

GUNPOWDER MILLS STUDY GROUPNewsletter No. 2October 1986WEEKEND MEETING IN W LONDON - SATURDAY 11th - SUNDAY 12th OCTOBER, 1986

At the meeting in June, it was decided to have our next meeting in London at Gunnersbury Park Museum, to include, if enough people were interested, a tour of the extensive remains of the Hounslow and Bedfont mills.

The programme has now been arranged and is included separately with this Newsletter. Please complete the attached form and return to Phil Philo, Gunnersbury Park Museum, Gunnersbury Park, London W3 8LD as soon as possible so that final arrangements and accommodation, as required, can be made.

PROPOSED MEETING IN CORNWALL, MAY 15th - 17th, 1987

It was proposed at our meeting in June that a weekend visit to Cornwall be arranged at about the same time next year, to see the Kennall Vale site and other places of interest. Enquiries are now being made of the Cornwall Trust for Rescue Archaeology, who have been working on the Kennall Vale site.

The preferred date is May 15 - 17, 1987. It is hoped to have some definite news by the time of the meeting in October.

EXPLOSIONS AT GUNPOWDER MILLS

A list of the 'Special Reports by H M Inspector of Explosives' from August 1871 to October 1905 has been compiled by Wesley Harry. The list comprises 182 entries and fills some 13 pages typed on A4 size. Photo-copies of individual reports are available at a suggested cost of 50p from:  
 ✓ Wesley Harry, Royal Arsenal Historian, DGDQA, Royal Arsenal East, Woolwich, London SE18 6TD.

A list of explosions in British gunpowder mills as reported in 'The Times' between 1790 and 1850 has been compiled by Rowland Baker.

This gives the date the report was published together with the relevant page and column in which the report will be found.

These lists will be available for inspection at the meeting in October.

The Group held a most successful meeting in South Wales on the weekend of 6-8 June, based at the Aberdulais Falls National Trust Centre. Twenty-one members and guests attended the meeting, which was a special version of the Centre's standard Industrial Heritage Weekend, arranged to include an extended visit to the Glynneath gunpowder mills site at Pontneddfechan.

An introductory lecture on the early industrial background of the region was given on the Friday evening by Richard Keene of the Welsh Industrial and Maritime Museum in Cardiff. On the Saturday morning the group visited Aberdulais Basin at the junction of the Neath and Tennant canals and Aberdulais Falls, which was the site of copper smelting, corn milling, iron working and tinplate manufacture and was a favourite subject of artists in the late 18th and early 19th centuries. Those who came will be interested to know that an article on the history and archaeology of Aberdulais Falls, by Richard Hayman, appears in the Spring 1986 issue of The Industrial Archaeology Review (Vol 8, No 2, pp 147-165).

On the Saturday afternoon a tour of the gunpowder site was led by Tom Pritchard, a former employee at the works, and Sidney Johnson, who are co-authors with Jack Evans of the book 'The Old Gunpowder Factory at Glynneath', published by the Merthyr Tydfil and District Naturalists' Society in 1985.

A striking feature of the site is the leat which served the waterwheels, and later water turbines, which was carried across the River Mellte by three aqueducts, the last of which was unfortunately demolished by the army when practising for the Falklands war. At the lower end of the site is a row of foundations of bottom-driven incorporating mills. There are more substantial remains of buildings higher up the valley including those of corning and glazing houses, stoves and magazines. It is encouraging to read in the recent Brecon Beacons National Park Newsletter (No 40) that representatives of the Forestry Commission, the National Park Service and the Neath Development Partnership have agreed that a major effort should be made to preserve the most important features of both the gunpowder works and of the nearby Dinas silica mines.

After the tour of the site we viewed Tom Pritchard's collection of artefacts and the models he has made for demonstration purposes of an incorporating mill, a press and a set of glazing barrels. When we left he presented us with a barrel stencil with the words "W H WAKEFIELD & Co Ltd / GUNPOWDER / KENDAL / F O" and I am in touch with the Abbot Hall Museum in Kendal about this.

On the Saturday evening Rick Pool of the National Trust Centre gave a general talk on the industrial history of the area with particular reference to quarrying and the use of black powder and Arthur Thomas, a former coal-miner now at the Cefn Coed Mining Museum, gave a very entertaining account of his experiences, including using up stocks of black powder, as an employee in a small privately owned mine.

A business meeting followed by members' contributions occupied the Sunday morning. The first talk was given by Colin Rynne of University College, Cork, on recent archaeological work at Ballincollig. Kenneth Major then spoke about horse mills and Wesley Harry showed coloured photographic reproductions of 18th century prints of Woolwich Arsenal held by the National Maritime Museum. Peter Clarke showed aerial photographs of Chilworth, Surrey, taken using a novel hydrogen-filled balloon, John Upton reported on recent garden construction work on the site of the House Mills at Battle, Sussex, Sidney Johnson showed slides of the Glynneath site and George Kelleher commented on mills in Ireland, South Wales and Yorkshire. Brenda Buchanan suggested several projects for further research, which are the subject of a separate article in this Newsletter.

A document in the Surrey Record Office (SRO 212/9/3) gives details of the sale in 1661 of Carshalton gunpowder mill by Bartholomew and Lewis Fossan to Josias Dewye. Previously there had been a gap in our knowledge of the ownership of the mills between the Fossans in 1657 and Dewye in 1692. Also it is clear from the deed that part of the site lay in the neighbouring parishes of Beddington and Wallington. Of greater interest however is the associated inventory of the contents of the mill buildings including the stove house, corning house, stable, boiling house, watch house, three trough mills, kitchen, hall, chamber over the hall, and house. The name 'trough mill' is new to me and I find it difficult to decide whether it means a pestle mill or an edge runner mill. These mills contained troughs (and broken troughs), copper scrapers, a round beam with cheeks and rails and locks and keys. The stove had a fire fork, a coal rake, a pair of bellows, a shovel and a lantern but also 115 sieves and 2 locks and keys. The corning house contained a beam and scales, a set of weights, dry dusters, a splintersieve, dishes, tubs and bins, three pair of corn...(?) and a lock and key. The boiling house had a horse mill, 4 bins, 3 half vats, 21 tubs, 3 pails, a copper, 3 skimmers, a ladle, a fire fork, a coal rake, 4 copper pans, 18 brass pans, a beam and scales, a set of weights, 4 shovels and 3 locks and keys. The chamber had a bed, a bolster, a rug, a blanket, a bedstead, a table, a form, a lock and key and a lock without a key! I can provide a complete transcript to anyone interested.

I am indebted to Mr C S Sampson of the Croydon Natural History and Scientific Society for bringing this document to my attention.

#### RECENT PUBLICATIONS

The Industrial Archaeology Review, Volume 8, Number 2, Spring 1986, contains a short article on gunpowder and an article which is not on this subject but is relevant to the weekend visit to South Wales in June:

HAYMAN, Richard. Aberdulais Falls. pp 147-165

✓ PATTERSON, E M. A gunpowder vocabulary. pp 215-6

NOCK, O S. Railway Archaeology. Patrick Stephens, 1981, Appendix 2, pp 187-9 This contains a graphic description of a blasting operation carried out in 1843, in constructing the railway line near Folkestone in Kent between Abbot's Cliff and Shakespeare's Cliff and through the obstruction of Round Down Cliff, in which 18,500 lbs of powder were used.

Journal of the Ballincollig Community School Local History Society, 1986 40pps. pp 1-26 on the powder mills. Obtainable from: Dermot Lucey, Ballincollig Community School, Ballincollig, Co Cork, Eire.

#### KENNALL VALE GUNPOWDER WORKS

Bryan Earl

A well presented report by John R Smith on the Kennall Vale gunpowder works in Cornwall, has been produced by the Cornwall Trust for Nature Conservation.

This is the outcome of a detailed survey which was made following the increase in appreciation of gunpowder to the industrial development of Britain, and the value of the site as a nature reserve. Plans and reports covering the evolution of the works are presented, along with reproductions of Special Reports of Her Majesty's Inspectors of Explosives.

Altogether the publication is an example of how a site can be investigated and a foundation laid to enable it to be 'saved' - both from the Industrial Archaeology and natural history viewpoints.

✓ Information on the report can be obtained from: The Cornwall Committee for Archaeology, Rooms 2-4 Old County Hall, Station Road, Truro, Cornwall, TR1 3EX

The weekend meeting of the Gunpowder Mills Study Group at Neath in June 1986 provided an opportunity to raise some problems about the ingredients, process, and purpose of powder making. It is hoped that a wider circulation of these questions will help further towards their solution. All advice is welcome.

First there is the matter of the recipes used in the making of gunpowder. Contemporary documents show that in the Bristol region in the mid-eighteenth century the favoured proportions were: saltpetre 65%, sulphur 17.5%, charcoal 17.5%, although now the mix that was most widely used is quoted as: saltpetre 75%, sulphur 10%, charcoal 15%. Discussion at Neath confirmed the suitability of the former for blasting powder and of the latter for artillery use, but showed that there was a great range of formulae in use at different times for different purposes. However this does not solve the problem completely, for although the suitability of the Bristol powder for blasting was shown by its use in the mines of north Somerset from the 1680's and in Cornwall and South Wales in the course of the next century, it was not limited to this purpose. It also found a market amongst the merchants of Bristol, especially those engaged in the slave trade by whom it was sent as a barter good on ships sailing for the west coast of Africa. References to 'Guinea powder' in the Bristol records were at first thought to be only a geographical indicator, but a recent reading of an encyclopaedia of the 1820's suggests that the term may have had a more general significance as a description of an inferior commercial powder. As an economy this was made with a low nitre content which had the additional effect of producing a commodity suitable for use in mining as well as in trade. Although very different from the official Government standard, the Bristol recipe may thus have been well-suited to two separate commercial markets.

In the second half of the eighteenth century these mills were supplied with charcoal from local landowners, and sulphur from the merchants of Bristol and London. More controversially, the records reveal years when the saltpetre imports came not from India, the traditional and naturally-occurring source since the early seventeenth century, but from the Baltic. These cargoes were insured, and in 1758 the partners of the Woolley works received the sum of £180 for damage to the petre shipped from Danzig in the 'Time and Fortune'. In the following year insurance was taken out on a similar cargo from the same port, but this time shipped in the 'Seventh Son'. An inventory of 1759 lists 41 casks of saltpetre from Danzig at the warehouse in Bristol, but in 1760 supplies were still aboard the 'Henrietta Constantia' carrying 22 casks from Danzig. It was common practice to include within the inventory a note of any saltpetre still on board ship, but the additional information of the port from which the vessel had sailed was only given in the late 1750's and early 1760's. The possibility that a Danzig-owned fleet of carriers was employed in transporting this raw material from its true source in India can be discounted, both because of the wording in the documents, and because of the continuing association these vessels had with Bristol. Recent enquiries have now revealed that in the sixteenth century saltpetre was imported from Poland on a considerable scale. The problem has thus now changed from the simple one which puzzled the Neath meeting, of the likelihood of this commodity coming from the Baltic, to the more complicated question of the stages by which supplies from India replaced those from northern Europe, and of the circumstances in which this trade could be revived despite the controls of the East India Company. On a more practical point, the arrival of ships so late in the season that supplies were often still at sea at the annual reckoning suggests that the timing of these voyages was determined by circumstances beyond the control of merchants, such as the limited period within which ships could

operate in northern waters. These same climatic conditions also make it seem unlikely that saltpetre would occur naturally in a region so different from India with its heat, and seasonal alterations of wet and dry. Supplies from Danzig were therefore produced artificially, from decaying nitrogenous matter. The high value of these cargoes would have given such procedures a continuing importance on this northern rim of Europe.

The process by which these ingredients were incorporated presents further problems. Evidence for the Woolley mills, founded in the 1720's, indicates incorporation by a water-powered grinding of the raw materials under edge runners or rollers. But in an article entitled 'Black Powder Manufacture' in the American Journal of the Society for Industrial Archaeology, Vol 1, No 1 (1975), Robert Howard has concluded that by the mid-eighteenth century grinding was "an acceptable alternative to stamping, but was not widely used until the introduction of the press" which he placed in the last two decades of the century. Was the Bristol region in the forefront of technical change in this matter, perhaps because the circumstances of its development in the early eighteenth century allowed for the adoption of techniques which could not be so quickly taken up in longer-established areas? Or was the move from stamping to grinding taking place more rapidly than was judged by Howard?

The question of uses to which gunpowder was put is an important one, and the range of outlets for this product in the Bristol region should not be allowed to obscure the general problem of its late adoption for civil purposes relative to its military functions. In an interesting contribution to the tenth volume of the History of Technology (1985) entitled 'Gunpowder and Mining in Sixteenth and Seventeenth Century Europe', G J Hollister-Short has examined in detail the available evidence and concluded that powder was first used for blasting by Caspar Weindl at Schemnitz in Slovakia in 1627. From here the innovation spread through western Europe, being described in English journals of the mid-1660's, and employed for the first time at the Ecton copper mines between 1665 and 1680, the traditional date being 1670. By the 1680's it was in use in widely separate parts of the country, including the Mendip lead mines. But gunpowder had been used by military engineers from the 1440's, so why was its use in mining established so relatively late? Hollister-Short describes the military use of gunpowder to undermine fortifications, level mountains and deepen rivers, as operations involving large quantities and causing great devastation, so that the more controlled and specific use of powder in mining may have grown from experience with guns, rather than from military engineering. But although the conceptual problem is thus neatly summed up in the challenge to the miner of seeing the analogy between the shot-hole bored at the rock face and the barrel of a gun, this explanation of the difficulty does not adequately explain the extent of the delay.

Finally, it is ironic that this practical demonstration of the usefulness of gunpowder for civil purposes should have come too late to save its reputation. In the sixteenth century it had been linked with printing and the compass as the three symbols of progress, but the claims that gunpowder would deter war and diminish casualties came to seem increasingly unsatisfactory, just as the idea that it mimicked thunder and lightning in order to demonstrate God's power on earth began to appear irrational in an age of reason. Perhaps also its more elevated earlier reputation was harmed by association with that other trilogy in which its notorious associates were 'treason and plot'. Gunpowder continued to be cited as a valuable achievement, but from the mid-seventeenth century it was being demoted from its place in the pantheon of progress, just as its role in mining was being developed. The contribution of gunpowder to society through its role in civil construction and mining was thus underestimated by contemporaries, as it has continued to be unappreciated by historians.

## RAILWAY GUNPOWDER WAGONS

Alan Crocker

After I gave a talk on Gunpowder Mills at Leatherhead recently a member of the audience, Ted Crawforth, talked to me about Southern Region pre-grouping gunpowder wagons. He subsequently sent me a list of these together with associated measured drawings. There were 13 London & South Western Railway, 23 South Eastern & Chatham Railway and 4 London, Brighton & South Coast Railway wagons built between 1888 and 1913 and all but 5 were withdrawn between 1946 and 1958. One 1912 LSWR wagon, built by G.R. Turner at Nottingham, was in use until 1980 and is now awaiting restoration at the National Railway Museum, York. The body of a 1904 wagon is at Tenterden in Kent. They were intended to carry a load of 7 tons.

I was interested in the earliest date of 1888 for some of these wagons as it was then that the Chilworth gunpowder site was linked by tramway to the local railway station. I therefore wondered whether it was illegal to transport powder by rail before 1888. Ted Crawforth could not help so I contacted Graham Boyes of the Railway & Canal Historical Society who is also Regional Freight Manager at Waterloo Station. He could not help either but drew my attention to a series of books by G Bixley, A Blackburn, R Chorley, M. King and J Newton entitled 'An Illustrated History of Southern Wagons', Oxford Publishing Co. Volume 1 appeared in 1984 and has a 1948 photograph of a 1904 LSWR gunpowder van. It states that this was very similar to the Great Western Railway 'iron mink' design and that before 1923 it is possible that red iron oxide paint was used on these vans. Also during the First World War 103 ordinary covered wagons were converted to become temporary gunpowder vans. In addition it reveals that the one which survives at York was transferred in 1956 to the Scottish Region. It would be interesting to know whether it was still being used for gunpowder!

Then in July on a television programme on steam railways presented by Miles Kington a gunpowder van was featured being shunted at Highley Station on the Severn Valley Railway. I wonder whether this was a GWR 'iron mink'? Finally two years ago I saw a decaying gunpowder van, painted red, at the Lowwood gunpowder site in Cumbria. This has been recorded by Michael Davies-Sheil and is illustrated in The Lake District at Work, Past and Present by J D Marshall and M Davies Sheil, David & Charles, 1971.

Research on transport of gunpowder clearly falls within the Group's area of interest. Personally I have little knowledge of railways and am unlikely to pursue this topic further. However I hope the above notes will stimulate others to take up the study. Please contact me if you would like copies of the detailed information I have acquired.

## WORSBOROUGH DALE, SOUTH YORKSHIRE

Glenys Crocker

Newsletter 1 contained some short notes about these mills near Barnsley which are now under the spoil heaps of Barrow Colliery. Martin Watts (see Slope Reels) has sent some further information. He was formerly curator of Worsborough Mill Museum, Worsborough, Barnsley, S Yorks (corn milling) and recalls seeing a brochure, probably of the 1920's when the powder works were run by Kynoch Ltd, containing photographs of the buildings. This was either in the South Yorkshire County Record Office or in Sheffield City Reference Library. He has also sent me a photocopy of a woodcut of the powder mills which he has received from the present curator of Worsborough Mill Museum, Robert Higginson. This is labelled 'Black Gunpowder Works, Worsboro' Dale' and is undated and the source is not yet known. It shows a bird's eye view of an extensive wooded factory site in an industrial landscape with a tall chimney stack and what look like stacks of wood for charcoal in the foreground. The buildings seem unusually close together. The photocopy is rather grainy and indistinct so it would be well worth seeing the original (Worsborough Mill Museum Ref. Coll./APT 86).