Vereniging Histechnica KIVI NIRIA Cornwall 7th - 12th May

INKIJKEXEMPLAAR

Heritage of Industry Ltd Journeys into the Industrial Past

Tour to Cornwall

Vereniging Histechnica KIVI NIRIA

May 7th - 12th May 2012

With grateful thanks to Kingsley Rickard Trevithick Society, PO Box 62, Camborne, Cornwall TR14 7ZN

Picture credits Page 6 - Ironbridge Gorge Museum, John Lucas (National Portrait Gallery) Cover, Page 8, 24 - Bill Barksfield Page 10 - Smalljim Page 12, 14 - Trevithick Society Page 13 - John Bennett Page 16, 18, 19 - Pete Joseph Page 21 - Fred James Page 22 - W.E. Sevier collection Page 23 - Martin Bodman Page 23 - Martin Bodman Page 25 - Tony Atkin Page 26 - Pauline Eccles Page 28 - Jamesjen, Richard Penn Page 30 - Olaf Tausch Page 32 - Rwendland

Tour organised by Heritage of Industry Ltd Hunters Moon, Gorelands Lane, Chalfont St Giles, Bucks, HP8 4HQ Phone: +44 1494 873677 Email: <u>info@heritageofindustry.co.uk</u> Web: <u>http://www.heritageofindustry.co.uk</u>

> Registered Office : 80 Udimore Road, Rye, East Sussex, TN31 7DY Registered No: 2374281

Table of Contents

Timetable				
Participants5				
Monday 7 th May6				
Royal Albert Bridge Saltash6				
Tuesday 8 th May8				
Levant				
Geevor				
Hayle				
Wednesday 9 th May16				
China clay16				
Littlejohns China Clay Pit17				
China clay dry quarrying and processing plant, Meledor17				
Parkandillack beam engine18				
Parkandillack tube presses				
King Edward Mine19				
East Pool23				
Thursday 10 th May25				
Porthcurno25				
The Wayside Museum, Zennor				
Trewey Watermill27				
St Ives27				
Friday 11 th May29				
Falmouth Docks				
Bodmin & Wenford Railway				
Saturday 12 th May				
Finch Foundry				

Timetable

Timings will be adhered to wherever possible but may have to be varied due to local conditions. Any changes known in advance will be communicated to you at the earliest opportunity. Please listen carefully for instructions and confirmation of times each day during the tour.

Monday	07 May 2012	12:50 13:00 13:30 15:30 16:30 18:00	KLM departure from Amsterdam KLM arrival Bristol airport Flight KL1051 Bus depart for Plymouth Tamar Bridge, Plymouth. Coffee & comfort stop Leave for Carnon Downs Premier Inn Carnon Downs
Tuesday	08 May 2012	09:00	Collect group at Premier Inn
5	5	11:00	Arrive Geevor and walk to Levant
		13:00	Lunch at Geevor
		14:00	Geevor
		16:00	Hayle
		17:00	Return to Premier Inn
		18:00	Evening talk : China clay, Ivor Bowditch
Wednesday	y 09 May 2012	09:00	Collect group at Premier Inn dep for Wheal Martyn
		09:45	Meet Ivor for China Clay tour
		13:00	Lunch, The Countryman, Piece
		14:00	King Edward Mine
		16:00	National Trust, East Pool
		18:00	Return to Premier Inn
	k	19:15	Depart for dinner at Punchbowl and Ladle
		21:30	Return to Premier Inn
Thursday	10 May 2012	09:00	Collect group at Premier Inn
		10:30	Porthcurno
		12:30	Lunch, Commercial Hotel, St. Just
		14:00	Wayside museum Zennor with water mill grinding flour St Ives about 1Hr 30m free time
		17:00	Return to Premier Inn
		18:00	Evening talk : Cornish mining industry by Allen Buckley
Friday	11 May 2012	09:00	Collect group at Premier Inn
		09:30	Falmouth docks
		12:00	Lunch, The Norway Inn, Perranarworthal
		14:30	Bodmin & Wenford Railway
		17:30	Return to Premier Inn
		18:30	Depart for dinner in Falmouth
		19:00	Dinner Penmere Manor Falmouth
		21:30	Return to Premier Inn
Saturday	12 May 2012	09:00	Collect group at Premier Inn
		10:30	Finch Foundry nr Okehampton
		12:00	Lunch nr Okehampton
		13:10	Leave for airport
		15:10	Arrive Bristol Airport
		1/:10	KLM departure from Bristol Flight KL1054
		19:25	Arrive Amsterdam

Monday 7th May

Royal Albert Bridge Saltash



The Royal Albert Bridge, designed by Isambard Kingdom Brunel, spans the River Tamar between Plymouth, on the Devon side, and Saltash on the Cornish side. Its unique design consists of two 455 feet curved iron trusses 100 feet above the water, with conventional plate-girder approach spans. This gives it a total length of 2,187.5 feet. It carries the Cornish Main Line railway into Cornwall.

Surveying started in 1848 and construction commenced in 1854. The Cornwall span was positioned in 1857 and the completed bridge was opened by Prince Albert on 2 May 1859. Brunel died later that year and his name was then placed above the portals at either end of the bridge as a memorial.

The structure was the third in a series of three large wrought iron bridges built in the middle of the nineteenth century and was influenced by the preceding two, both of which had been designed by Robert Stephenson. The two central sections of Brunel's bridge are novel



adaptations of the design Stephenson employed for the High Level Bridge across the River Tyne in Newcastle Upon Tyne in 1849.

Brunel (seated, right hand edge of picture) was present when Stephenson (centre, seated) raised the girders of his Britannia Bridge across the Menai Strait in the same year.

From 1849 to 1853 Brunel was erecting the bridge at Chepstow which carried the South Wales Railway across the River Wye and featured a main truss of 300 feet with a

curving tubular main member, and three conventional plate-girder approach spans of 100 feet, a similar solution to that adopted for crossing the River Tamar.

The river is about 1,100 feet wide at Saltash. Brunel's first thoughts had been to cross this on a timber viaduct with a central span of 255 feet and six approach spans of 105 feet with 80 feet clearance above the water. This was rejected by the Admiralty, who required a greater clearance, and Brunel thus produced the final design. The two main spans are lenticular trusses with the top chord of each truss comprising a heavy tubular arch in compression, while the bottom chord comprises a pair of chains. Each of the trusses is simply supported and therefore no horizontal thrust is exerted on the piers, which is crucial in view of the curved track on either side. Between these two chords are supporting cross-bracing members and suspension standards which hang beneath the bottom chord to carry the railway deck which is a continuous plate beam.

The first work was to properly survey the river bed. On 26 April 1848 a 6 feet iron cylinder 85 feet tall was launched into the Tamar. From the bottom of this the bed of the river could be examined to identify its nature and the location of solid foundations. The Cornwall Railway at this time was finding it difficult to raise funds and so most operations were suspended that summer, but a small fund was allowed for Brunel to continue the survey. The cylinder was positioned at 35 different places and a total of 175 borings made.

In 1853 the tenders for the bridge were considered by the Cornwall Railway Board, and it was decided to let the work to Charles Mare, a shipbuilder from Blackwall who had built the ironwork for the Britannia Bridge. The fee he sought for building the Saltash Bridge was $\pm 162,000$, but on 21 September 1855 he filed for bankruptcy. Brunel proposed that the company should take over the works on the bridge without engaging another contractor, to which the company agreed.

Mare's first task was to establish an erecting yard on the Devon shore with a jetty and workshops. He then proceeded to construct a 37 feet iron cylinder 90 feet tall which was to form the work base for the construction of the central pier. This was launched in May 1854 and moored in the centre of the river between four pontoons. The bottom had been shaped to follow the rock surveyed in 1848; once it was settled on the river bed the water was pumped out, the mud within it excavated, and a solid masonry pier built up clear of the water. This was completed in November 1856.

The landward piers on the Cornish side of the river were completed in 1854 and the girders for these spans were hoisted up to their correct positions. Next to be built was the main truss for the Cornwall side of the river. The lower ties of the trusses formed of chains made from 20 feet links. Many were obtained from the suspended works for Brunel's Clifton Suspension Bridge and others rolled new for Saltash. The Cornwall span was floated into position on 1 September 1857 and jacked up to full height in 3 feet stages as the piers were built up beneath it, the central pier using cast iron octagonal columns; the landward one using ordinary masonry.

The main Devon span was floated into position on 10 July 1858 and then raised in a similar manner; it was in its final position by 28 December 1858. The work was sufficiently advanced that directors were able to make an inspection by train on 11 April 1859.

7

Tuesday 8th May

Levant



Levant is one of Cornwall's most famous mines and like many others in the county very little is recorded of its early history. In 1820 Richard Boyns, a local mining man and entrepreneur, formed a new company to work the mine, almost immediately they struck a rich vein of copper ore which eventually led to large dividends being paid to the share holders. This company operated Levant until getting into difficulties in 1871 when a new company was formed to take over the mine, its purser being Richard White, who was to run Levant for the next 30 years or so. It has been said both unjustly and inaccurately that Purser White never worked underground however it is a matter of record that in June 1840 the young Richard White was buried underground by five fathoms of 'rubbish' and only removed after several hours work by many men.

Over the years the mine continued to get deeper and to go further under the Atlantic Ocean, reaching its deepest point, the 350 fathom level, by 1904. Access to the lower levels was achieved by sinking two shafts out under the sea, Old Submarine shaft connecting the 210 to the 302 fathom level and, New Submarine Shaft connecting the 260 to the 350 fathom level.

To get to and from their place of work the miners had to climb many hundreds of feet on the ladders. In 1857 a man engine was installed on the mine, and eventually this saved the men enormous toil by enabling them to descend to and ascend from the 266 fathom level (approximately 1800 feet from the surface) with very little effort. On October 20th 1919 however the main rod of the man engine broke killing 31 miners and injuring many more.

In 1920 the old cost book company was dissolved to be replaced by a new limited company, Levant Tin Mines Limited, under a new manager, Colonel F. F. Oats, son of the great Francis Oats.

[Cost-book companies were popular with miners under the justicition of the Stannaries of Cornwall and Devon. As the name indicates, the cost-book company was held together as an entity by its accounting method. The managing officer was the purser, a similarity with traditional practice in ship management. A cost-book company was formed by a meeting of the adventurers agreeing upon a constitution and appointing a purser. Meetings were held at regular intervals; between meetings the purser acted for the company and kept the accounts. The feature of the cost-book company was the regular presentation of the cost-book made up to date, to the company meetings – typically once a month. Adventurers had the right to transfer their shares witout the consent of their associates and could relinquish their interest and withdraw their share in cash.

The advantage of this kind of company, as noted by Matthew Boulton, was that "if a mine should become a losing concern an adventurer may withdraw, and is not liable to lose more than the sum he advances, and as the accounts are publicly settled every month, you may from time to time see how the company goes"]

Amazingly, only working from surface down to the 210 fathom level the mine survived for ten years on ground supposedly worked out many years before. It did however finally close in October 1930.

In the late 1950s the neighboring mine Geevor began to investigate the possibility of reopening Levant to enable them to work the seaward extension of their own lodes. Initial investigations in Skip Shaft revealed that the sea had broken in to the old workings. This hole through to the ocean was eventually traced to a notorious weak spot in Levant on the 40 fathom level, the "40 backs". It took two attempts to seal this breach but by the end of the 1960s this had been successfully achieved. Skip Shaft was refurbished to the 190 fathom level with a four man cage being installed in place of the original two ore skips. Geevor and Levant sadly succumbed to the collapse in the price of tin in 1985 and closed in 1991; both mines are now flooded to sea level.

In 1935 concerns were raised regarding the future of the beam winding engine on the mine and in August that year a group of the great and good of Cornish mining and engineering got together to preserve it. This group called itself the Cornish Engines Preservation Committee; in 1948 it became a registered charity and changed its name to the Cornish Engines Preservation Society.

The winding engine stands in the same house where it worked for 90 years, perched on the edge of the cliff, making it the most westerly steam engine in the country. It is also Cornwall's oldest. Built in 1840 by the West Country's foremost engine builder, Harvey and Co. of Hayle, it is said to have been designed by Francis Michell, a member of a distinguished Cornish engineering family. The engine also has a national claim to fame. It was Britain's first beam engine preserved on its working site by private individuals. Today the engine is owned by the National Trust having been handed over by the CEPS in 1967 along with other engines: Taylor's 90" and Robinson's 80" pumps and Mitchell's 30" whim. Taylor's and Mitchell's are both on display at Pool.

The engine house was restored by the National Trust, whilst the engine itself was put back into running order by a group of Trevithick Society members (known as the Greasy Gang) over the years 1984 to 1992. In 1990 the National Trust and the Trevithick Society jointly launched the Levant Beam Engine Appeal to raise a sum of £128,000 required to complete the restoration and to provide a means of steaming. Using the funds obtained the National Trust rebuilt the ruined boiler house and installed an electricity generator and an oil-fired boiler. An old Cornish boiler was obtained and installed in a non-working manner to show how steam was raised before. The engine first ran again in steam in 1992, and since then it has been steamed for several months each year for visitors to see how the engine once looked and operated.



Geevor Mine was one of Cornwall's great survivors and was working up to 1990. It is a unique example of a 20th century tin mine and one of the largest preserved mining sites in Britain. The word Geevor comes from the Cornish for goat -' gever', and the Geevor Goat is still a symbol of the mine. Mining in this area can be traced back centuries. Wheal Givar was reported in 1716 and a Geevor Mine in 1768. Other workings in the vicinity were Wheal Stennack and Wheal Mexico - the old shallow workings of the latter are today part of the Geevor visitor tour. By the mid-19th century, most of what is now Geevor was described as North Levant in tribute to the rich and legendary Levant Mine, just to the west.

Early in the 20th century, St Just miners, returning from South Africa due to the Boer War, formed a succession of companies to prospect in the Geevor area. In 1911, these became Geevor Tin Mines Ltd with a capital of £50,000 and an area approximating to the Geevor of today. The mine used the latest plant and methods and took power from the Cornwall Electric Power Company at Hayle. No traditional Cornish beam engines were used at Geevor.

Work began around this time on Wethered Shaft, which is at the entrance to the site, while Victory Shaft, further west, was sunk in 1919.

The mine worked steadily through the first half of the century, though with periods of closure in 1921 and 1931. Nevertheless, the mine survived the Second World War and into the postwar period. By the 1960s, the company was actively seeking new reserves of tin beyond its own sett.

These years saw an epic project to pump out the old Levant Mine, regarded then as a good prospect at depth. This entailed sealing a breach in the seabed where the Levant undersea workings at the 40 fathom level had fatally weakened the roof, allowing the Atlantic to break in following closure in 1930. The breach was successfully closed in 1968 but sadly the promised riches in Levant did not materialise. In 1975, a new sub-incline shaft was begun to go below the old Levant workings and out to sea; HM The Queen opened this in 1980. Work also began to the north east at Boscaswell Downs and the prospect of reopening the famous Botallack Mine was reviewed. The modem steel headgear at Allen's Shaft, Botallack dates

from this time.

All this activity came to naught in 1985 when the international tin price collapsed. The International Tin Council's role was to buy tin when prices were low and sell when they improved, thus stabilising the market. In 1985, the ITC ran out of money, ceased operations and released its tin stockpile onto the market. There was a huge surplus and the price dropped like a stone from £10,000 a ton to £3,400. No Cornish producer could survive without help. The DTI decided to assist the other Cornish mines and gave £25 million to South Crofty and Wheal Jane. Geevor got nothing and in April 1986 it closed. There was a period of activity removing already broken ore and in 1988, with the tin price picking up, mining recommenced in a small way. However, in early 1990 the mine finally closed; pumping continued for a few months in case of a rescue bid but later that year the pumps ceased and the mine flooded. Scrap merchants began to remove equipment from Geevor.

Fortunately there was recognition, locally and across Cornwall, that a unique part of the county's heritage was in danger of disappearing forever. As a result, Cornwall County Council purchased the site in 1992 and it opened as a tourist amenity the following year, offering access to the ore processing mill and other surface buildings. By 1996, underground visits to the shallow early workings of Wheal Mexico were on offer and Geevor has continued to develop year by year, first under the management of the Trevithick Trust from 1996, and since autumn 2001 run by locally based Pendeen Community Heritage (PCH). Over this period visitor numbers have steadily risen to around 40,000 per annum and new parts of the site have been opened up, such as the miners' dry in 2001 and an exhibition devoted to St Just engineers and founders Nicholas Holman in 2005. An HLF lottery bid, agreed in 2006, with contributions from Cornwall County and Penwith District Councils, funded a £3.8m project, which included repairs to 21 buildings at Geevor - the entire site is now scheduled - and a new museum, Hard Rock, which opened in 2009. A project is in hand to increase the length of the current underground tour in Wheal Mexico. Geevor has also been designated a 'gateway site' to the western part of the Cornwall & West Devon Mining World Heritage Site.

The visitor arriving at Geevor by road first sees Wethered Shaft and the buildings around it. The wooden headgear, a rare survival, dates from 2001 and is a replica of the original which collapsed a year or two earlier. This was the main shaft when Geevor Tin Mines took over in 1911 and remained so for the next decade. Its use declined with the sinking of Victory Shaft and it was effectively out of use by the 1950s. Wethered Shaft is still open and some 400ft deep. The wooden engine house, one of only two surviving in Cornwall, still contains the original winding engine. It also at one time housed compressors. Adjacent buildings include the former power house, the mine social club and old stables. From 1983 to 2005, a set of water-driven stamps stood here. The Locke Stamps were brought from Nancledra and reerected as an example of this early technology. After some years of neglect, they have been re-erected elsewhere on site.

Leaving the car park, on the left are steps leading down to a small underground chamber. This seems originally to have been part of a small shaft and prospecting tunnel later converted to a miners' store and shelter; it is one of the oldest features on the site. Site reception is in the former mine offices. A magnificent three dimensional model of the mine, showing all the shafts and the miles of levels excavated in the search for tin can be seen here before going out onto the site. After the compressor house, which provided all the air for the drills and machinery, we come to the main winder house for Victory Shaft. This contains the electric winder from British Thomson-Houston, which came into service in 1954.

Though only fifty years old, the electric winder is now a piece of history in its own right; its installation was part of a major rearrangement at Victory Shaft. The current steel headgear, replacing a wooden structure, also dates from this time. When the electric winder was installed, its steam predecessor was retained and is in the adjacent concrete building. It dates from 1906 and came to Geevor from Wheal Vor, near Helston, in 1923. It has been altered to run on compressed air and saw occasional use when winding ropes were changed right up to the mine's closure.

Behind the winder house stands a large building, formerly an engineering fitting shop. This now houses the mining museum where striking modern displays tell the story of Geevor and local mining. A purpose-built cinema shows the Geevor film and upstairs a set of beautifully engineered, interactive exhibits shows how tin was processed from the ore.



We then reach the miner's dry, where men changed before and after their shift, by a covered tunnel from Victory Shaft. This is the most atmospheric part of the site and remains essentially as it was on the day the mine finally closed. Clothes, hard hats and boots remain by lockers and graffiti, much mercifully obscure, is on walls. Allowing public access to this building was a brave decision and has been done with considerable sensitivity - to stand here when the Atlantic wind whistles and the air is damp and cold is to understand in a small way just what is meant in human terms by "the price of tin". A total of £350,000 was

spent here to make the building look exactly the same!

We now make our way via the drill shop and mine rescue station to the mill. The mill treated all the broken rock hoisted from the mine, 98% of which was totally valueless. The mill is a large building and its processes are complex so a very brief description must suffice here. It has seen many changes and it suffered from the depredations of the scrap merchants immediately after the mine closed. Fortunately most damage was in the newest part of the mill dating from 1980. Enough survives to enable us to follow the treatment process. In fact only at Geevor can one get a real sense of the processes involved in a 20th century Cornish tin mine.

Ore entered the top of the mill having been crushed to a two inch size. It was washed and further crushing then took place. Examples of a jaw and a cone crusher can be seen awaiting restoration. The ore then travelled along the picking belt, where rubbish was removed by hand and any iron waste by electromagnet. Women worked this belt during World War II and some have recorded their experiences on a fascinating CD as part of Geevor's Oral History Project.

At the next stage, known as Heavy Media Separation, less dense rock particles were floated off. The ore now went to a fine ore bin, which was the supply for the mill. A further crushing to fine sand then took place using steel balls in a ball mill - a 1937 example is still in situ. The fine ground ore was then graded by size and passed to shaking tables. Here the water and the motion of the tables separate the product into 'heads' (high grade tin), 'middlings' (waste rock with some tin attached) and 'slimes' (containing only very small amounts of tin). The names refer to where they come off the tables.

The 'heads' went to a flotation process to remove arsenic and sulphides. This process was previously undertaken by roasting in a calciner. A Brunton calciner, last used in the 1930s and the most complete surviving example in Cornwall, has been restored and will in the future be open to visitors. 'Middlings' went to regrind ball mills and then returned to tables; 'slimes' went to a separate plant, which will also soon be open to the public. Unlike other Cornish mines, such as South Crofty, Geevor never produced arsenic for sale commercially.

This whole process produced three grades of tin, the tin being in the form of cassiterite - tin oxide - also known as black tin. High grade tin was bagged for sale to the smelter; medium and low grades were stockpiled and sold in bulk.

The sulphides were eventually sold for their small copper content but the presence of arsenic depressed the value - interestingly they did include some gold, but only a few parts per million.

Many processes in the mill relied on gravity to move the ore and slimes around. In the old days, the final waste went over the cliff and Geevor could be recognised from a red stain on the sea. Coming back uphill on the left are the Locke stamps from Nancledra, mentioned previously. These were refurbished and re-erected in 2006 as a memorial to Clive Carter, author, historian, painter and model maker, who oversaw their original move to Geevor in 1983. He was a great friend to Geevor and was involved in the creation of the Holman Exhibition near the stamps. Nicholas Holman & Co., run by a branch of the great Camborne family, Holman Brothers, were based at St Just and Penzance and served the mining industry of West Cornwall as engineers and foundry men.

Hayle



Hayle as a town is a child of the Industrial Revolution, the name not appearing on maps until the late eighteenth century. Hayle sits on the confluence of two short rivers and takes its name from the Cornish language word "heyl" meaning saltings. These two rivers meet at Hayle and flow as one for the last half mile to the sea where they create a shifting sand bar causing difficulties for shipping, of which more later. The town is a linear development along the southern bank of both rivers, with the western end of the town being known as Foundry and its eastern counterpart as Copperhouse. In the early 1700s the port facility and its industrial development started to take place and, although the quays along both rivers dry out at low water, there was ample depth for the ships of the day.

The story really begins with the decision of the Cornish Copper Company to move its smelter from Carn Entral near Cambome to Hayle in 1757. The local mines produced a considerable tonnage of copper ore and this needed smelting. Over time it was found cheaper and more convenient to send the copper for smelting in South Wales with its plentiful supply of coal so the company moved into engineering trading as Sandys, Carne & Vivian becoming renowned for their large engines for mine pumping. One example of such an engine is the 90inch built in 1846 for water supply, still operating today at the Kew Steam Museum in London.

The company finally ceased trading in 1869. Sadly few remains of this enterprise have survived although the canal constructed alongside the river to allow ships up to the works is still discernible with much of the masonry constructed of black scoria or smelter waste. A small town grew up around the works and became known as Copperhouse, a name still borne by that part of Hayle to this day. The company built houses for its workers, many from scoria blocks cast from copper slag. In 1769 the copper company built the Copperhouse Canal still to be seen today and began the practice of flushing the harbour, a practice which continued until recent years.

In 1799 blacksmith John Harvey from nearby Gwinear set up a works at Carnsew to the west of Copperhouse in the area known to this day as Foundry. The scene was set for many years of dispute between the two companies, which was exacerbated as the Copper Company moved into foundry work from the 1820s. For the next 50 years two of the greatest makers of Cornish beam engines operated cheek by hostile jowl in this small Cornish port. In 1847 Harvey's was listed as "Millers, merchants, iron founders, iron & coal merchants, shipbuilders, ship owners , ironmongers, wholesale grocers, tea dealers, general merchants and ropemakers".



Harvey's are probably best known for building stationary beam engines, principally for pumping, which were installed all over the world.

Examples of their work remain still preserved today including the 90in engine of 1893 at East Pool, the 100in engine of 1869 at Kew and, the largest, 144in of 1850 at Cruquius in Holland which powered eight separate beams.

The Copperhouse foundry

closed in 1869 and Harvey & Co. took over most of their assets. Harvey's continued in business but in 1903 their foundry closed and they were thereafter builders' and general merchants. Although a considerable number of Harvey buildings have been demolished much of interest still remains.

The Hayle Railway opened in 1837, using a combination of locomotives and inclines, ran to Camborne and Redruth with branches to Portreath and Tresavean Mine near Lanner. The Hayle terminus was beneath the viaduct. Its route ran from the quays and followed the line of the rivers eastward on the level, eventually gaining higher ground east of Hayle by an inclined plane at Angarrack, traces of which can still be seen. Passengers were carried from 1843. In 1846 the Hayle Railway became part of the West Cornwall Railway, which ran from Truro to Penzance, and Hayle then became a station on the Cornish main line. When the West Cornwall was extended in 1852 it followed the Hayle Railway route to a point just east of Hayle with deviations to avoid the incline at Angarrack and another at Penponds, west of Camborne. The line then kept to higher ground through Hayle and from the new station just east of the viaduct a steep branch descended to link with the old Hayle Railway network on the wharves. A network of lines served the harbour and foundries; many of the sidings were horse worked until closure in the 1960s.

The West Cornwall main line crossed Hayle town on a timber viaduct 277 yards in length. The viaduct we see today is a replacement, dating from 1886, and is what is politely known in Cornwall as a 'lash-up'. At least one pier at the east end is significantly out of the vertical and elsewhere can be seen the results of various pieces of reconstruction work. The square brick piers at the west end still contain old cast iron columns inside them. Its odd claim to fame being that it is the only viaduct in the country under which the same road passes twice.

Nestled around the viaduct are the remaining buildings of Harvey & Co.'s foundry. Following some grievous losses in recent years, they are now being conserved and restored by the Harvey 's Foundry Trust. Among the buildings to be seen are the 1835 granary or foundry barn, remains of the boring mill and erecting shop, a pattern shop and the timber-clad drawing office, supported at first floor level on former mine drainage pipes. Also still to be seen are the remains of the 1776 hammer and boring mills and a 500 metre ropewalk which operated from 1791 to 1916.

A substantial smelting works operated locally here at Mellanear from 1838, although there is virtually nothing to see today. It opened, like several of its kind, with the abolition of tin coinage from 1838 and was operated by Williams, Harvey. In 1908 the operation transferred to Bootle, the better to handle the preponderance of foreign ores coming into Liverpool, though the works retained the Mellanear name. The original Hayle works reopened briefly from 1915 to 1921.

On the north side of Foundry Square White's Warehouse is the former Hosken, Trevithick & Polkinhorn (HTP) Steam Bakery, part dating from 1828. In 1852 part of the Harvey empire passed to J. H. Trevithick Holdings, later to become the great Cornish trinity, HTP. John Harvey House with distinctive clock tower was Harvey & Co.'s head office. Barclay's Bank was Harvey's Emporium, effectively the company shop, and Foundry House of 1895 is on the site of the foundry offices and shop. It was later the Cornubia Biscuit Factory of HTP. The original White Hart Hotel of 1824, now in Masonic hands, was built by Henry Harvey to provide a living for his sister Jane, whose income from her husband Richard Trevithick was, to say the least, sporadic. The current White Hart next door dates from 1838 and was used to accommodate Harvey customers visiting Hayle.

Other notable businesses that operated at one time on North Quay Hayle were a C.E.G.B. coal fired power station, an oil depot, Associated Octel which produced bromine from sea water and the Pentowan Calcining Works. Situated on the outskirts was the National Explosives Works and at Copperhouse was the works of J. & F. Pool, which specialised in the manufacture of many sizes of perforated plate. This business has now transferred to the Midlands under the Ashe & Lacy banner. Thos. Ward shipbreakers also operated for some time in the harbour. Foundry House, the former Harvey offices and, later, the Cornubia Biscuit Factory.

Wednesday 9th May

China clay



China clay was first recognised in Cornwall by William Cookworthy in 1746 at Tregonning Hill, north-west of Helston. Some years later huge deposits of very high quality clay were discovered in the Hensbarrow granite of the St Austell district. By 1768 Cookworthy had patented a way to use the clay and developed his own Plymouth Porcelain Factory. English pottery had previously been of coarse earthenware and stoneware, but now white porcelain was possible.

Other potteries started to use china clay from Cornwall, and by the early nineteenth century the kaolin industry had become a big business. Many of the pottery factories owned rights to mine the material themselves. In addition to pottery, kaolin was starting to be used as a whitener by the paper industry. Early in the twentieth century there were around seventy producers. The competition was cut-throat. Corners were cut, with little capital investment or product development; wages were low and working conditions were poor. However, these various works helped the Cornish engineering companies which supplied the pits with many beam engines for pumping slurry.

By 1910 production was nearly one million tons a year and paper was using more than ceramics. 75% of output was exported, mainly to North America and Europe. Cornwall held a virtual monopoly on world supply. English China Clays was formed in 1919 by the merger of the West of England China Clay Co., Martyn Brothers and North Cornwall China Clays, who together accounted for around half the output at the time. ECC became the leading clay producing company for the rest of the century.

This merger was followed in 1932 by the merger of ECC with two of its main rivals, John Lovering and H. D. Pochin. This formed the new company English Clays, Lovering, Pochin, & Co. (ECLP); in 1956 the Lovering and Pochin families were bought out and the company became known as ECC International Ltd. English China Clays was acquired by Imetal of France for £756m in 1999 and continued to be run as ECC. Imetal subsequently changed its name to Imerys.

Today around 80% of the china clay produced is used in paper. Of the rest, 12% is used by the ceramics industry and the balance in products such as paint, rubber, plastics, cosmetics, pharmaceuticals, cork and agricultural products. Even waste products are saleable, from granite blocks for coastal armouring to sand for aggregates: annually the industry sells 1.6 million tons of rock and 500,000 tons of sand.

120 million tons of china clay have been extracted, but reserves in the ground will last at least another hundred years.

Littlejohns China Clay Pit

Littlejohns was worked in conjunction with Virginia, Hallew and Trethosa pits from at least the 1840s to the present day; formerly it had been partly owned by Spode. In 1843 it was acquired by the Cornwall China Stone and Clay Company at a rent of £1,300 pa for the first 7 years, £1,600 the second and £1,800 the third, with dues of 6shillings/ton on china clay and 3shillings/ton on china stone. Two days after the commencement of lease, the contiguous Littlejohns pit in Roche parish was sold and may have been acquired by the company. During the first six years the lessors had not made enough money to cover the minimum rent and the tenancy ended on 31st December 1849 with 4,000 tons of china clay and 6,000 tons of china stone unsold on site.

In 1849 a scheme was put forward to regulate china clay and stone prices and the remaining Littlejohns clay was released onto the market in 1850. New sheds, pits and pans were built at Littlejohns in 1850 by the West of England China Clay Co. Because of construction and renewals at and around the pits the company did not reach full production till 1851, and only 1,117 tons of clay and 3,710 tons of stone were produced during the first year of the term. Demand for clay rose from this point with corresponding expansion of industry.

Bythe 1870s the West of England Company, by far the biggest and most successful concern, paid $\pounds 6,000$ annual rent between 1876 and 1883 and was committed to $\pounds 7,000$ per annum thereafter. In June 1877 it sent away 5000 tons less clay than the previous June. Since 1873 all companies had been selling clay at below cost price, partly as a result of competition, and several companies went into liquidation; some directors had even fled the country to escape creditors.

Following strikes in 1912, the West of England Company was one of the few companies to respond favourably, it was then employing about a quarter of the industry's labour force. The pay rise offered to the men was followed by offers from a few other companies. The men not receiving offers moved to other pits to make the men stop working and another general strike ensued, though men at Littlejohns (and others) stayed at work. The strike lasted over ten weeks but came to nothing. The pit became part of ECC then ECLP, and still produces high quality clays.

China clay dry quarrying and processing plant, Meledor

The dry mining operation was commissioned in 2007 at a cost of £8 million. The plant is designed to process all mined china clay matrix, including the considerable quantities of nonclay bearing rock. Essentially, the plant differs from the traditional hydraulic mining methods in as much that excavated material is carried by dump truck to the water and processing rather than the wet mining method where water is carried to the quarry face for discharging through water cannons and subsequent pumping stations, for sand removal. In this method the non-clay bearing rock has to be removed by a dedicated earth moving team and may or may not be further processed to produce aggregate.

The dry mining plant eliminates the need for multiple pumping stations and reduces the water consumption by two thirds. The resulting reduction in energy consumption is significant. The plant incorporates a 1200 by 800 millimetre jaw crusher which is fed with all material over 80mm. The less than 80mm material, a mix of clay, sand and mica goes first to a washing barrel, where the minerals are slurried. This then allows for the standard classification using bucket wheel sand classifiers, followed by hydrocyclones, which produce a product below 53 micrometres, 90% china clay and 10% mica. The plant operates 24 hours a day with a throughput of 900 tons per hour.

Parkandillack beam engine

The Parkandillack Cornish cycle pumping engine was originally built for Old Sump Shaft at Wheal Kitty, St. Agnes, in 1852 by Sandys, Vivian & Co., Copperhouse Foundry, Hayle. This 50" engine was then moved in 1912 to its present location and fitted with a new cylinder by Bartles of Carn Brea. It then pumped china clay slurry from the clay pit until it was retired in 1953. Like many of these engines it is "levered" or has uneven strokes, the outdoor stroke being 9ft and the indoor 10ft. A feature of Copperhouse design is the valve arrangement of the top nozzle chest whereby the equilibrium valve is situated centrally between the governor and the steam valves. Other companies located the equilibrium at the side. Another feature of the Parkandillick engine is the St. Austell governor. In the clay district the pumping engines had a winding engine situated next door to wind skips full of waste to the top of the sky tips and the two engines were fed from a single boiler. The St Austell governor sensed the steam requirements when both engines were working and favoured the pump to keep clay production continuous. Yet another odd feature of the engine is the dog's paw mark. When the beam was being cast a dog was in the foundry and ran over the sand mould leaving its paw prints. These prints can be seen on the beam and we even know the dog was a spaniel! Today the engine is still operational, and with no pumps attached, is in balance and works perfectly well on 5psi. air pressure.

Parkandillack tube presses



The tube press, developed by English China Clays / Imerys, is the most efficient method of filtration for the production of medium to course size china clay products. The plant, commissioned in 2008, at a cost of £20 million, incorporates 120 tube press units which produce at a rate of up to 90 tons per hour. Formerly the hydraulically operated presses were made from cast-iron but are now polypropylene. The product from the tube press is further reduced in moisture by a fluidised bed dryer. The energy reduction obtained compared with more conventional filtration plants is up to 80%. The 15,000 tons of weekly production is moved, mostly by rail, at 1,140 tonnes at a time to the port of Fowey for export by ship. The tube press plant produces almost all its output for paper manufacturing and at the present time output from Cornwall is 1.2 million tonnes per year, of which 50% goes into paper, 30% into a wide variety of ceramics and the remaining 20% into products such as paint, rubber, plastics and pharmaceuticals.

King Edward Mine



Near the village of Troon, south of Camborne in Cornwall , lies a museum and collection of mining machinery that deserves to be far better known. King Edward Mine, on the Great Flat Lode, owes its survival first to its previous use as an educational establishment and secondly to the dedication of a stalwart group of volunteers.

King Edward Mine was originally the eastern section of South Condurrow Mine. This dates back to the 1850s and was a notable producer of copper and tin. The mine closed in 1902 and the School of Metalliferous Mining in Camborne took over the abandoned eastern part for the practical instruction ofstudents. The School was able to use the shallower levels of the mine down to 400ft as they drained into the then working Wheal Grenville to the south. At surface the mine, renamed King Edward VII Mine to honour the new King in 1901, was re-equipped, based on the best mining practice of the time. This included a full mill and dressing plant, survey office and lecture rooms. The original count house and miners' dry were retained. Although its main purpose was educational, the mine was run commercially with much work being undertaken by the students. The intention was that the tin produced would cover the mine's running cost. Students received practical tuition both in underground mining techniques and in ore processing.

By the end of the 19th century,the great days of Cornish tin were over. There was little investment in the new technologies and methods being developed elsewhere, due to the industry's innate conservatism and a disastrous slump in tin prices. So the new equipment installed at King Edward between 1897 and 1906 was relatively rare in Cornwall at that time. The mine came into production in 1904 and continued until the outbreak of the First World War. In 1921, the adjacent Grenville Mines closed and pumping there ceased. This caused King Edward Mine to flood, and commercial tin production ceased. From this time, underground training moved to the more shallow levels of Great Condurrow Mine, higher up the hill.

King Edward continued to be used as a field station and, over the years, the mill was stripped and turned into a pilot plant. In 1974, the School of Mines moved to larger premises outside Camborne and some of the teaching from King Edward Mine along with the pilot plant was relocated there. In 1987, with the support of the School of Mines, the KEM Preservation Group was set up with the objectives of preserving the site, restoring the mill to its condition c1910, and establishing a small museum. Since then volunteers have put in thousands of hours in pursuit of this end. In 1989, the importance of King Edward Mine was officially recognised by the listing of all buildings on the site as Grade II*, putting them in the top 5% nationally. The site is now a major component of the recently designated Cornwall & West Devon Mining Landscape World Heritage Site.

In 2000, the Trevithick Trust leased a major part of the site from the School of Mines. Following major building repairs. King Edward Mine first opened to the public in April 2002.

In 2005, on the demise of the Trevithick Trust, the lease reverted to Kerrier District Council and, at short notice, a combination of the Trevithick and Carn Brea Mining Societies and the KEM volunteer group formed a charitable joint company to run the museum. In 2005, the School of Mines, on relocating to the new Combined Universities in Cornwall campus at Falmouth, relinquished its lease of the mine to original landowners, the Pendarves Estate. Kerrier District Council started the process of acquiring the site and this was completed by Cornwall Council in 2009, however the site is still operated under a temporary lease. A supporters' group, The Friends of King Edward Mine, was formed in 2007.

The importance of the King Edward site is that it houses a comprehensive collection of extremely rare, and in some cases unique, equipment. Furthermore it is all in working order. We owe this firstly to those who equipped the mine at the dawn of the 20th century and secondly to the enthusiasts and volunteers, who have laboured over the last 20 years to conserve, restore and replace a collection of mineral processing machinery which has immense significance. As the mine in its present form was always something of a demonstration mine, it is entirely appropriate that it should now perform that function for visitors. Fortunately the Californian stamps were still on site when the volunteers began work in 1987 but almost all the other mill equipment had been scrapped. Undaunted, the team set to work to collect a representative set of machinery. In 1974, the Trevithick Society had dismantled and saved two Cornish round frames from a tin stream works at Tuckingmill. These made up one good frame. Shaking tables from South Crofty and Geevor mines were installed. A 14ft diameter double dipper wheel came from Tolgus Tin where it was to be scrapped, while scrap merchants were about to remove a small Hardinge ball mill from Geevor when the King Edward team came to know of it. Other items were recovered wherever possible.

On the approach toKing Edward Mine, a ruined engine house is seen to the left. This is not part of the museum but, built in 1869, housed the engine which drove the South Condurrow stamps. Ultimately there were 96 head of stamps and the engine worked until 1909. The buildings at King Edward fall into two categories; those, which were originally part of South Condurrow Mine and date from c.1870 and those built by the School of Mines between 1899 and 1907. It is these latter that the museum currently occupies.

Visitors enter the site through the calciner house, which until the 1930s contained a furnace for roasting ore to drive off unwanted impurities. It now contains an exhibition on the Mineral Tramways Project. Next comes the Museum shop and reception. This once housed a large buddle and was later a laboratory for the School of Mines. On proceeding outside, we pass the original boiler house before another engine house can be seen. This dates from 1868 and housed a beam winding engine with a 25inch cylinder, which passed to the School of Mines but was replaced by a more modern winder in 1907. This wound from the Engine Shaft of South Condurrow, which can be seen a short distance to the north. Engine Shaft opened up unexpectedly in 1995 and has since been re-collared. Over the shaft is a very recent item of Cornish mining history, the very last cage brought to surface with miners when Cornwall's last working mine, South Crofty, closed in March 1998.

Before entering the museum buildings, look for one of the star exhibits on site. This is the original Holman twin cylinder horizontal winding engine, which replaced the beam engine in 1907. Though it now sits on its original site, the engine has led a nomadic life. In 1942, it was removed to Castle-an-Dinas Mine on Goss Moor. This fascinating mine was then being extended in the wartime search for wolfram, the ore of tungsten. After its closure in 1957, the winder was on display at Poldark Mine. It returned to King Edward in 2001 and is now being restored; at present it will run on compressed air. Happily finances have now allowed for a replica of the engine's original wooden house, which burnt down in 1958, to be erected. Eventually there may also be a new headgear over Engine Shaft.

Now enter the 1901 museum building. This once housed a 90hp horizontal compound steam engine, again from Holman Brothers of Camborne, which drove all the plant in the mine mill via a flat belt. It was superseded by electricity in the 1930s. The museum houses a small and comprehensive collection of items concerned with Cornish mining in general and the surrounding area, the Great Flat Lode, in particular. Move through to the heart of the museum - the mill with its comprehensive collection of ore processing machinery, all of it rare and amongst the last of its kind in the world, all in working order.

The purpose of the mill is to recover cassiterite, tin oxide, SnO_2 , which is 78% tin metal by weight. The ore entering the mill may only have a 1-2% tin content by weight, which means that 98-99% will effectively be a waste product. The processes within the mill are designed first to crush the ore, then to separate the heavier tin content from the waste by means of gravity and water. At the same time as separation, there are also the first stages of collection and concentration, which will continue as far as possible, eventually to obtain a saleable black tin concentrate. All the processes depend on the differential behaviour of mineral particles, the tin, in waste whilst flowing in a more or less controlled manner over moving sloping surfaces. The heavier material should stay on the surfaces whilst the lighter waste is washed away.

Visitors enter the mill at the upper level, just below where the ore was trammed in from Engine Shaft. Immediately above, and not at present open to the public, is the area where the ore was tipped out and fed through the 'grizzly', a set of iron bars that controlled the maximum size of ore to go into the stamps ore bin. Any over-size pieces would have been fed into the Fraser & Chalmers jaw crusher. This is contemporary with the Californian stamps and was bought and erected at the same time.

Descending the staircase by the side of the Californian stamps, one can appreciate the scale of this machinery. The stamps came from makers Fraser & Chalmers in 1901, after being exhibited by them at the Paris Exposition of 1900. Five individual stamp heads are each in turn lifted and partly rotated by a camshaft. Each head weighed 850lbs and has a drop of 8 in. The individual heads drop roughly once a second. These stamps crushed the tin ore to a pulp. It is believed that these are the only full sized working set in Europe.



The pulp from the stamps is transferred via a small dipper wheel to an hydraulic classifier. Whilst the stamps were probably the third set to be erected in Cornwall, the classifier was the first such installation. This sizes the material into four products dependent on size and weight fractions. The different machinery within the mill will only operate successfully with material of a certain size range. The coarsest, heaviest pulp is fed to the Holman-James shaking

table. The material fed here can be likened to beach sand. As the pulp flows across the deck, the shaking action causes the heavy tin to go to the bottom and be trapped behind riffles, whilst the lighter waste is washed off the table. The longitudinal shaking drives the tin up and along the table to be collected at the end. None of the processing machinery in the mill is so efficient as to be able to trap all of the available tin. Middlings pulp, which still contains tin and waste, is collected separately and fed via one side of the 14ft dipper wheel to the Hardinge ball mill. This grinds the middlings, releasing further fine tin and waste that is returned, via an original pattern mill pulp sampler, and the other side of the 14ft dipper wheel to the classifier, where the sizing process will start again.

The second stream of pulp from the stamps is fed onto the Holman-James slime table, a similar piece of equipment to the sand table, but dealing with a much finer source material. Again tin is collected at one end, waste flows away and the middlings go back, yet again, through the ball mill regrinding process.

The third pulp stream - and by now the material has the consistency of gritty flour - is fed to the Cornish round frame. The table slowly rotates and the pulp is fed onto the deck via a fixed circular launder that goes two thirds of the way around the deck's circumference. The tin tends to stick on the deck and the waste washes away into the centre to be discarded.A second circular launder, covering the remaining third of the circumference, carries in clean water, which as the table rotates from the feed area, gently washes away further waste from the rich tin material still on the deck. Control of the water flow here is critical, so as not to wash any tin away with the waste. Finally a strong jet of water and a brush remove the concentrate into a separate collection launder in the centre of the table. Like the feeds to the sand and slime table, once started this is a continuous process fed from a steady flow of pulp from the stamps and the subsequent regrinding.

The hydraulic classifier separates the pulp into four streams and the last one, containing the finest tin particles, is led on to the set of three 19th century self tipping wooden automatic 'rack' or 'rag 'frames. These have been reconstructed on the original design and are another very rare feature. Once, like the round tables, there were banks of these machines working downstream of the main processing mills, but being of wood construction none appear to have survived in Cornwall. The frames operate in a similar manner to the round frame, a steady stream of pulp flowing over the inclined deck. The heavy tin sticks and the waste flows away, often to another set of frames further downstream. An automatic wash of clean water is regularly flushed across the deck. The tin is then swept into a separate collecting launder, the deck resets and the process continues.



The concentrate from the various processes would contain not only cassiterite, but also other heavy minerals such as copper, iron and arsenic, as sulphides. Roasting of the concentrate would drive off the sulphur and arsenic and this was done in the calciner. The lighter oxides of copper and iron, which remained with the tin, were then retreated on a Frue vanner. Like the rag and round frames, these were once very common but again, as far as is known, no operating example has survived. The King Edward

Mine vanner is a project that has occupied the volunteers at the mine for around 12 years. Over this time original vanner pieces have been restored and others made so that, as far as is known, KEM now has the only working Frue vanner in Europe, if not much further afield.

Lastly, we have the final stage of concentration. Calcined tin is fed over a 12ft diameter convex centre-head buddle, another piece of original 19th century equipment. This concentrates heavy black tin and again any middlings that might still be within the system would be taken out and sent back for regrinding. From the buddle the tin is finally concentrated in the bank of kieves. The kieves in the mill are not the originals, but the automatic stirring and packing mechanism above them is still in situ. The output from the kieves was the final black tin concentrate, now a saleable product to the smelter.

As well as the mill, King Edward Mine contains other machinery awaiting restoration; currently work is progressing on the erection of a vertical steam engine, which drove, via overhead shafting, machinery at the world famous Holman Brothers factory in Camborne. There is also a 1930s pattern froth flotation cell, and other potential projects.

Elsewhere on site are the parts of a rare surviving Cornish beam engine. The Rostowrack engine was designed by William West and built at his St Blazey Foundry in 1851, the only surviving engine from this maker. It was put to work at a china clay works near Bugle and then in 1861 moved to Rostowrack where it worked for 91 years. It is a rotative engine with a 22in single acting cylinder and was used for pumping via a bell crank and flat rods. The Shell Film Unit filmed it just before it ceased work. Then owners, the Goonvean & Rostowrack China Clay Co., presented it to the Cornish Engines Preservation Society and it was reerected in the Holman Museum, Camborne in 1953, where it could be run on compressed air. Sadly, on the closure of Holman's museum in the 1970s, the engine was dismantled and has remained so ever since. Another long-term project is the erection of this engine, which will, of course, also involve the renovation of the original 1868 winder house.

In addition to the areas of King Edward Mine currently open to the public, there are other historic structures on the site. Among these are the 1860s count house or mine office, the School of Mines survey office, carpenters' and blacksmiths' shops, the original miners 'dry' or change house and a cobbled 'spalling' floor, also dating from 1860, where copper ore was broken up for further treatment.

East Pool



The National Trust Cornish Engines facility occupies the site of East Pool Mine. East Pool, a very rich mine, can trace its history right back to the eighteenth century as a copper mine. It was restarted in 1835, again for copper, but by the 1860s tin had become the main product. In 1895 East Pool amalgamated with neighbouring Wheal Agar to become East Pool & Agar Limited. East Pool was predominantly to the south of the old A30 with Agar to the north. East Pool was a prosperous mine whereas Wheal Agar often struggled.

In 1921 a disastrous underground collapse at East Pool rendered much of the mine unworkable. Nothing daunted, the management sunk a new shaft, Taylor's, adjacent to the Wheal Agar part of the mine. East Pool continued to work until 1945, latterly sustained by government subsidy; when this was withdrawn the mine closed though pumping at Taylor's continued until 1954 protect Shaft to neighbouring South Crofty. East Pool is now part of the very large South Crofty operation.

Highlights of a visit to East Pool are the two preserved Cornish engines. At Michell's Shaft, East Pool is a 30" double acting beam winding engine from Holman Brothers of Camborne, a late example of the type. This was made redundant by the 1921 collapse but was preserved in its house and passed to the Cornish Engines Preservation Society and thence, via the Trevithick Society, to the National Trust. It is operated by a concealed electric motor. The adjacent boiler house is a reconstruction with a boiler similar to the original.



At Taylor 's Shaft in a house dating from 1923 is a 90" beam pumping engine from Harvey & Co. of Hayle. Built in 1893 for the nearby Cam Brea Mines, the engine was stopped in 1914 and purchased ten years later by East Pool for their new shaft. She was the last big engine built by Harvey at Hayle and worked until 1954. Her preservation was due to her purchase by an American steam enthusiast, Mr Greville Bathe, and donated to the care of the Cornish Engines Preservation Society. The National Trust, and formerly the Trevithick Trust, has created a major display of Cornish mining history in the ancillary buildings around Taylor's Shaft, with most of the artefacts on display belonging to the Trevithick Society (the Trevithick Trust was created in 1993 by Cornwall County Council, the Cornish District Councils and the Trevithick Society, the latter providing specialist knowledge). These buildings contained all the other shaft equipment, a horizontal winding engine by Holman and a steam capstan by Harvey but they were wantonly scrapped in 1974. The stack at Taylor's is a notably fine one, bearing the initials of the company EPAL, also the trademark of the company's arsenic output.

Thursday 10th May

Porthcurno



The Telegraph Museum occupies the site of the Porthcurno Telegraph Station and the Cable & Wireless training facility. In 1870 the telegraph cable to India was brought ashore at Porthcurno instead of at Falmouth as originally planned. The absence of rocks in the sandy cove and the fact there was no local fishing activity drove the choice. The four companies, which had laid the Bombay cable soon merged in 1872 to form the Eastern Telegraph Company and as this

company developed its network, Porthcurno, "PK", was to be its major station; in fact, it was the largest cable station in the world. At its zenith 14 cables came into Porthcurno from such points as Lisbon, Vigo, Gibraltar, Madeira, Newfoundland and Valentia. These cables went on to New Zealand, Australia, Malaya and Singapore.

At the beginning of the twentieth century Porthcurno sat at the heart of a world wide network but in 1902 Marconi sent a wireless message across the Atlantic from Poldhu on the Lizard to Newfoundland. Despite the cable companies' protestations that they did not fear this competition, they built a mast on the cliffs near Porthcurno to eavesdrop on, and possibly interfere with, Marconi's transmissions. Its base can still be seen.



The importance of submarine cables became apparent during World War 1, as their traffic cannot be intercepted. The Royal Navy found and cut all German cables, leaving the Germans dependent on neutral cables, which passed through the UK! By the 1920s cable traffic was falling and in 1928 the Eastern Telegraph Co. and the Marconi network merged to form Imperial and International Communications Ltd. This in turn became Cable & Wireless in 1934.

During World War II Porthcurno was

regarded as a key strategic site. Underground tunnels, driven by miners loaned by Geevor Tin Mine into the cliff behind the cable station, housed all of its equipment to safeguard it from bombing. The tunnels were bomb proof and airconditioned. In addition the cove and surrounding cliffs were fortified with pillboxes and pipes were laid across the beach, which could be flooded with petrol and set alight in the event of an amphibious landing. The Defence of Britain Project lists no fewer than 13 pillboxes of various types at Porthcurno, an astonishing number for this relatively isolated cove. One pillbox, alas no longer extant, served for many years as the box office for the Minack Open Air Theatre.

After the war Cable & Wireless was nationalised and its activities confined to overseas with the Post Office taking over all UK operations. Porthcurno was the sole exception to this, remaining with Cable & Wireless and becoming its main training facility. The last telegraph cable was brought ashore in 1952 but in 1970 the final telegraph activity took place. The training college remained open until 1993 and the Museum of Submarine Telegraphy opened in 1997, largely manned by former members of staff. The main building houses displays, which tell the story of submarine telegraphy. The wartime tunnels contain the museum's collection of equipment and explain the technology, while at the top of the beach the Cable Hut contains the terminations of the network of cables.

The Wayside Museum, Zennor



Zennor and the surrounding area, well known for their dramatic scenery, were heavily populated from c3000 BC and are consequently rich in archaeological sites and remains. The small fields that form a patchwork design on the landscape with their stone 'hedges' date back in many cases to the Bronze Age and are now considered to form part of one of the oldest working landscapes in the world.

In 1935 Colonel Frederick Hirst, an amateur archaeologist, started collecting agricultural and other implements and relics peculiar to this area and displayed them ' along the wayside' adjacent to the miller 's cottage at Trewey Mill. They were then moved into the grounds of the property where they have remained ever since, forming what is now the internationally renowned Wayside Museum and Trewey Mill. Deceptively small from the outside, the museum houses an extensive collection of over 5000 artefacts which reflect the lives of the people who have lived and worked in this ancient landscape dating from 3000 BC to the 1960s.

Housed in twelve themed undercover areas, The Wayside has a unique setting within the garden of a 16th century miller's cottage and fully working granite water mill - Trewey Mill. There is something to interest everyone: agriculture, domestic life, people of past Zennor, mining, archaeology, quarrying, blacksmiths forge, shipwrecks, schoolroom, dairy and fishing. What makes this museum so interesting and different from others are the detailed stories and descriptions enabling visitors to not only experience how items were used, but to gain a rare insight into the lives of the people who used them and unlike most museums many of the artefacts are in their natural surroundings.

Trewey Watermill

Trewey Watermill is situated within the grounds of the Wayside Museum and is a grist mill which was painstakingly restored and repaired by the present owners during 2009-10.

The mill has two sets of original granite millstones, rare in milling terms, as most are either made of French burrstone or Derbyshire grit. Trewey Mill is one of only two fully working watermills grinding corn in Cornwall today. Research shows that a mill existed here as far back as 1513 or earlier, and although the present mill dates from the mid-1800s, there are many unusual features which are characteristic and unique to Zennor.

As the only remaining mill in Zennor (there were once four on this stretch of river to the sea), Trewey Mill, last worked 150 years ago is now capable of producing a good quality stoneground wholemeal flour. Visitors to the mill and museum can view the new 12 ft waterwhee1 and impressive restored 19th century gearing machinery made by Harvey's of Hayle and which operates daily. Milling demonstrations also take place.

Now that the mill is fully operational it forms an important feature of Cornwall's heritage as well as a practical educational resource. The mill building, also houses a collection of early wooden ploughs and agricultural implements on the upper floor.

St Ives

St Ives lies on the north coast of Cornwall to the west of Camborne.

From medieval times St Ives was the most important fishing port on the north coast but is now better known as a holiday resort and, since the 1920s, as an artists retreat. The pier was built by John Smeaton in 1767-70 but was lengthened at a later date. The octagonal lookout with a cupola belongs to Smeaton's design.

In the decade 1747–1756 the total number of pilchards dispatched from the four principal Cornish ports of Falmouth, Fowey, Penzance and St Ives averaged 30,000 hogsheads annually (making a total of 900 million fish). Much greater catches were achieved in 1790 and 1796. In 1847 the exports of pilchards from Cornwall amounted to 40,883 hogsheads or 122 million fish while the greatest number ever taken in one seine was 5,600 hogsheads at St Ives in 1868.

Seining, the usual method of fishing here, was carried on by a set of three boats of different sizes, the largest two carrying seine nets of different sizes. The total number of crew was 17 or 18. However this came to an end in 1924. The bulk of the catch was exported to Italy: for example in 1830 6,400 hogsheads were sent to Mediterranean ports. From 1829 to 1838 the yearly average for this trade was 9,000 hogsheads.

Modern St Ives came with the railway in 1877, the St Ives Bay branch line from St Erth, part of the Great Western Railway. With it came a new generation of Victorian seaside holidaymakers. Much of the town was built during the latter part of the 19th century. The railway, which winds along the cliffs and bays, was orginally listed to be a victim of the Beeching axe but somehow survived and has become a tourist attraction in itself.

Bernard Leach and Shoji Hamada set up the Leach Pottery in St. Ives in 1920. Leach was a studio potter and art teacher. Sometimes known as the "Father of British studio pottery" he learned pottery under the direction of Shigekichi Urano in Japan where he also met Shoji Hamada. The two promoted pottery as a combination of Western and Eastern arts and philosophies.



Leach continued to produce work until 1972, and the Victoria and Albert Museum held a major exhibition of his work in 1977. The Leach Pottery is still operational and houses a small museum showcasing work by Leach and his students.

In 1928, the Cornish artist Alfred Wallis and his friends Ben Nicholson and Christopher Wood met at St Ives and laid the foundation for the artists' colony of today. In 1939, Ben Nicholson, Barbara Hepworth and Naum Gabo settled in St Ives, attracted by its quiet beauty.

Prior to the 1940s the majority of artists in St Ives and elsewhere in West Cornwall belonged to the St Ives Society of Artists; however events in the late 1940s led to a growing dispute

between the abstract and figurative artists within the group. In 1948 the abstract faction broke away from the St Ives Society, forming the Penwith Society of Artists led by Barbara Hepworth and Ben Nicholson.

In 1993, a branch of the Tate Gallery, the Tate St Ives, opened here. The Tate also looks after the Barbara Hepworth Museum and her sculpture garden.

The town also attracted artists from overseas, such as Piet Mondrian, who let the landscape influence their work, and Maurice Sumray, who became a successful and respected contributor to the St Ives art scene when he moved to the town from London in 1968.



Friday 11th May

Falmouth Docks

Carrick Roads, the estuary of the River Fal on which Falmouth stands, is one of the most extensive natural harbours in the world and one of the deepest in western Europe. The current Falmouth Docks complex dates from the mid nineteenth century and was begun under Parliamentary powers obtained in 1859. A site of 150 acres was obtained under Pendennis Head and by 1863 the Eastern and Western Breakwaters and two dry docks were in operation by the Falmouth Docks Company. In 1868 Cox & Co, a ship repairing business already operating in Falmouth moved to the Docks area.

In 1914-18 the business came under Admiralty control and work began on a third dry dock. After the war the Docks Company and the ship repair operation, by now Silley, Cox & Co came under the control of a London company R. & H. Green and Silley Weir, Ltd. They built a fourth dry dock and greatly extended the wharves and repair shops.

Falmouth was a key port during the Second World War, repairing, converting and fitting out a stream of vessels; it was also a major embarkation point for the Normandy landings. Post war the County and Duchy Wharves were completed in 1958 and the rebuilding and extension of No. 2 Dry Dock, now Queen Elizabeth Dock, followed. This dock is 850' long and 130' wide. By 1974 the docks had passed to the P. & O. Group.

The docks have never handled cargo as such, being a ship repairing and bunkering facility. The long term anchorage, further up the Fal at King Harry Ferry, which sees ships laid up in hard times, comes under the control of theTruro CorporationHarbourmaster.

The docks were rail connected from an early date, initially by broad gauge and from 1892 by standard gauge. Locomotive No. 3a Hawthorn Leslie 0-4-0 ST of 1926 now runs on the Mid-Suffolk LightRailway.

Bodmin & Wenford Railway



[On this occasion we will unfortunately not be able to experience a trip on the railway but we will be given a specially arranged tour including visits to the signal box, workshops, engine shed and the station buildings]

Bodmin and its vicinity has quite a complex railway history. The Bodmin & Wadebridge Railway opened in 1834 using steam power from the outset. It ran from Wadebridge to Wenford Bridge with branches to Bodmin and Ruthern. The B & W in its early days relied to an extent on canal practice. Thus its intermediate goods sidings were referred to as 'wharves' each with a wharfinger in charge. In 1845 the line was acquired, quite illegally, by the London and South Western Railway but remained an isolated outpost of that company's system until the North Cornwall line reached Wadebridge in 1895. Meanwhile the Cornwall Railway main line had avoided Bodmin by opening a station at Bodmin Road, some miles distant in 1859. It was 1887 before a steeply graded branch was opened from Bodmin Road to the town. The branch had its own terminus in Bodmin, known latterly as Bodmin General. The following year a line to Boscarne Junction linked the branch to the former Bodmin & Wadebridge system. That had its own station in Bodmin, Bodmin North, now demolished for road improvements. All passenger traffic ceased in 1967 and freight in 1983 with china clay traffic from the dries at Wenford being the final workings. The Wenford Branch achieved legendary status among railway enthusiasts due to the survival there of three 1874 L&SWR 2-4-0 Beattie well tanks until the 1960s. Their short wheelbase and low axle loadings made them ideal for this early mineral line. Two of the three are preserved.

In 1984 the Bodmin Railway Preservation Society was formed, and they held their first open day at Bodmin general two years later. 1987 saw the Cornish Steam Locomotive Society move their equipment from Bugle to Bodmin. A Light Railway Order was granted in 1989 and the following year passenger services recommenced between Bodmin General and Bodmin Road, although by now that station had been renamed 'Bodmin Parkway'. A new intermediate station known as Colesloggett Halt was brought into use. In 1996 the former junction line was also reopened, with another new station provided as Boscarne Junction.

The stations served are all in or near Bodmin. They are Bodmin Parkway, Colesloggett Halt, Bodmin General and Boscarne Junction.

The Bodmin & Wenford Railway is now established at Bodmin General and runs trains approximately three miles to Bodmin Parkway (formerly Bodmin Road) in one direction and three miles to Boscarne Junction in the other.

The Cornish Steam Locomotive Preservation Society was formed in 1974 to preserve mainly industrial locos. The society is based at Bodmin General station on the Bodmin & Wenford Railway and has a number of locomotives in its care. An open day was held at Par within months of the organisation being formed. In 1977 the CSLPS moved to Bugle and started the Bugle Steam Railway. In the early 1980s the British Rail branch from Bodmin Parkway to Bodmin General was finally closed and a group of interested people started the Bodmin & Wenford Railway. The CSLPS moved to Bodmin General in 1986 and provided the locomotives for the infant railway.

As well as the steam locomotives the Society also has the care of a number of wagons including a Mink, a mineral wagon and a fruit van.

Saturday 12th May

Finch Foundry



Set amid beautiful Dartmoor countryside in the village of Sticklepath, near Okehampton, Devon, this last remaining water-powered forge in England gives a unique insight into village life in the 19th century. It contains examples of a tilt hammer, drop hammer, and shear hammer all powered by water wheels.

The foundry produced agricultural and mining hand tools including sickles, scythes and shovels but, as the edge tool business grew, Finch Bros expanded into providing carts, gates and even coffins. You will see a large variety of edge tools made at the foundry along with a display of tools used by the Finch wheelwrights and carpenters in the carpenters shop, adjoining the grinding shop.

In its heyday it made 400 tools a day and was active until 1960. It has been a National Trust property since 1994.