Old Workings on Main lode of 5 feet has been effected, water level from surface now being 828 feet. The western skip-road in Seecombe's Shaft has been fitted a further 170 feet, making a total depth in working order of 495 feet from [50] surface. Stoping is in progress on the 180 foot level west, in good payable ore, the full width of the lode. At the 360 foot level a station is being cut. Stowes Shaft has been cleared, cut down, and re-timbered a further 62 feet. The installation of the compressor plant is nearing completion. The excavations and earthwork for the railway sidings will soon be ready for the laying of the rails. A contract has been placed for the supply of an electric installation for the driving of surface machinery, and also the supply of rock-breakers, and concentrating plant.

Tin Sales for the past few weeks were 3 tons 9 cwt 0qrs 13 lbs value £378.11 .2.

Phoenix United

Tin Sold	Tons	Per Ton	Gross
10 Feb 1912 Prince of Wales	3	£118.16. 0	£366. 6. 0.
24 " " "	3	116. 0. 0.	340. 0. 0.
9 Mar " "	3	115. 5. 0.	346.16. 0.

Prince of Wales Shaft – 23rd October 1913

"This shaft is now sunk to a vertical depth of 1204 feet, and a crosscut has been commenced southwards for the intersection of the main lode. The eastern drive has been advanced 93 feet and the width of the lode found to be 10 feet, composed of very close grained tin capels and assaying 4.71 lbs of metallic tin per ton. The hydraulic winze which is 1260 east of the shaft, is now sunk to a depth of 166 feet below the old 212 fathom level, and the lode assayed at 7.28 lbs metallic tin per. ton. Another winze 1496 feet east of Prince of Wales shaft is sunk to a depth of 94 feet in a very large lode, 8½ feet wide, the average assay being 62.6 lbs of metallic tin per ton

(2.62%); 200 tons of mineral taken from a stope about 1660 feet east of Prince of Wales shaft on the 212 fathom level has assayed 44 lbs of metallic tin per ton (2.2%).”

Prince of Wales Shaft – 16th January 1914

“The 1193 foot level has been driven 320 feet west from the crosscut south of the shaft; the lode has been found to be large, composed of strong tin capels, ‘peach’, quartz’, and a small amount of tin ore inter mixed throughout, the whole being of very promising nature. In this same level, at a point 231 feet west of the main south crosscut, the lode gave an assay value of 66.9 lbs of metallic tin per ton (2.84%) per width of 7 feet.”

Prince of Wales Shaft – 20th February 1914

“The 1193 foot level has now been driven 60 feet to the east, with encouraging results, the lode composed of peach (chlorite), quartz, and tin ore inter mixed throughout, I think this level should be extended east, as indications are good for coming into contact with greater values ahead. I regret myself that the management should have driven that long crosscut south from the 1193 foot level, when there is such a vast area to explore on the main great master lode with such excellent prospects of success. I suppose that not less than £1400 to £1600 has already been spent in that south crosscut, and this would have gone a long way to proving the bottom level in the eastern mine (towards East Phoenix Workings).”

Bewick, Moreing & Co., Consulting Engineers were called in to give an independent assessment of the mine, and in their report to the management dated Thursday 9th July 1914, advocated the extension of the 200 fathom level eastwards from Prince of Wales Shaft. (1) see below.

(1) A partner in the firm of Bewick, Moreing & Co. Mining Engineers, of London, was the late Captain Algernon Henry Moreing of Bures, Suffolk, who [51] was educated at Winchester and Trinity College, Cambridge. After having served in the Royal Artillery in France 1915-18, being mentioned in dispatches, was recalled for military duty in 1940. In 1925, Captain Moreing married Dorothy Maude, Daughter of the late J. Holman JP of Rosewarne, Camborne.

Captain Moreing was Coalition Liberal MP for the Buckrose Division of Yorkshire from December 1918 to 1922, and then represented the Camborne Division of Cornwall first as a National Liberal in 1922-23, and then as a Constitutional in 1924-29. He was also Parliamentary Private Secretary to Sir Eric Geddes, Minister of Transport in 1920, and a past master of the Merchant Taylors’ Company.

“The Times” October 24th 1914

Before Messrs. Bewick, Moreing & Company’s suggestions could be implemented, however, it transpired that the Phoenix had exhausted all its working capital, the Duchy of Cornwall were also reluctant to extend the lease, and the outbreak of the First World War commenced in the year (1914); operations ceased, the lease was surrendered, miners paid off, pitwork drawn to the surface, and the sett abandoned.

THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE

In this latter period of working, the accident incidence at Phoenix was low, only one fatality ~ that of James Rudd who was killed in a stope on the 150 fathom level in Prince of Wales shaft (November 1912) by the premature detonation of a charge.

John Trebilcock sustained a serious – though not fatal head wound, from falling backwards into a slime pit; Richard Pryor sustained a fractured jaw whilst lowering a pipe by a winch which was suddenly released after being jammed. In all these cases of injury, the injured were conveyed and accompanied to hospital in Plymouth – 15 miles distance – by W. Hedley Harris – the Accountant at Phoenix, who also acted in the capacity of ‘First Aider’.

Information kindly supplied by:- Mr. W. Hedley-Harris, St. Newlyn East, Cornwall. A further attempt was made to obtain Government Financial Assistance to re-open the mine in 1920-22, under the Trades Facilities Act, and to obtain capital in connection with a proposed drainage scheme to unwater Phoenix, Wheal Jenkin – nearby, and Marke Valley Mine; similar applications were also made at that time on behalf of Levant Mine (Pendeen), Tresavean (Lanner), South Crofty, and others. This attempt was abortive however, and Phoenix has now been idle 60 years.

In 1909, Phoenix United – by then a limited company witnessed one of the most notable events in its long and colourful career. In that year, HRH, the Prince of Wales together with the Princess of Wales (later King George V and Queen Mary) made an official visit to the mine, to start the then new 80" pumping engine; the shaft being named the Prince of Wales shaft in their honour. This engine which had been built by Holman Bros. Ltd. at Camborne, and designed by Nicholas Trestrail – the famous engineer, was erected by T. Rowe of Redruth, who had previously been in charge of the erection of the Severn Tunnel pumping engines.

The Royal Party who had been visiting the Duchy farm at nearby Stoke Climsland, were guests for a few days of the Earl of Mount Edgcombe, before going on to St. Columb and the Royal Cornwall Show to meet the Duchy Tenants.

Upon their arrival at Phoenix United, the Royal Party were met by the Chairman of the company – John H. Gretton; Directors Horton Bolitho, [52] James Holman, H. Moir and other directors, W. Nance-Williams Mine Manager, H. Milner-Willis, Company Secretary, E.A. Loring – Mine Superintendent, W. Hedley-Harris – Mine Accountant and V. Foster-Brown – visiting Government Inspector of Mines and Quarries.

The Account House was decorated with a double arch of flowers over the main entrance, bunting festooned all the windows, where the Union Jack was also displayed, whilst another floral display in the shape of the Royal Coat of Arms was arranged in front of the Prince of Wales engine house, and a similar display was erected in the Account House garden, where the Royal Party had lunch with the Chairman and Directors of the company, followed by a visit to the engine house, during which a band played the National Anthem, and his Royal Highness christened the engine with a bottle of whiskey.

Above the engine house, at Stowe's Adit, at Clannacombe Cottages, on the Dressing Floors, and on every attainable projection and eminence, miners and spectators gathered, cheered, and waved their Union Jacks. After christening the engine, their Royal Highnesses then visited Stowe's Adit - under the famous Cheeswring, where a new tram road had been laid, and accompanied by the Directors of the company, walked a short distance into Stowe's Adit.

In 1911, the management of Phoenix United Mine, was taken over by Bewick, Moreing & Co. mining engineers of London, and put in charge of M.T. Taylor an Australian, who later under the same management, was placed in charge of East-Pool & Agar Mines in Pool, Redruth.

From 1907 to 1914, all the tin ore from Phoenix was sampled at the Tin Ticketings held at Tabb's Hotel, Redruth, and smelted at Chyandour Penzance; Mellanear-Hayle; Carnkie near Redruth; and Point Smelting Works at Devoran near Truro.

Captain Richards in his report to the Directors dated Thursday June 26th 1913 stated that, "In Seecombe's Shaft on the bottom 212 foot level, No.1 winze has been sunk to total depth of 30 foot and the lode for the whole width carried, viz; about 5 feet produces 40 lbs of tin per ton. The 200 fathom level has now been connected to the Prince of Wales Shaft by a crosscut and this communication will greatly facilitate work in the 212 fathom level."

It is the writer's contention, that after examination of the mine's longitudinal sections, and reports of the agents, future explorations would probably locate payable ore bodies in the East Phoenix sett, following the easterly dip of the ore channel. Such a discovery could well lead to the re-emergence of Phoenix as a major producer of tin.

Today (1976) Prince of Wales engine house with its distinctive square based stack forms a conspicuous landmark in the Caradon area, and Phoenix United Account House still in an excellent state of repair, is now a private residence. Below ground, the levels, winzes, raises, and crosscuts are water filled and Silent, and await the day when like the Phoenix of mythology the mine will be reborn, and echo again to the sound of voices and operations.

THE PHOENIX UNITED MINES, IN THE PARISH OF LINKINHORNE



H.R.H. H.R.H.
Sir William Carrington J.S. Martin I.S.O. W. Nance Williams The Prince of Wales The Princess of Wales Lady Mary Forbes Trefusis Horton Bolitho
Geo. F. Richards J.M. Holman John H. Gretton Lord Balfour of Burleigh W. Peacock H.M. Willis
J. Hosken R.J. Hoffman W. Forster Brown

Plate 1 Royal Party, Stowe's Adit, Phoenix 1909



Plate 2 Engine House, Prince of Wales Shaft in 1974