

**Gunpowder & Explosives History Group**

**Newsletter 8, Spring 2004**

**GEHG SPRING MEETING**

Friday, 7<sup>th</sup> May 2004

Royal Gunpowder Mills, Waltham Abbey, Essex

- 10.15 Meet in the Saltpetre House where coffee, tea, and biscuits will be served.
- 10.45 Brenda Buchanan, *The production of saltpetre in England and India*
- 11.35 Wayne Cocroft, *Saltpetre production at the Royal Gunpowder Mills*
- 12.10 Kenneth Major, *The Fairbairn water wheel at Waltham Abbey*
- 12.45 Lunch Time, Tea and coffee will be served, but bring sandwiches to allow time for site visits. Wayne Cocroft will lead a party round the southern end of the site, and Ken Major will undertake a northern tour. The on-site exhibition may also be visited.
- 14.15 Robert Smith (Royal Armouries) *Early gunpowder: an experimental approach*
- 15.00 John Edmonds (Chiltern Open Air Museum) *Reproducing a mid-19<sup>th</sup> century confederate nitre bed*
- 15.30 General Discussion
- 16.00 Tea. Meeting concludes

The meeting will be held at the Waltham Abbey Royal Gunpowder Mills, Powdermill Lane, Waltham Abbey, Essex, EN9 1BN. If you are travelling by car follow the signs for Waltham Abbey from junction 25 or 26 of the M25 or the A10, the Royal Gunpowder Mills are signposted as you approach Waltham Abbey. Parking is free. By public transport take a train from London, Liverpool Street to Waltham Cross, the gunpowder mills are then about a 20 minute walk from the station, or alternatively take a bus or a taxi firm, there is usually a taxi rank at the station. Members are advised to bring a packed lunch as the café facilities are often limited. The exhibition may be viewed before the lectures or at lunchtime. A short video presentation on explosives will be shown several times during the lunch break.

## AUTUMN 2003 MEETING AT THE RNCF, HOLTON HEATH



*RNCF Holton Heath, the main administration buildings, courtesy of the RNCFA*

This meeting took members of the GEHG into the heart of the Dorset countryside on 1 November 2003, an autumn day of sunshine and colour. After a tour of the site, we could understand the view of one of our colleagues that the visit was worthwhile for the trees alone – but we were also under no illusions about the historical and strategic importance of the heathland estate. The decision to establish the RNCF at Holton Heath had been made in the early weeks of the First World War, on the initiative of the First Lord of the Admiralty Winston Churchill. The aim was to produce a high quality propellant for the Navy, and the establishment remained in commission for this purpose until 1957, with research on naval materials continuing until 1997. Since then, in a pattern with which we have become so familiar, the site has been subject to development plans. Access to some of the surviving buildings and grounds has been made available to a group of volunteers in the RNCF Association, and they are committed to keeping alive some sense of the spirit and significance of the place. They were our hosts at Holton Heath.

We are very grateful to the members of the Association for giving up such a fine Saturday to make our visit possible. They manned the impressive gates guarding the entrance to the site, heated up the otherwise very chilly meeting facilities, provided refreshments at intervals during the day, and even more importantly, talked to us about the site and led our tour of the grounds and museum. The Chairman of the Association Dr Bob Dukes, and colleagues Bob Honeybun and Peter Taylor, deserve a special word of thanks. It should also be mentioned that Holton Heath is well-served by the volume written by M R Bowditch and L Hayward entitled *A Pictorial*

*Record of the Royal Naval Cordite Factory, Holton Heath* (Finial Publishing, 1996). The book does indeed contain many pictures and plans, but is also more of a history than the title would suggest.

Bob Dukes gave us the essential introduction to the complicated site and processes at Holton Heath. Extruded in cords, like spaghetti, hence its name, cordite was tailored to meet the Navy's need for a high quality product that would provide an accurate propellant for shells at distances of up to 20 miles. It was essentially a combination of nitroglycerine and guncotton, with mineral jelly or acetone to aid the mixing process. The variations in proportions resulted in a number of different types: Cordite MD, made in WWI; Cordite SC, with a higher nitroglycerine content; and Flashless Cordite NF, involving picrite. The stages of manufacture hark back in their names to those used in the making of gunpowder, with which most of us are more familiar. They include: incorporation, rolling, hydraulic pressing, shaping, in this case into cords rather than grains, and a blending of the batches into a product tailored to meet the Navy's requirements.

An aspect of the subject that is easily overlooked is the importance of such large establishments (covering here c.500 acres), not only to the defence industry but also to the economy of the area in which they were located. During the Second World War some 5,000 people were engaged in continuous production at Holton Heath, with others employed in such ancillary work as keeping supplies of gas, steam and electricity going and operating the road, rail, and sea transport network. Even in peacetime Holton Heath remained a major employer in an otherwise rural area. The great explosion in the nitroglycerine section in 1931 (see fig.2), when 30 workmen suffered death or injury, was a reminder of the dangers involved, and their likely impact on the community. The rebuilding of the nitrator in 1935 by a team of German engineers revealed the existence of a wider world of international expertise that was to be split apart by wartime pressures.

A tour of the grounds followed Bob's talk. We are grateful to Les Tucker for the following account of this, and of the visit to the museum. It first appeared in *Touchpaper* (December 2003), the Newsletter of the WARGM Friends' Association.

## **TOUR OF HOLTON HEATH**

Les Tucker

On 1 November 2003, the GEHG visited the Royal Naval Cordite Factory (RNCF), Holton Heath, near Wareham, Dorset.

The factory was built in 1915 in response to a directive from Churchill, then Lord of the Admiralty, that the Royal Navy should have its own cordite production facility. It covered 500 acres of the heath, with a small hill in the centre affording the height necessary for nitroglycerine production, drawing its labour from the surrounding Purbeck towns and villages and must have been quite an attractive alternative to the prevailing low paid agricultural work.

RNCF had some connection with Waltham Abbey. It was designed by Bt Col Sir F L Nathan, Superintendent at Waltham Abbey 1900-1909, who had moved to

employment with Nobel Explosives, and who was engaged at the time in designing and setting up a TNT plant for Nobel at Pembrey in Wales. Mr W T Thompson, previously Chemist in Charge of Guncotton production at Waltham Abbey, was Manager and Deputy Superintendent, Dr R S G Knight joined the RNCF from Waltham Abbey in 1915 as Chemist in Charge of Nitroglycerine and Cordite, ultimately in 1931 succeeding Mr Thompson as Manager and Deputy Superintendent.

The history of RNCF from 1915 was similar to Waltham Abbey. Massive production in First World War followed by a period of relative quiet in the 1920s in production, but research effort continuing, then 1930s rearmament and significant increase in activity in Second World War followed by cessation of production and change to research establishment.

Of the 500 acres, 40 are now owned by a property development company and are at present on a care and maintenance basis pending the outcome of a lengthy planning enquiry and the company permits visits organised by the RNCF Association. The balance of the 500 acres is now a light industrial estate. Some RNCF buildings survive on this part but access is not permitted.

The main entrance leads on to an impressive courtyard area containing the main administration block, the Captain Superintendent's block and the inspection monitoring block. The Association runs a museum in the administration block and the tours start from here. The first impression is of walking in a highly wooded country estate with well-kept grassy banks. In the 1920s, 27,000 trees were planted, which must have brought joy to the nurserymen's hearts - their invoices are still preserved. Presumably, this was functional for blast alleviation but the result is now a fine wooded landscape. The factory was surrounded by a high spiked metal fence painted black. The paint used was made on site from a by-product of the factory gasworks. This was something of a continuous Forth Bridge job, and there was keen competition amongst the painters to paint the outside face of the fence - they were permitted to smoke, the inside people were not - a problem occasionally solved by passing lighted cigarettes through the fence.

Steam lines ran throughout the site, very similar to those at Waltham Abbey and now characterised in a similar way by rows of brackets and their supports, the pipes having been removed as an asbestos risk. There is one significant difference; the RNCF lines ran about 2ft above the ground, Waltham Abbey's were above head height to permit canal and other facility clearance.

The buildings, which were seen on the tour, include the administration building, stores, what was termed the physics block, the hospital (following an explosion early experimentation in the use of water beds for burns treatment was carried out here). In the extensive engineering workshop as much repair work as possible was carried out on site and this policy extended over the whole range of activities, including metal work, leather work, glass, extending even to a sailmakers shop, making anything in canvas, for example, toolbags, blast protection rope mantlets, etc. The railway engine sheds housed two types of loco, which were used in danger areas, an electric battery engine and a 'fireless' steam engine, called in the factory 'Fowler's Ghosts'; the latter were not of course coal fired but were charged up with high pressure steam from

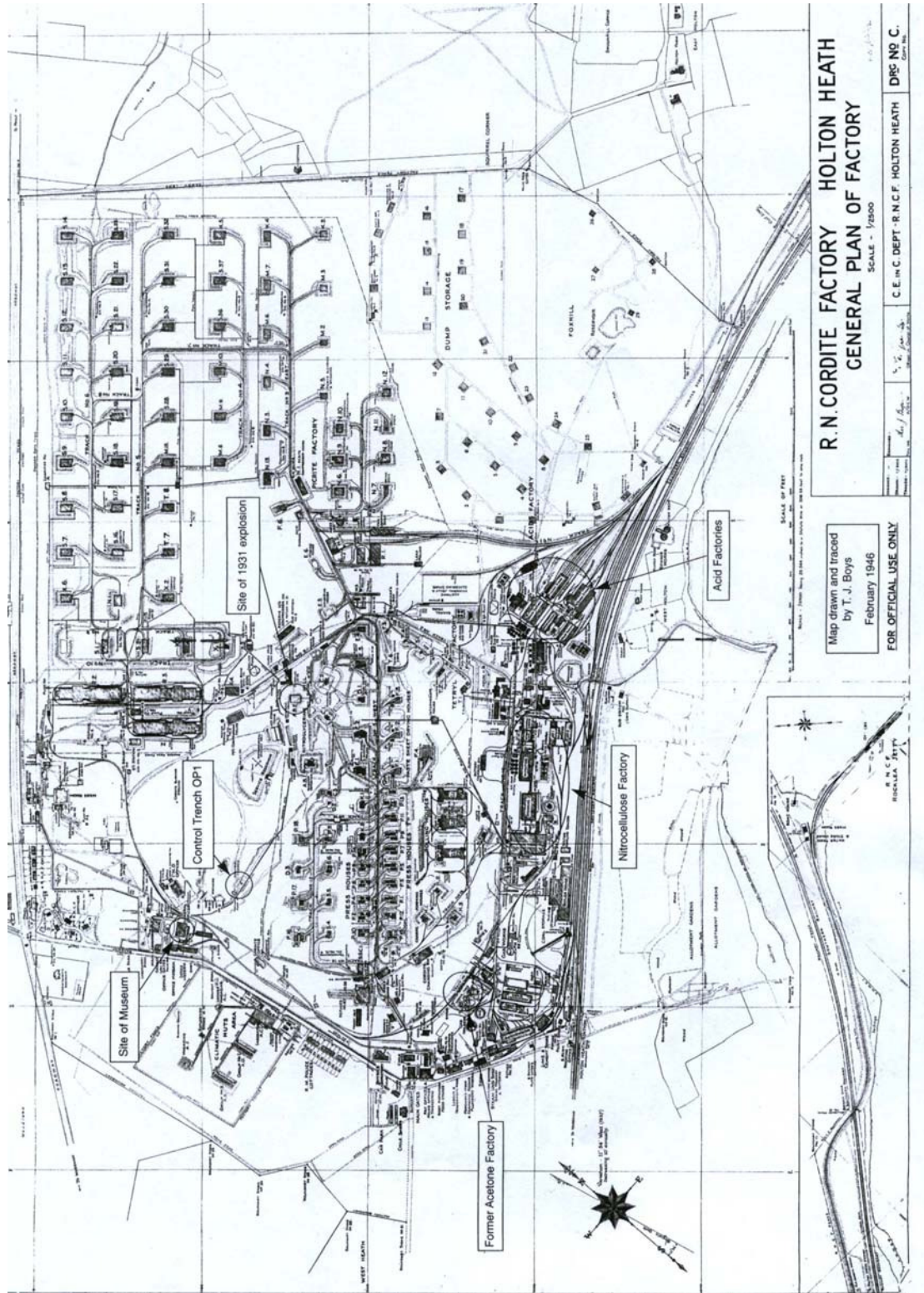
insulated storage chambers. The internal rail system comprised about 5 miles of track, of which only about 12ft remains, embedded in concrete.

Cordite was taken by rail from the factory to a nearby jetty in Poole Harbour, from where it was taken by barge to the Royal Naval Armaments Depots at Upnor Castle, Chatham and Priddy's Hard, Gosport. Some manoeuvring of the barges in harbour channels was required and local fishermen were employed for this.

High points of the tour are the most fortunately surviving 'biggest flower pots in Dorset', the giant concrete acetone fermentation tanks, together with the acetone raw material preparation building, very significant artefacts of the era of solvent based propellant. The raw material was mainly maize, imported from America and stored in the factory's granary, demolished in 1934, leaving about 5,000 tons of rubble. There are many stories of schoolchildren collecting chestnuts for this unit. This apparently happened only in one year 1917, when the U boat attacks on the Atlantic sea-lanes were reaching their peak. The scientist in charge of acetone production was Chaim Weizmann, who famously having only produced a laboratory amount was told by Churchill they needed 30,000 tons. A certain amount of political bargaining took place leading ultimately to the creation of the state of Israel, with Weizmann its first President, so one can draw a link between giant concrete tanks on a Dorset heath and to-day's cataclysmic events in the Middle East. The acetone facility became redundant in 1927 when the RNCF went over to solventless cordite. During the Second World War, the tanks served as air raid shelters.

Finally, the tour returns to the Museum. This contains many interesting artefacts relating to the history of cordite. A remarkable tour de force is the factory model. Although we were aware this existed the sight of its scale is still astonishing and to move it to its present site required specialist removers. It covers a large part of the floor area of one fairly large room and depicts every detail on the 500 acres. It was built in 1942 and apart from being of great interest to model builders, it is a unique piece of explosives history. What is somewhat puzzling is what determined that this should be done, with consequent diversion of staff, resources, etc in the middle of a war. The Association appear to be equally baffled.

Holton Heath is a most interesting site historically and it is to be hoped that when the 40 acres are ultimately developed some means can be found of preserving at least some of its most important aspects.



RNCF Holton Heath, this plan shows the maximum extent of the factory at the end of the Second World War, courtesy of the RNCFA

## THE ANNUAL GENERAL MEETING OF THE GEHG

The Annual general Meeting was convened after lunch. Fourteen members were present, two who had hoped to attend were defeated by train problems. It is remarkable that this number of 16 was balanced by the 16 apologies received previously, which means that a healthy two-thirds of those on our circulation list had been in touch about this meeting.

The two gatherings of the previous year were reviewed – that in November 2002 held jointly with the Royal Society of Chemistry History Group at Waltham Abbey, organized by Dr. Gerry Moss, and that in May 2003 at Purfleet magazine, held courtesy of Sue and Alan Gosling and the Trust who look after the upkeep and use of the building. On the latter occasion, about half of us stayed on to visit the fort at Tilbury with its eighteenth-century magazines, the next morning. We are grateful to all who have helped organize our meetings. Suggestions for future venues will always be most welcome. It was reported that some time had been spent negotiating with the Birmingham Proof House, before it became clear that numbers must be limited to 10, with no possibility of two groups of 10 each going in opposite directions. However, this remains an attractive option, perhaps for some of our members to get together to organize their own visit.

The report from our Newsletter Editor, Wayne Cocroft, unable to attend for family reasons, emphasised the ever-present need for members to send in material. The meeting acknowledged the fine work done in keeping up the standard of the Newsletter. The report from our Treasurer, Kenneth Major, also unable to attend but for travel reasons, showed that we then had 31 fully-paid up and 3 honorary members. Having started the year with £1,513.87 in the bank, we now hold £1,620.09. Again, we registered our thanks to Ken for keeping track of our finances. We noted his observation of a slight loss of members, and the need for those who wish to keep the Group going, to ‘muscle in’.

The concept of ‘muscles’ having been introduced, it is not inappropriate to conclude this report of the AGM by observing that we manage to ‘punch above our weight’ in terms of the significance of the meetings held, the Newsletter produced, the questions if not answered then at least ‘fielded’, and the work undertaken by our members. However, as we look ahead to another profitable year we should be aware that before the next AGM we must have in place a strategy for electing a new Chairman, as the present holder of the office will by then have served for four years instead of the three previously agreed to.

## REPORT ON PAPERS PRESENTED AT THE MEETING

*The four papers presented in the afternoon will be summarized briefly because it is hoped that each speaker will prepare an account for publication in the Newsletter.*

First we had **Les Tucker** to introduce us to **K.B.Quinan and the Quinan Stove**. Working in the explosives industry in South Africa in the first decade of the twentieth century, Quinan had devised a system for drying guncotton which, along with other achievements, led to him being invited to Britain at a time of munitions crisis in the

early years of the First World War. Under Lloyd George as Minister of Munitions he was appointed Head of the Explosives Supply Department, charged with the design and construction of munitions factories. The most substantial was at Gretna in Dumfriesshire, from where the first cordite was despatched in 1916. After the war, Quinan returned to South Africa, leaving the Government to dismantle in part the munitions empire he had built. It was for a time uncertain whether Gretna or Waltham Abbey would continue as the chief cordite factory but eventually the vote went to the latter, whose survival was thus ensured. A tangible reminder of Quinan's talents is still to be found at Waltham Abbey in the form of the remains of the Quinan drying stove, built in the mid-1930s as the shadow of another world war drew close.

**Tony Yoward** presented our next paper, on **The Schultze Gunpowder Works at Fritham in the New Forest**. Here smokeless powder was manufactured from the later 1890s to 1923, on a system devised by a Prussian Army officer. Schultze had experimented with nitrated wood fibre in the 1860s to form 'nitro-lignin' (see Wayne Cocroft's *Dangerous Energy* for technical details), as the basis for a product used successfully as a sporting powder. But although a possible replacement for gunpowder it never achieved acceptance by the military and thus became an example of a technological dead end. The factory was demolished in the early 1920s, but Tony was able to introduce us to some of the surviving archaeological features, and to pictorial evidence of the workforce there.

The paper by **Gerry Moss** on **Gunner William Rivers' Ordnance & Expense Book** was the kind, which set our minds working, trying to provide explanations for the symbols used in this notebook of c.1800. It had come into Gerry's possession after giving a lecture on fireworks, and appeared to be a record of items such as the composition of stars and rockets. It is not clear whether the pages of symbols and recipes represented lecture notes, or were based on experience, but whatever their background it is clear that they reveal the extensive knowledge which the gunner then had to acquire if he was to practise his craft successfully.

Lastly, **Brenda Buchanan** explained that her paper entitled **Prince Rupert (1619-1682): Mars and Vulcan** had its origin in one of the enquiries she had received as Chairman of the GEHG. This concerned Prince Rupert and the early use of powder in mining, to which it was possible to reply briefly by reference to recent scholarly work on the subject. But the matter had then acquired an interest of its own, with first with the discovery of a fanciful contemporary eulogy which referred to Rupert as 'Mars and Vulcan' because he had shown both the courage of the former in battle and the industry of the latter in his concern with the making of ordnance and gunpowder; and with then the idea that although the importance of powder for mining had been long recognized, its significance for quarrying had been neglected. This sparked an exotic chain of enquiry which included the Prince, the Royal Society, the Board of Ordnance, the marriage of Charles II to the Portuguese Princess Catharine of Braganza, the acquisition of Tangier as part of her dowry, and an unexpected glimpse of a large painting of this port under siege, half-hidden on a staircase at Dyrham Park, a National Trust property north of Bath.

To capitalize on this new asset, a mole or breakwater was constructed at Tangier in the 1660s in an operation heavily dependent on the use of gunpowder for quarrying. Sir Hugh Cholmley was appointed to undertake this task, largely because of his



experience of similar work at Whitby, which raises the intriguing question of when powder was first used for quarrying in England. Sir Hugh took some of his quarrymen to Tangier, where they named their settlement near the coast, 'Whitby'. But twenty years later the project faltered and was abandoned in the face of the understandable hostility of the Moors. In terms of the experience gained in the use of explosives in major works of engineering however, the mole at Tangier deserves a special place in our gunpowder history. Further information on the early use of gunpowder in quarrying will be most welcome.

## **CORDITE IN CONTEXT SOME ADDITIONAL PROBLEMS**

The tracing of the relationship between the Waltham Abbey Royal Gunpowder Factory, the Nobel Company's works at Ardeer, and the Royal Naval Cordite Factory (RNCF) at Holton Heath, is of particular historical interest to the GEHG. The planning of the RNCF, initiated in January 1914, was undertaken by Col Sir Frederic Lewis Nathan, who had served as the Superintendent of Waltham Abbey from 1900 to 1909. From information provided by Miles Oglethorpe of Historic Scotland, who was unable to attend our meeting, but sent photocopied pages from a volume published in 1939 entitled, *Imperial Chemical Industries Limited and its Founding Companies*, vol.I, *The History of Nobel's Explosives Company Limited 1871-1926*, we are able to construct the following course of event. In August 1909, the position of manager at Nobel's Ardeer factory on the south-west coast of Scotland became vacant on the appointment of Mr Lundholm as technical adviser to the Nobel-Dynamite Trust. His successor, Col Sir Frederic Nathan, stayed only some four and a half years before the threat of war led to his being recalled into public service. Though brief, these were significant years, for during that time the bulk of the work of designing and erecting a new cordite factory adjoining the older works at Ardeer, was carried out. The Waltham Abbey connection was retained because Mr Rintoul, who had gone from there to Ardeer with Sir Frederic, stayed on as the Head of the Research Division. The site of the new RNCF having been decided with the selection of Holton Heath between Poole and Wareham, its construction was undertaken on plans devised by Sir Frederic, drawing, it is understood, on his work for the Nobel Company. W T Thompson who had previously served at Waltham Abbey as the Chemist in Charge of Guncotton was appointed Deputy Superintendent and Manager at Holton Heath, and Dr R S G Knight, also from Waltham Abbey, was appointed to the RNCF in 1915 as Chemist in Charge of Nitroglycerine and Cordite. Some workmen and their families also made the transfer, and personal links were maintained for many years.

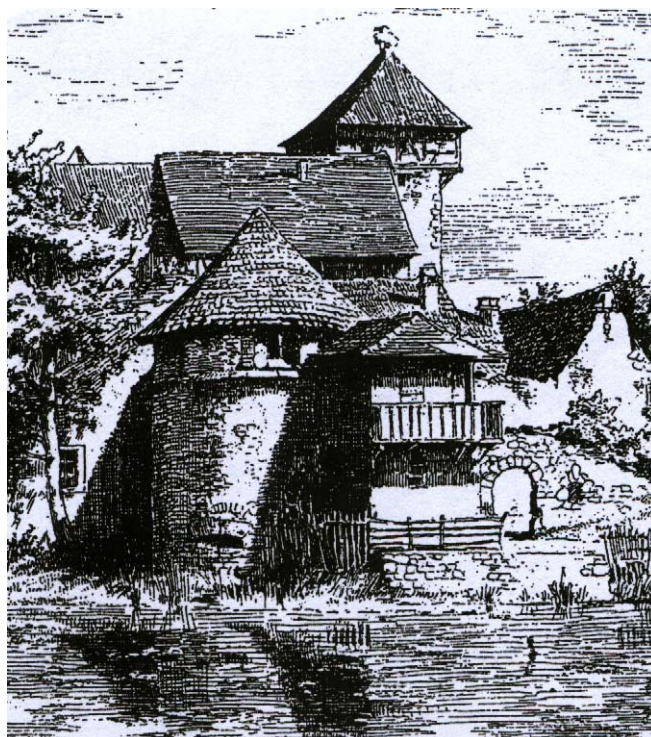
In a modest way our Group can also claim to have connections with this triangle of sites, for not only is Waltham Abbey well-known to us, we also had the good fortune to visit the then still active Ardeer works in 1990 on a memorable tour organized by Alan and Glenys Crocker. Our visit to Holton Heath rounds off the experience.

Brenda Buchanan

**DRESDEN, GERMANY, POWDER TOWER**

Wayne Cocroft

In *Newsletter 2*, 13-14, Brenda Buchanan drew our attention to the surviving powder tower in Prague. Municipal powder towers were a feature of many central European cities, within the fortified city of Dresden, there was also a powder tower its site now occupied by a large post-medieval building, itself reconstructed after wartime bombing. The memory of the powder tower is preserved by a café in the cellar of the more recent building, which uses the motif of an exploding tower on its napkins and sugar twists.

**RADOLFZELL, GERMANY, POWDER TOWER***Bernard Lowry*

*Radolfzell powder tower (to left), engraving 1887*

*Festungsjournal* in a listing of fortified structures reports a powder tower at Radolfzell, Kreis Konstanz, Württemberg in southern Germany, it lies about 17km to the northwest of Konstanz.

*Festungsjournal*, **15**, September 2003, 19

## **GUNPOWDER PLOT WOULD HAVE DEVASTATED LONDON**

*The New Scientist* reported in November 2003 that analysis by physicists at the Centre of Explosion Studies in Aberystwyth has shown that not only would Guy Fawkes have killed the King and destroyed Parliament, but he would also have devastated large parts of London. The scientists calculated that the 36 barrels, would have held about 2,500 kg of gunpowder. For their calculations, they assumed that the gunpowder would have created an explosion equivalent to the same amount of TNT. Using damage assessment tables, developed from Second World War bomb damage data, supplemented by information derived from recent terrorist explosions. They predicted that everything within 40m would have been razed to the ground, within 110m, buildings would have been partially destroyed, as far as 900m away windows would have been blown out. The blast would have destroyed Westminster Abbey and seriously damaged buildings as far as Whitehall. They acknowledge that the data tables they used assume that the blast took place in open-air, but argue that 17<sup>th</sup> century buildings were probably less robust than their 20<sup>th</sup> century equivalents, thereby balancing out the results.

*Wayne Cocroft*

## **AN EARLY USE OF MERCURIC FULMINATE?**

The account books of Sir Francis Lennard, Lord Dacre, of Herstmonceux, Sussex, compiled between 1630 and 1662, record 'paid for white mercuric to scare cows 1s/6d'. This presumably refers to mercuric fulminate that is detonated by percussion. Although the compound was not chemically isolated and identified until about 1800, it was clearly known about two centuries previously and was being put to practical use.

Calvert, D and Martin, R 1994 *A history of Herstmonceux Castle*, 12

*John Whitbourn*

## **PURFLEET FLASHING HOUSE/BARREL STORE**

Kathryn Morrison

The Purfleet Flashing House/Barrel Store has recently received funding from WREN (Waste Recycling Environmental) and the Heritage Lottery Fund to carry vital conservation to the roof, as well as refitting the toilet and kitchen area. A small extension will also be built to accommodate a toilet for the disabled. The restored building will be used by the Thurrock Play Network. During autumn 2003 building works exposed the upper sections of the building and roof when the suspended ceiling was removed and the stone slates lifted from the roof.

The Flashing or Proof House was erected about 1765 as part of the Purfleet magazine complex, for the purpose of testing powder samples. Flashing involved igniting a small quantity of gunpowder with a hot iron on glass, porcelain or copper plate, and observing the how cleanly the powder burned. It is a tall, rectangular brick building, which contains a single room, currently open to the roof. Documentary evidence

records an oven the building, and although there is no physical evidence for its form or location, it was probably positioned close to the flue which rises through the east wall. In recent years, a trench was found in the centre of the floor: this is thought to be where the proving process was carried out. Proving may have been observed from galleries which ran along the east and west walls of the building, and for which structural evidence survives. The building is roofed in three bays, and the east bay seems to have accommodated a ventilation cowl which rose above the roof. It may have been similar to that at Greenwich Magazine, built in the 1690s. An inserted floor in the roof no doubt relates to the later use of the building as a store, first for copper hoops and later for barrels.

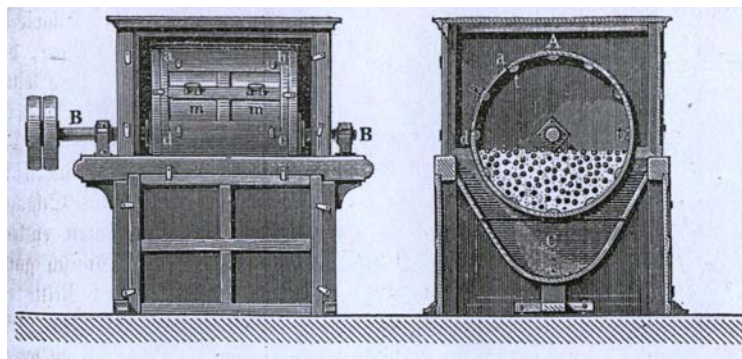
This account is based on an archive report, with accompanying photographs, to be deposited in the National Monuments Record, Swindon.

## DAS SCHIESSPULVER, Dr J UPMANN

*DAS SCHIESSPULVER, GESCHICHTE, FABRIKATION, EIGENSCHAFTEN & PROBEN*, Braunschweig, Drud und Verlag von Friedrich Vieweg und Sohn, 1874

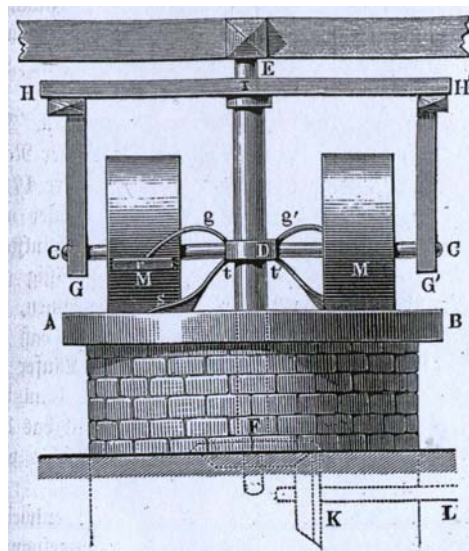
(Shooting powder, history, manufacture, quality and proof)

This publication is one of a series of handbooks published in Germany in the 1870s on chemical technology each written by an expert in the field. The illustrations accompanying the chapter provide an interesting snapshot of some of the manufacturing machinery in use in Germany at that date. The first is of a drum, or ball, mill (figure 1), devised in 1790s revolutionary France, it was packed with 4 to 13mm bronze balls. Manfred Schultz (1996) relates that ball mills were used to pulverise the ingredients and then for mixing of the powder.



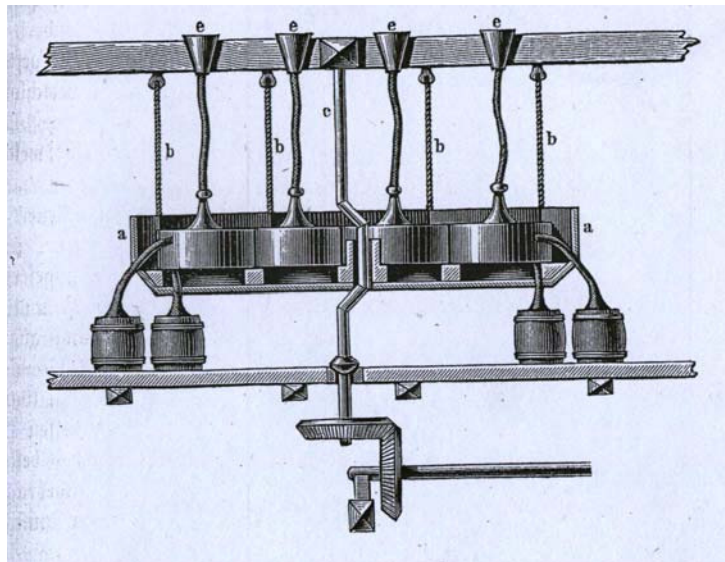
*Figure 1 Drum mill*

He then describes the powder being transferred to the *walzenpressen* (figure 2); the name suggesting the compacting action of the rollers was more significant than the mixing action. The rollers are made of stone and rotate on a stone bed, and were powered by underfloor shafting, it also exhibits a far more elaborate plough compared to those found in contemporary English mills.

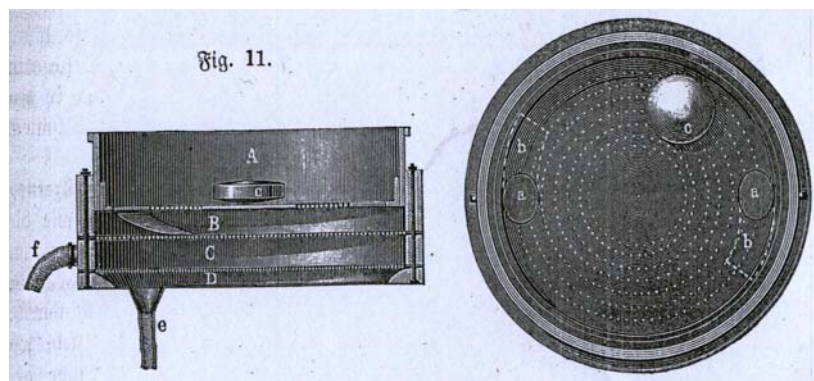


*Figure 2 Walzmühlen (Rollermühlen)*

The powder was then transferred from the roller mills to a Lefebure corning mill (figure 3), again this powered by an underfloor drive shaft, which transferred power to a cranked shaft, which agitated the table on which the sieves were placed. This motion revolved a 'cheese' around the top sieve, the lower horizontal sieves collecting different sized powder for use in cannons or small arms. After sorting the powder was dried, polished in smooth wooden drums and different batches mixed together to ensure a consistent product.



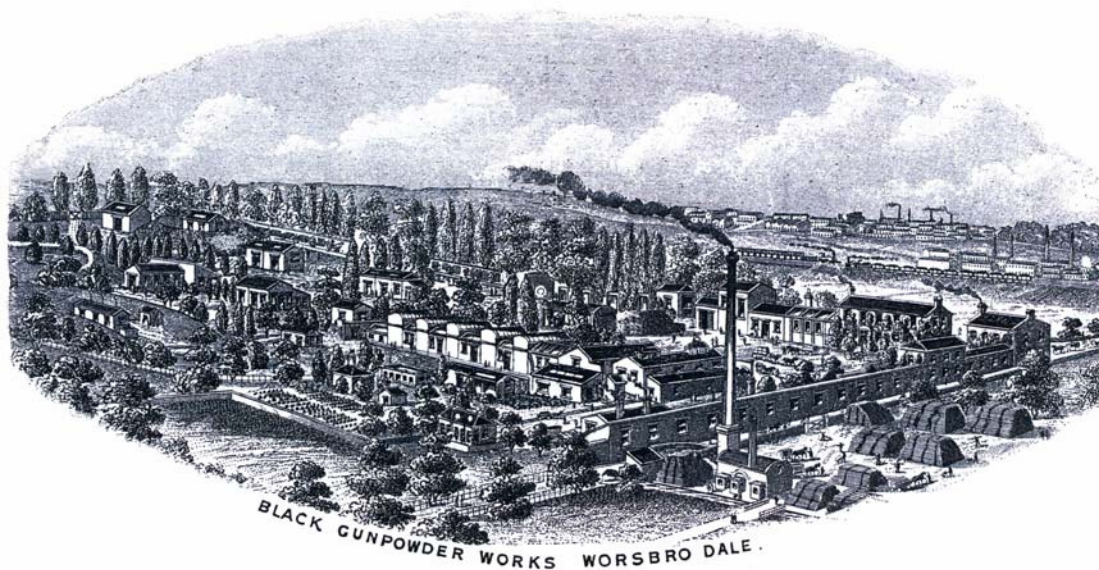
*Figure 3 Lefebure corning machine*



*Figure 4 Corning sieve and cheese*

Schulze, M P 'The gunpowder mill at Spandau', 351-358 in Brenda Buchanan (ed) 1996, *Gunpowder The History of an International Technology*, Bath: Bath University Press.

## WORSBROUGH DALE GUNPOWDER WORKS, YORKSHIRE



This engraving shows an interesting and previously unpublished view the Worsbrough Dale gunpowder works that were established in the mid-nineteenth century, on the River Dove about 2km SSE of Barnsley (SE 3503). Its site now lies beneath the spoil tips of barrow colliery.

Jim Buchanan

Crocker, G 1988 *Gunpowder mills gazetteer*, The Society for the Protection of Ancient Buildings, London, page 41

## POWDER MAGAZINES, HOLPOOL GUTTER, FRODSHAM, CHESHIRE

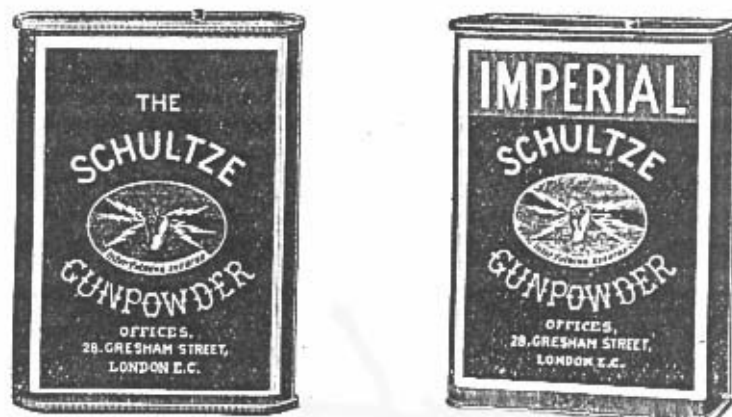
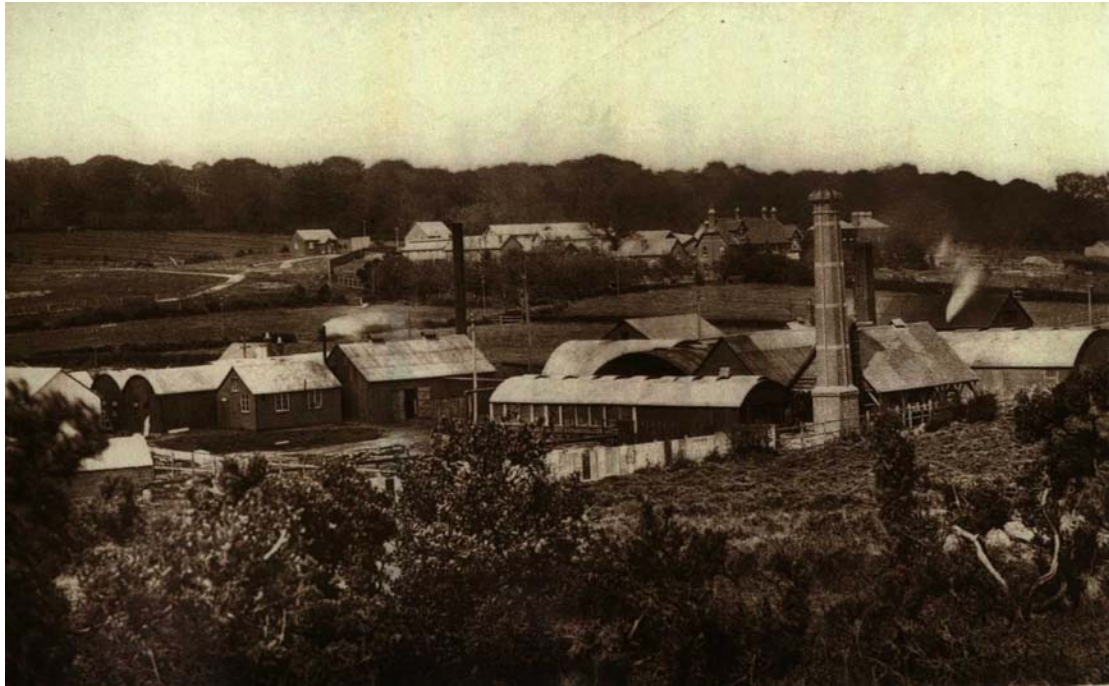
The website <http://www.transportarchive.org.uk> contains many images of industrial archaeological interest, a series on the Manchester Ship Canal illustrates a pair of powder magazines at Holpool Gutter, Frodsham Marsh, Cheshire. The details accompanying the image state that explosives were used to clear away obstructions during the construction of the canal and that they were stored at Holpool Gutter. It is not clear if the magazines were specially constructed for this purpose or whether the company made use of existing structures. The magazines are brick built and raised on brick arches to protect them from flooding, and have hipped slate roofs. The photograph evidently taken at low tide, shows a muddy channel with timber jetties leading back to the magazines. A peculiar feature of their construction is a flight of steps leading up to the main walkway, a feature usually omitted in magazine design due to the risk of stumbling, but perhaps necessitated here by the need to raise the magazines above the local mudflats. The 1977, 1:50 000, Ordnance Survey map, Sheet 117 Chester, shows a pair of buildings close to Frodsham Marsh at SJ 485 784, which may mark the site of these magazines. It is not known if the magazines survive.

*Jonathan Clarke*

**EYEWORTH, HAMPSHIRE**

Jim Buchanan

The smokeless powder factory at Eyeworth, Hampshire is comparatively well-known, a booklet having been published on the works by the Hampshire Field Club and Archaeological Society (Pasmore, 1993). The factory was established in the late 1860s to manufacture a patent smokeless powder invented by the German Schultze. The booklet is well illustrated, however, Jim Buchanan has recently discovered another view of the factory (later than the published example taken from trade pamphlet published about 1896) and illustrations of packages for some of its products.



Images © Jim Buchanan

Pasmore, A 1993 *New Forest Explosives*, Hampshire Field Club and Archaeological Society



**NOBEL MONUMENT ST PETERSBURG**

Wayne Cocroft



*Monument to Alfred Nobel, St Petersburg © W D Cocroft*

Historically the Nobel family had long standing links with St Petersburg. In the north-east industrial sector of the city, Vyborg, the Nobel family established an iron works in the early nineteenth century. Later, during the Crimean War, Alfred Nobel's father, Immanuel, manufactured sea mines for the Tsar's navy. However, at the end of the war orders for mines ceased and Immanuel Nobel was forced to Sweden when creditors closed in on his factory. St Petersburg as a major centre naval centre was an important munitions producing area, Nobel's contribution to the industry is acknowledged by this discordant sculpture, a monument erected by city which has suffered devastating explosive bombardments.

**ROYAL ORDNANCE FACTORIES IN ART**

Wayne Cocroft

Two sketches were made by artists working under the official direction of the Ministry of Supply on the recommendation of the Ministry of Information Artist's Advisory Committee. Probably for security reasons no indication is given of the location of Royal Ordnance Factory under construction. The presence of a multi-storey, steel-framed structure suggests an acid handling building, which might suggest the factory illustrated is ROF Bishopton. The note accompanying the sketch of H McLelland notes that he received his OBE for sticking to his post under very dangerous conditions during which he was severely injured.

From *War pictures by British artists: Production* 1943 Oxford University Press

**NEW FAVERSHAM SOCIETY PUBLICATION**

Arthur Percival

*Faversham Gunpowder Personnel Register 1573-1840* Raymond Godfrey and Arthur Percival, 2003, Faversham Paper No.88, Faversham Society, Faversham ISBN 1 900214 35 0 viii + 110 + viii pages, A4 format, £4.45. Available from: The Faversham Society, The Fleur de Lis Centre, 10-13 Preston Street, Faversham, Kent, ME13 8NS, £4.45 plus £1.50 postage and packing.

In this recent publication by the Faversham Society, the authors have trawled through a wide variety of sources, including printed books, genealogies, parish registers, title deeds and the official records of the Royal Gunpowder Factory to compile a list of over 350 people who worked in the local gunpowder industry. For each there is at least a line of biographical detail and for ease of use the volume is fully indexed. As a centre of gunpowder manufacturing expertise, many links existed between Faversham and other gunpowder works, making the register a valuable resource for researchers investigating other works. It also contains a list of the Huguenot refugees who were employed in the industry. A cut-off date of 1840 was selected, as from 1841 the Census Returns are available for people researching individuals involved in the industry.

**CHILWORTH GUNPOWDER WORKS, SURREY**

Wayne Cocroft

English Heritage has recently completed an archaeological survey of the Chilworth gunpowder works in partnership with Guildford Borough Council. The report is now available and comprises a brief history of the works, a description and analysis of the archaeological remains and is illustrated with photographs and drawings of the key buildings. The 1:1000 scale plan of the site has been broken down into eight A3 sheets and these are bound into the rear of the volume. Accompanying the report is a CD that contains the 'Professional Papers' these are made up of component sheets, which describe all the principal features on the site, referenced against relevant maps and documents. The report is available from English Heritage and costs £15.00, the CD costs £5.00, both prices include the cost of post and packing. Please send a cheque made payable to 'English Heritage' to Amanda Atton, English Heritage, Brooklands, 24 Brooklands Avenue, Cambridge, CB2 2BU.

**PUBLICATIONS FOR SALE**

Crocker, G 1988 *The Lowwood Gunpowder Works A Short History* £1 incl.p&p

Palmer, A 1998 *The Low Wood Gunpowder Company its inception and early growth 1798-1808* Gunpowder Mills Study Group Cost £7.50 members £6 p&p £1

Harding D F, 1999 *Smallarms of the East India Company 1600-1856* Volume III *Ammunition and Performance* Foresight Books (Offprint of Chapter 21, Gunpowder – including relevant sections of contents list, introduction, index, etc). Cost £5 p&p £1

Orders should be sent to: Glenys Crocker, 6 Burwood Close, Guildford, Surrey, GU1 2SB, please make cheques payable to 'Gunpowder and Explosives History Group'.

## PRINCIPAL CONTENTS

*Names in brackets indicate sources of information rather than authors*

Autumn 2003 meeting at the RNCF, Holton Heath	Brenda Buchanan	2
A tour of Holton Heath	Les Tucker	3
Annual General Meeting of the GEHG	Brenda Buchanan	7
Report on the papers presented at the meeting	Brenda Buchanan	7
Cordite in context some additional problems	Brenda Buchanan	9
Dresden, powder tower	Wayne Cocroft	10
Radolfzell, Germany, powder tower	[Bernard Lowry]	10
Gunpowder Plot would have devastated London	[Wayne Cocroft]	11
An early use of mercuric fulminate	[John Whitbourn]	11
Purfleet, Flashing House/Barrel Store	Kathryn Morrison	11
Das Schiesspulver, Dr J Upmann	Wayne Cocroft	13
Worsbrough Dale gunpowder works	Jim Buchanan	15
Powder magazines, Frodsham, Cheshire	[Jonathan Clarke]	15
Eyeworth, Hampshire	Jim Buchanan	16
Nobel monument, St Petersburg	Wayne Cocroft	17
Royal Ordnance Factories in art	Wayne Cocroft	18
New Faversham Society publication	Arthur Percival	19
Chilworth gunpowder works, Surrey	Wayne Cocroft	19
Publications for sale		19