ROYAL GUNPOWDER MILLS WALTHAM ABBEY

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Touchpaper

The Newsletter of the ROYAL GUNPOWDER MILLS WALTHAM ABBEY

FRIENDS ASSOCIATION



JUNE 2005

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PLEASE NOTE: Deadline date for submissions to the next issue is 15th August 2005



Editorial

The new season is now in full swing with a full programme of special events. The UE Day Celebration weekend in May was a great success and a full report is given in the centre pages. As a special treat this has been printed in colour (and damn the expense!)

In addition to reports from the ASM and Reunion there are 2 major articles in this issue; one on the Royal Arsenal Railway at Woolwich and one on the story of the famous chemist, William Perkin, and the rise of the chemical industry.

Thope you enjoy this larger than normal issue and continue to send in your contributions, however big or small. All will be gratefully received.

Norman Paul Jouchpaper Editor

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CHAIRMAN'S CHAT

Welcome to this edition of Touchpaper. I hope you all enjoy reading the articles that some of you produce. If you would like to see something different please do submit an item yourself to the Editor, He would be very pleased to assist. Touchpaper belongs to its members.

As you will see from the AGM report elsewhere in this issue you will see that I remain as your Chairman for the forthcoming year and thank you for the vote of confidence; as do the other officers and committee members who were re-elected.

The new site season has now begun and there has been some changes and some new ideas. Visitor attendance is increasing and there have been some excellent special event weekends so far with many more to come. We hope that you will come and support the Mills. More visitors are always welcome and remember that Friends get in at a reduced rate on production of your membership card. Of course, if you become a volunteer you can get in free, on or off-duty! The site relies almost entirely on volunteers and there is always room for more.

Our Laboratory and Rocketry exhibition has been updated and enlarged for the new season with the addition of more exhibits and well worth a visit.

It is noticeable that the deer are gradually becoming less concerned about the presence of people and so you stand a much better chance of seeing them than in previous years. Some of the other wildlife requires more care to see it. A hide has now been built halfway up Long Walk which may help you to see some of our more elusive birds.

John Wright

AGM Report

The AGM was held on the 27th May at the Royal British Legion Hall in Waltham Abbey and was attended by about 40 members.

The chairman, John Wright, spoke about the work and special projects carried out by members on the site in 2004 and paid special tribute to many of the volunteer members for their efforts.

Although the site is beginning to attract more visitors the Operating Company cannot proceed with further developments without the injection of significant additional funds. There is a proposal to sell of part of the site, currently unused, for development which would raise considerable revenue. In particular, the Powerhouse and Lodge grounds are the subject of a planning application although this is not likely to happen for some time. This is a contentious issue and although recognising the need for additional funding some members were not happy at the further loss of any part of the site.

A welcome addition to the staff is a Volunteer Co-ordinator, Liz Went, who is paid for by the Heritage Lottery Fund as reported in the March 2005 issue of Touchpaper.

The Treasurer, Norman Paul, presented the accounts for the year 2004 which showed a healthy balance of just over £2,000 at 31st December despite significant expenditure last year on fitting out the Laboratory and Rocketry exhibition and the purchase of items for the Operating Company. Membership is holding steady at about 380 and no increase in subscriptions is considered necessary. Further consideration is being given to seeking charity status which could yield an additional £4-500 annually on Gift Aid from subscriptions.

The existing Chairman, Secretary and Treasurer were re-elected as were six of the Committee Members agreeing to stand. Since the Constitution allows for 8 Committe Members the Chairman asked for further nominations but none were forthcoming. The Committe therefore consists of:

Chair John Wright, Sec. Richard Penfold, Treas. Norman PaulCommittee - Brian ClementsBryan HowardDave MannersDavid SimsRon TreadgoldLes Tucker

The 2005 REUNION

As usual the Reunion followed on from the AGM in the British Legion Hall and thanks are due to the Legion for the use of their premises and for the excellent catering by Barbara Fowler. Numbers continue to drop each year but until it becomes uneconomic we will continue with this event. 65 members had booked but, inevitably some failed to make it. Still, it was a very successful and worthwhile meeting.



It is especially good to see many of our members from distant parts who make this special effort each year.

(It also means we don't have problems getting a quorum for the AGM!)

THE 'Q' - SHIP SHELL

How stable was Mark 1 cordite? The following story gives some indication.

A friend in my local sailing club at Lowestoft said that he had a World War One shell at home that had been sitting in his fireplace for many years and was known to contain propellant; I was asked if I could render it safe. I was presented with a small 'Three Pounder' round that had failed to ignite and had been taken home as a souvenir of the action of 'Q' - ships operating out of Lowestoft. (you may recall that 'Q' - ships were an answer to German submarine attacks on unarmed merchant ships and carried concealed armament - Lowestoft was the main base for such ships). An examination of the round, which consisted of a 4 inch long shot fitted into a 12 inch long brass case, had two interesting features. The shot was marked with a red and white band indicating the type of warhead filling while the case had the date of 1907 on its base. Four pin-punch marks, also in the base, was interpreted as being refilled four times. Removing the shot showed that half of the original propellant was still intact as a series of cordite strands tied with twine. Bert Betts, the Establishment Safety Officer, sent the propellant to the Main Lab. for a heat test which revealed that the propellant was almost a as good as the day it was made; in spite of standing in a fireside hearth for most of its life! An X-ray of the shot indicated a warhead filling and a fuse. Referring to a modern book of band markings to identify the filling was of no use - the shell was too old. The complete round, minus propellant, was sent to Fort Halstead for decontamination in their remote breakdown facility.

Eventually the round was returned to its owner. We never did discover what the warhead filling was; but it must have been as good as the propellant!

A LECTURE ON HISTORIC FIREARMS

Some years ago I was at a lecture in Norwich on historic firearms given by the vicar of Horsham St. Faiths. The lecture began with a pistol being primed with gunpowder followed by a sheet of the Eastern Daily Press rammed down the barrel. A pinch of powder in the pan and the gun was ready to fire. Aiming at the wall across the faces of the audience he pulled the trigger. Nothing happened! After an interval of at least 10 seconds the gun fired with a deafening roar showering the room with fine paper confetti. I'll swear that the first few rows of the audience had daylight between them and their seats; their attention was absolute. Various guns were then showed and described, including an Arab flintlock. No more guns were fired until 2 matching pistols were produced that were intended for a lady to carry in a hand-muff to 'protect her Honour'. A repeat firing sequence resulted in an even longer ignition delay than before. The vicar drily observed that by now she'd probably lost 'her Honour'. It was noticeable that the smoke from the firings lacked any smell of sulphur and this was probably the cause of the delays. After the lecture we had a chat with the vicar, pointing out that he was using sulphur-free powder. He laughed when I said that "only the devil would put sulphur in his gunpowder". Bryan Howard

SIDNEY AND THE BOMB



Dr Sidney Alford has a career that many schoolboys, dabbling in the chemistry lab., may have dreamed of. He is an explosives expert, running his own consultancy company since 1985, At an age when others of his year group are probably starting to limit their activities to the back garden or golf course, Sidney is still travelling the world sorting out problems ranging from 'how to deal with unexploded bombs' to 'how to rescue hostages without killing them in the process'. This is from a recent expedition to Laos. The photograph and caption first appeared in the Old Buckwellian News - the newsletter for Old Boys of the Buckhurst Hill County High School for Boys.

Recent work by Sidney includes a specially designed shaped charge, the 'VULCAN' (which injects a jet of burning magnesium into an aircraft bomb, or other steel cased munition, causing the immediate reaction of the explosive fill to burst the case without causing detonation) and a range of vehicle bomb disruptors which eject bombs from vehicles before they have time to explode, These are currently in service in Iraq.

Sidney's company recently received a Queen's Award for Innovation for the 'VULCAN'.

Les Tucker

This is the extraordinary story of **William Perkin and the Empress's eyes**

In the poems on the end page of the June 2004 Touchpaper it is striking that the colour purple appears in both, conveying a sense of boldness and distinctiveness. [In the first poem, by Jenny Joseph, the wearing of purple is linked with wearing a red hat. The poem inspired a Californian artist, Sue Ellen Cooper, to form a Red Hat Society, which now has a world wide membership].

William Perkin was the pioneer of the first synthetic textile dye, light purple - mauve and the following is his story.



The Perkins and senior staff at the Greenford Factory. William Perkins - 2nd from R & brother Thomas 2nd from L. William was later to take the mantle of a white beared patriarch.

For centuries all textile dyes had been made from natural products - indigo, logwood, woad, madder, turmeric, cochineal, sandalwood, dava and so on. The making of purple dye was a particularly laborious and complex process involving the crushing of thousands of marine molluscs for one robe. It therefore became a mark of wealth and high office - When Julius Caesar was Emperor the wearing of purple was confined to himself and his household.

In France a light purple shade was popular, termed in French mauve - the name for the mallow plant.

In the mid 19th century the traditional ways of the centuries in dyes were about to change for ever. The 1850s saw three momentous events which were to add a whole new industry to the economies of the West.

1) Around 1856 the Empress Eugenie of France decided that the dress colour mauve was an ideal match for the colour of her eyes and her wardrobe began to display a preponderance of mauve. She was the ultimate 'fashionista' of Europe, wielding immense influence on fashion trends at a time when the rising middle class had disposable income to spend beyond the necessities and when trends were disseminated through the mass circulation magazines with hand coloured fashion plates which were becoming available.

2) In 1858, possibly to emulate Eugenie the colour of Queen Victoria's gowns at the marriage of her daughter was mauve.

3) In March 1856 an 18 year old chemistry student in a makeshift home laboratory at 1 King David Fort in Shadwell East London attempted to synthesise quinine, the cure for malaria at that time. In this he failed. The student was William Perkin, studying at the recently founded Royal College of Chemistry. In a later account of his life Perkin said "The possibility also of making new discoveries impressed me very much. I determined if possible to accumulate bottles and make experiments". He had only succeeded in going to the College after a struggle with his father, who had wanted him to follow his brother Thomas into architecture. The Principal of the College was the inspirational August von Hofmann.

Hofmann was particularly interested in the by product of town gas production, coal tar and its molecular complexity and corresponding wide opportunity for molecular rearrangement and a major part of his influence on his pupils was to direct them to this line of exploration. In his attempt to synthesise the natural alkaloid quinine Perkin had chosen to tinker with allyltoluidine by adding oxygen and removing hydrogen. He ended up with a useless reddish powder. At that time Hofmann was encouraging his students to examine the potential of two products isolated from coal tar - benzene and aniline.

Perkin, in a spirit of scientific curiosity, decided to try his method on aniline. This time a blackish powder resulted. On an impulse Perkin added spirits of wine and applied it to a piece of silk. What resulted was an attractive shade, which Perkin called mauveine.

What happened then was startling. In an apparently totally intuitive leap Perkin decided that he was looking at the way to a fortune. Perkin, with no capital, no land, no factory decided that he would set out to bring his discovery to the world. To do this he would first have to face up to his long suffering father and to Hofmann and tell them, having fought so hard to get into the College, that he was now going to leave for the world of commerce and manufacturing.

Hofmann had strong views on the relationship between pure science and industry and believed that the practitioner of the former should not directly involve himself in the world of the latter and doubtless Perkin Senior thought that his son was taking the final step to ruin. Perkin however was not to be dissuaded and he left the Royal College. Bearing in mind his position at the time, it seems that beneath an apparently mild demeanour lay a steely determination. Perkin knew that to obtain investment capital he would have to convince textile dyers of the value of his non natural product. This was not to be easy. At that time Scotland was a centre of textile dyeing and he received encouragement from Pullars of Perth. However other Scottish dyers were sceptical of the youth and his wild claim and to cap it all the Pullars factory was badly damaged in a fire. There was no investment. Ironically at this low point having travelled unsuccessfully to Scotland Perkin received encouragement from virtually a next door neighbour in East London.

Thomas Keith was an important silk dyer in Bethnal Green who had shown the colour mauve to the female members of his family and their reaction had been effusive. Perkin told Pullar who replied prophetically "I am glad to hear that a rage for your colour has set in among that all powerful class of the community - the ladies. If they once take a mania for it and you can supply the demand your fame and fortune are secure". But he was still preoccupied with the fire and there was no investment.

At this point the Perkin family closed ranks. In a remarkable gamble worthy of Las Vegas Perkin's father decided to back his son with his life's savings and not content with this Perkin persuaded his brother Thomas to leave architecture and come in with him. The firm of Perkin & Sons was born.

Next came the land. The adventurers found a plot at Greenford Green in Middlesex close to the Grand Junction Canal which they purchased from the widow of the licensee of the Black Horse pub. The sale came with one condition - the Perkins were bound not to build a competing pub. Then came the factory, which was constructed over the second half of 1857. The Perkins moved nearer to the site and William established a laboratory in the back wash house of their new home.

Perkin discovered that benzene, an organic compound, could be obtained from Miller & Co. tar distillers of Glasgow and he decided to nitrate this aromatic hydrocarbon to produce nitrobenzene which could be reduced to aniline. His knowledge of nitration as a method of introducing oxygen to benzene was doubtless based on his experience at the Royal College. The crude aniline then passed through various processes until mauve was isolated. Bearing in mind the rudimentary state of organic chemistry and chemical engineering at this time the establishing of these processes on an industrial scale was a considerable feat.

Meanwhile in the outside world demand for mauve dyed dresses was steadily increasing and producers of the natural product were beginning to feel the pressure. In January 1858 Queen Victoria's daughter married and the Queen's colour choice was mauve. Three months later the Illustrated London News note "the mauve colour at present so highly fashionable is honoured by the especial favour of her Majesty".

What had been a strong demand became a stampede. The floodgates had opened and textile dyers using traditional mauve were totally overwhelmed. In desperation they turned to the youth who had tried to persuade them of the advantages of his new fangled chemical product.

It has been said of the Industrial Revolution that it comprised the encountering of a series of technical hurdles which were then surmounted. In this case, uniquely, the solution had arrived before the problem.

At one point pure mauve was worth its weight in platinum. In five years, in his mid twenties, Perkin was worth a fortune.

The Aftermath

There were no sad endings for Perkin. In 1873 at the ripe old age of 35 Perkin decided to retire and sell the firm, in the future dedicating himself to private research and evangelical Christianity, a powerful force in Victorian society. Brother Thomas also retired, devoting much of his time to the 'pleasures of the hunt'. Perkin Senior was doubtless mightily pleased with the success of his financial gamble and concluded that maybe architecture hadn't been a good idea.

The lives of the other two protagonists were more shadowed - Victoria's by the death of Albert and Eugenie's by the death of her son Prince Louis in the Zulu War. After the sale production was moved elsewhere and the factory allowed to decline. However the site retains a connection with chemistry in the shape of GlaxoSmithKline. The Black Horse pub is still there and true to their contract the Perkins never built a competing pub.

Perkin was showered with honours and attended many banquets in his honour in the jubilee year of the discovery in 1906. Many speeches were made - but no one mentioned the Empress's eyes.

As time went on however Perkin must have had mixed feelings when he viewed the progress of the industry in Britain. On the Continent hugely successful combines had sprung up to exploit the market opening for synthetic textile dyes, branching out into a whole range of organic chemical products. In Britain, in a trend which was to become disturbingly familiar, the dye industry carelessly threw away a brilliant initial technical lead, succumbing to a lethal brew of complacency, lack of marketing, under investment in research, inability to provide trained staff topped off by a damaging contribution from Britain's Byzantine patent laws.

By 1916 dye supply problems had reached such a pitch that there was severe doubt that Kitchener's khaki clad legions would in fact be khaki clad, only overcome by a superhuman effort on the part of staff of leading dye producers, largely unknown, packing into a year development work which should have taken a decade.However lessons were learned and in the 1920s the British Alizarine company, which had taken on many Perkin patents, the British Dyestuffs Corporation along with major alkali companies and the Nobel Explosives concern amalgamated to form Imperial Chemical Industries. Perkin's discovery sparked the rise of the organic chemical industry extending over a whole range of products extending into every facet of modern living - apart from textile dyes, explosives, pharmaceuticals, medical drugs, anaesthetics, photographic chemicals, perfumery, medical dyes, paints and so on. The men of capital had discovered that by paying men of science to tweak molecules, money, lots of it, could be made.

It is not usually possible to say one individual was responsible for the ultimate rise of a whole industry but Perkin came close to it. The Stepney Historical Trust are in no doubt on the issue. A council block now stands on the site of Perkin's laboratory at King David Fort. On one wall they have fixed a plaque which states succinctly:

Sir William Henry Perkin, FRS, discovered the first aniline dyestuff, March 1856, while working in his home laboratory on this site, and went on to found science - based industry

Does any of this relate to Waltham Abbey? Yes, indirectly. Synthetic textile dyes were closely followed by explosives as initiators of the organic chemical industry.

Perkin was strongly influenced by August Hofmann at the Royal College of Chemistry. Similarly Sir Frederick Abel, working principally at Woolwich and Waltham Abbey to develop guncotton and cordite, had studied at the Royal College a few years earlier and Hofmann's ideas were equally influential on him.

In both industries the process of nitration was fundamental and process developments and discoveries made at Waltham Abbey influenced practise in both civil explosives and dye production.

Tetryl (CE) was an important initiating explosive produced at Waltham Abbey. For its manufacture dimethyl aniline, which was then nitrated, was required. This was obtained from the dyestuffs industry where it was an important building block material, made from nitrated dimethylbenzene (xylene).

It was another eighty eight years before a mode of synthesising quinine was finally discovered.

Les Tucker

60th Anniversary of VE DAY Celebration - 7 & 8th May

This was the busiest weekend we have seen with more than 1600 visitors over the two days. Fortunately the weather held up fairly well with only a few spots of rain. Queens Mead resembled an armed campsite with all the various re-enactment groups with their equipment on display.

The groups included costumed 'troops' in British, American, Russian, German and Japanese uniforms. Each day there was a mock battle enactment which, of course, we won!



In the Exhibition Centre Theatre, on both days, there were two performances by young actors from the E15 Acting School (You may remember they gave a special on-site presentation. 'BLAST', in October last year) with songs and poems from the era.



see 'Forthcoming Events' for detail on E15 show later this year.

The highlight of the weekend was surely the aerial display by 'The Grace' Spitfire over the site on the Sunday afternoon. Fortunately the weather held and we were treated to an excellent aerobatic display. The plane is the only surviving airworthy two seater spitfire trainer and was flown by the only woman spitfire pilot in the world, Carolyn Grace.



A very welcome feature, for the first time, was a 'pub' serving porter and ale supplied and manned by 'The Old English Gentleman'.

They didn't have a pub sign so we made one up for them!



Certainly the most successful events ever staged with over 500 visitors on the Saturday and a staggering 1100+ on the Sunday. There are plans to stage this event again next year.

Thanks to all the hard work by staff and volunteers, without whom it would not have been possible.



This event was supported by the Big Lottery Fund, who kindly awarded the Royal Gunpowder Mills a 'Home Front Recall Grant'

THE ROYAL ARSENAL RAILWAY AT WOOLWICH

The full history of Royal Arsenal Woolwich began over 300 years ago, at an area on the banks of the Thames that was used as a store in support of the Dockyards at Greenwich, Deptford and Woolwich. Records show that an Ordnance Store was in existence as early as 1565 supplying guns, cannon balls and gun carriages to the ships under construction. On the land known locally as 'The Warren', Proof Butts were built and cannons were tested by General Blake and his Ordnance officers. In 1667 Prince Rupert was instructed to prepare a gun-battery on riverside, facing North in order to provide a defence against the Dutch Fleet approaching London up the river.

Situated between the Gun wharf and The Warren was a manor house known as Tower House, and later to be known as Tower Place. By 1670 the Crown had decided to expand its operations on the site and in 1671, purchased the house and 31 acres of land from Sir William Pritchard. The spacious grounds were soon to be covered with cannon-balls, cannons and gun-carriages destined for the ships being built or repaired in the Royal Dockyards. Soon the Great Barn at Greenwich was built in The Warren grounds and in 1696, two Royal Laboratories (East and West Pavilions) were built to manufacture gunpowder, ammunition and pyrotechnics. In 1696 a Comptroller of Fireworks was appointed to preside over the munitions activities and, by then, the Carriage Department was in existence. At that time, the Crown did not manufacture its own cannon, and purchased or captured weapons were fitted on to new or repaired carriages. There are firm references to the Carriage Department of 1680, and the old carriage-yards appear on plans of The Warren compiled by General Borgard, first Commandant at Woolwich Barracks.

Up to 1716 the Crown had always preferred that the founding of brass and iron guns should be carried out by private enterprise, and much of this work was done by a foundry at Moorfields in the City of London. In that year, a serious accident occurred during the re-melting of captured French cannon, resulting in the death of seventeen persons including the Foundry owner. Mr. John Bagley.

Following this disaster, the Crown decided to exercise more control over gun founding and gave approval for a Royal Brass Foundry to be built at The Warren. Designed by Sir John Vanbrugh this was completed in 1717 and a young Swiss gentleman Andrew Schalch, was appointed as Master Founder. At the same time other important developments were taking place in this area, including the formation of the first two companies of Royal Artillery. The 'Great Pile' buildings were erected between 1717 and 1720, surrounding Artificer's Court and Basin Court and being used as storehouses and workshops.

In 1764 a sundial was erected over the main entrance, which led to the name 'Dial Square' being given to this part of The Warren. Today it is a very pleasant enclosed Green, which may be viewed from Beresford Square. During the 1970s The Royal Brass Foundry was extensively renovated and is the Royal Arsenal's only Grade 1 listed building. It is said to have been one of the finest cannon foundries in Europe

In 1741 part of Tower Place was taken over for use as a Military Academy, for instruction of young officers belonging to the Royal Artillery and Royal Engineers. The Academy remained at Woolwich until 1806 when the Royal Military Academy opened on Woolwich Common. It was not until 1805 following a visit by George III, that at his suggestion The Warren was officially named the 'Royal Arsenal'. During the period 1776-1856 much new building work was carried out, mostly by convict labour from the prison hulks laying at moorings in the Thames. Their accomplishments included such labour-intensive projects as digging the canal, constructing the lock gates, building the Arsenal wall, the 'T' Pier and the Iron Pier.

Iron guns were not made in the Royal Arsenal until 1855, when the Armstrong Gun Factory was built to boost production for the Crimean War. Was it just coincidence that, ten years later, a rival gun foundry was built on the Greenwich Peninsula (where the Millennium Dome now stands) under the control of a Mr. Blakely and Mr. Bessemer. The foundry was financed with money from the international opium trade; its objective was to make guns to match those of Woolwich Arsenal and to sell them abroad. Henry Bessemer, who developed the Bessemer converter for steel manufacture had become interested in Blakely's manufacturing process and they became partners. Unfortunately for Blakely shortly after 1865 the money ran out and he was soon to die in mysterious circumstances in Peru.

The many wars and Army campaigns all meant expansion of the Arsenal's facilities; it began with The Warren of approximately 42 acres and this eventually increased to almost 1,300 acres.

Most of the many workers employed at the Arsenal entered by the Beresford Gate, erected in 1829 in honour of Lord Beresford, Master General of Ordnance. The Arsenal wall, surrounding the 'Secret City', was completed to Plumstead railway station in 1857, at which time about ten thousand men and boys were employed in the war effort associated with the Crimean War. During the First World War this figure rose to over 72,000, a large proportion being women, as their men folk were absent on active service.

Just imagine what it must have been like walking alongside the perimeter wall at night in 1916, the roar of the forge furnaces, the thump of the huge steam drop hammers on white hot steel ingots and the hum of thousands of leather belts driving the machine tools from overhead line-shafts. During the Second World War the numbers employed was much reduced, owing to the need to disperse the armament factories as a protection against air attacks, just as happened at Waltham Abbey.

From 1950 the Arsenal began visibly to shrink as defence work was transferred to private industry and the MOD began to release parts of the Arsenal site for public use. It started in 1956 with the sale of 118 acres for a trading estate, and this was followed by the development of Thamesmead new town. The Arsenal officially ceased production on 1st April 1967.

Maps show that at its peak, the Arsenal stretched from the Woolwich Free Ferry to Crossness Point on the south bank of the Thames. On the inside curve of this crescent-shaped boundary, the wall stretched for 4 miles from the ferry, past Plumstead railway station, along the South-East London sewage outfall to Abbey Wood and there after via Berber junction to Crossness Point Belvedere, crossing the marshes of Plumstead, Erith and Belvedere. The Northern boundary was a riverfront of just over 3 miles and included four major piers, a truly massive industrial complex. Official records show that over 1,100 different buildings, offices, shops, sheds, huts once existed in the Royal Arsenal complex. To pin point the site's boundaries today, Warren Lane still exists, off the main Plumstead road just east of The Waterfront Leisure Centre, and Harrow Manor Way, which was at the extreme Eastern end of the Arsenal, is at the entrance to Crossness Works of Thames Water Plc.

The inherent danger of the Arsenal close to the Crossness Outfall Works was highlighted in July 1860. The engineer's Department of the Metropolitan Board of Works wrote to the War Office thus:

"On two occasions during the past month shot from the new practice ranges at Plumstead Marshes passed over the workmen constructing the Southern Outfall sewer"

From this letter it took until December 1860 to effect a solution to the problem. (The Crossness Engines Trust, RECORD Vol.8 No.4)

The first Avonside locomotives to be introduced to the Arsenal were the 'Charlton' Class O-4-O tank, they were found to be sturdy, reliable and much liked by the drivers, these started work in the Arsenal in 1916. WOOLWICH Wks. No.1748 of 1916 is the only remaining example of her class and is now at the Waltham Abbey Royal Gunpowder Mills, Essex.

A product of the Avonside Engine Co. Ltd. at Fishponds, Bristol, specialists in strong and dependable Industrial and Shunting Locomotives. The first company was founded in 1838 by Henry Stothert to supply the ever-expanding market caused by the expansion of the Great Western Railway; the original Avonside Ironworks factory was in the St. Philips district of the city. In 1841 the company's technical expertise was boosted when Edwin Slaughter - one of Brunel's Assistant Engineers from the Great Western Railway - joined as a partner, the new firm of Stothert and Slaughter became well known at home and abroad. It was re-named The Avonside Engine Company in 1864 and prospered, only to become bankrupt by the end of the decade, due to a failure to adapt to the changes in industry. In 1882 Edward Walker of Fox Locomotives set up a new 'Avonside Engine Company' and it remained a respected name for a further fifty years, moving in 1905 to new premises at Fillwood Road, adjoining Fishponds station on the outskirts of Bristol. In 1934 the business was taken over by the Hunslet Engine Company of Leeds and the Fillwood Road works closed, only a few years short of the centenary of the start of locomotive engineering in Bristol.

In 1916 the Ministry of Munitions placed an order with Avonside Engine Company for sixteen locomotives of the Charlton Class (O-4-OT). These were to be the final class of steam locomotive to be used on the Royal Arsenal Railway. The first six, BRISTOL, GLASGOW, LIVERPOOL, NEWCASTLE, DERBY and WOOLWICH were oil-fired and allocated to work in what were classified as Danger Buildings such as the Magazine and Filling Factories. The remaining ten coal fired locos were allocated to duties in Non-Danger areas such as coal and passenger haulage. All of this class were fitted with Conical Spark Arrestors but there were other subtle physical differences. Initially rear sandboxes were fitted below the footplate then moved to the tank tops, on MANCHESTER and ENFIELD the front sandboxes were fitted on tank tops although these look ungainly. The first four units had small water tank cut outs, on later units this was made longer. On SHEFFIELD, CHARLTON and DERBY a wooden toolbox was mounted on the left tank top, this may have been an in-house modification.

All the Class were constructed with outside frames to accommodate the 25in. dia wheels, at the Arsenal gauge of 18in. and the now standard axles centres of 3ft. 3in. Operating at a steam pressure of 160 lbs/sq. in. Walcherts valve gear was employed to the 8in dia. by 12in. stroke cylinders. The oil-fired units had a side tank water capacity of 260 gallons, a balance pipe connecting the two tanks, boiler feed by two Craven & Chesham injectors. The rear portion of each tank sectioned off for 50 gallons of light fuel oil, which was preheated via a steam coil before atomisation through a Kermode burner. It is presumed that on the coal fired units; this 'oil tank' would have served as coalbunker. Overall the Charltons were a sturdy and presentable locomotive, with a tractive effort of 4,980 lbs. They were quite happy to work around curves of 35ft. radius and could manage a tight bend of 25ft. if required.

Unfortunately, no photographs appear to exist of WOOLWICH operating on the RAR system, however others of the class DERBY, CHARLTON, SHEFFIELD and MANCHESTER have been recorded for posterity. In the mid 1920s after the First World War, manufacturing had declined at the Royal Arsenal and work was dispersed to other MOD sites across England.

During the mid 1930's the advent of diesel and the expansion of the standard gauge lines in the Arsenal meant that many narrow gauge locos were sold off or scrapped. After World War II manufacturing again declined and by 1947 NEWCASTLE and COLCHESTER were taken out of service and scrapped, MANCHESTER followed a similar fate in 1951.

The only survivor of the class, WOOLWICH was put into storage in around 1954 on sidings at the Royal Arsenal, before being disposed of in 1960 to dealers Messrs E.L. Pitt & Co. of Brackley, Northampton, having been extensively overhauled and possibly a new boiler fitted during her last days at Woolwich. During her time in the yard at Northampton the conical spark arrestor chimney was replaced with one of conventional design. In April 1962 she was put back into steam, on blocks by

J & W. Gower of Bedford, prior to sale and moved to Devon on 11th April 1962. There she was to assist with track laying and run on the newly constructed 18" gauge line at The Bicton Woodlands Railway. During her life in Devon an air braking system was fitted to be compliant with HMRI regulations, which is fed from a steam driven Stuart pump mounted on the rear of the cab. To accommodate the air reservoir the rear cab wall has been extended back some 6". The believed original RAR livery of green lined out with yellow was changed to blue with yellow lining.

Unlike so many of our heritage locomotives that have rusted to oblivion, or have been cut up for scrap, WOOLWICH was well cared for in the last 40 years and has now returned to a Heritage Industrial site at the Royal Gunpowder Mills at Waltham Abbey, Essex. It is likely that 100 years of working steam will be witnessed yet again to celebrate the durability of British Engineering in the post Victorian era.

Hunslet Locomotives were first introduced to Woolwich in 1934, the reliability of true diesel engines gave the Arsenal another opportunity to try another interesting locomotive, a high-powered locomotive was required, and it had to be capable of traversing the thirty-foot curves of the 18in. system. Built by the Hunslet Engine Co. Ltd. of Leeds, this was their first articulated type of loco, this wheel arrangement was essential to traverse the exceptionally sharp curves of Woolwich metals.

Named ALBERT, Double Bogie Diesel Wks. No.1722 of 1934 had an O-4-4-O configuration and was an interesting comparison to the much earlier double-bogie Akroyd Hornsby No.6234. built in 1903. The power unit for this first Hunslet was a McLaren Benz MDB 4 four-cylinder engine developing 75hp at 1,000 rpm CAV fitted with Bosch injection equipment. Accessibility was seen as an important feature, and embodied the "Hunslet" design of loose side shutters which were easily removed by one man, leaving the whole of the engine, starting gear and transmission open for inspection, lubrication and cleaning. The starting was carried out by a Scott 2-cylinder two-stroke engine, which automatically engaged and disengaged with the main diesel engine, the two-stroke was hand started from inside the cab. The "Hunslet" pre-selective change gear employed and was at that time the smallest locomotive to use this system. The main drive from the engine to the gearbox was through a multi-plate clutch, followed by a Hardy Spicer flexible coupling in order to prevent any cross strains in the frame set up by the articulation of the bogies. From the gearbox, which was mounted centrally in the frames, the final drive to the wheels was by means of a worm on to the jackshaft, the latter being coupled to the crank by rods, giving pre-selected speeds of 4 & 8mph. This jackshaft arrangement had been fully tried and proved, the first "Hunslet" standard gauge locomotive manufactured for the L.M.S. Railway, No.7401 had successfully operated for 35,000 shunting miles without need for mechanical overhaul.

CARNEGIE was to be the last narrow gauge locomotive to arrive at Woolwich (1954) and was a direct development of ALBERT with identical transmission and a very similar external appearance, so similar in fact that the makers handbook that

the Mills received with the loco was in fact an ALBERT handbook with all the technical differences changed in fine black pen! This more modern loco was fitted with a McLaren 88hp engine and the refinements of electric start, lighting, cab heating, and two gears in both forward and reverse. Westinghouse air braking was fitted to both bogies, compressed air being supplied by a two-cylinder compressor driven from the main engine. The hand brake was arranged to work in conjunction with the air brake and was compensated for operating correctly on both bogies. Air sanding gear was fitted for operating in both directions.

Disposal from the Arsenal in 1961 to dealers F & J Darnell in Essex, she was later purchased in 1966 by Bicton Woodlands Railway and operated on this line before being sold to the Royal Gunpowder Mills at Waltham Abbey, Essex in 2000.

Robin J. Parkinson WARGM Railway



'CARNEGIE' and 'WOOLWICH' now on display in front of the Volunteer Base.

Work continues on 'sprucing up' the locos and information boards are on display and leaflets available for visitors.

TOUCH



This photo was taken at the recent wedding of Dave and Sue Tisley. Sue had, from childhood, always kept her fvourite teddy bear and insisted that he should be in attendance. Since it was hardly fitting for the bride to carry him at the ceremony some luckless person was deputised. The lot fell to our ex-Treasurer, Frances Burgess who was left holding the 'bear' and caused quite a few raised eyebrows and whispered comments from those who did not know the circumstances. Whilst somewhat embarrased, Frances managed to 'bear' with this with great fortitude.

Knowing the circumstances it has still been suggested that this photo deserves some humorous caption and any suggestions would be most welcome.

MORE MATTERS CULINARY

As a young Assistant Scientific Officer in the early 1950s, many brought sandwiches for lunch and in the summer ate them outside the 'Old Main Lab'. In winter however and unknown to the upper echelons, instead of going to the canteen we heated up soup or boiled an egg in the lab upstairs. One episode I remember; someone, I won't mention her name to spare her blushes, decided to have an egg. Since it was Easter we decided to dye it with methylene blue. Unfortunately the shell had cracked and the white went blue and the yolk green. It cost us her lunch!

As an item of research can anyone tell me if there was a standard MoD cookbook or did each cook do her own thing? I only ask because Plum Duff always had the same sultana or currant density and both the gravy and custard did not vary in viscosity at all the MoD establishments I visited - except at AML Holton Heath whose Duff had a much higher currant count.

I once wrote a satirical verse based on "Oh God our help in ages past"

(bet it started "Oh Cod ….". Ed.) about the shrinking size of cod portions. It didn't go down too well and I was hauled before Miss Davidge and asked to explain myself and justify my criticism. They never did publish it.

My literary efforts have often got me into trouble and still do as I draw cartoons for my local Coast Watch lookout at Pawle Point, but things here are so much more relaxed. Geoff Howell

BYTES



This photo of BWD staff was taken outside the Carpenters Shop which stood on the concrete apron by L168, sometime in the mid 60's. Can anyone put a name to any of the numbered faces. If so please send a note or call. Ron Treadgold: 9 Mark Ave. Chingford, E4 7NR tel: 02085295673

No 'entries' for the "Why Did I Join The Friends" series. Those printed so far were very interesting and I had hoped to make this a regular feature. Alas! nothing this time round.

Perhaps in the next issue? Ed.

DON'T FORGET DEADLINE FOR THE September 2005 ISSUE: 15th August 2005

[20]

Arthur George Witham

1918 - 2005



Arthur worked at Waltham Abbey as a Chemical Plumber, joined ERDE in 1933 retiring after 49 years service in 1982.

He was a master craftsman, specialising in the construction of lead process equipment (a fine example of an NG Burette is currently on display in the Laboratory Exhibition).

He was a great supporter of the Friends Association and always looked forward to the annual reunion.

Arthur had been in bad health for some time but refused to give in and was always cheerful. He passed away on 24th February. A service was held in the Waltham Abbey Church on 14th March followed by the commital at the Waltham Abbey Cemetery. He will be greatly missed.

Robert ('Bob') Simkins

Bob, as he was usually known, passed away on February 17th. He joined ERDE in 1954 and worked in 'Organic Chemistry', 'Analytical Services' and 'Propellants 1 Branch'.

He was a very sociable character and was very active in the Social and Sports Club and a keen sailor; being a leading member of the Fishers Green Civil Service Sailing Club.

Bob retired in 1973 and moved to Moretonhampstead in Devon but still managed to attend a reunion a couple of years ago.

THE GUNPOWDER & EXPLOSIVES HISTORY GROUP SPRING MEETING at WARGM 21st May

This was a very interesting meeting which was open to all interested parties and was attended by a number of our members.

The first session was on the Waltham Abbey archives with a talk by Malcolm McLaren on the original archive which he initiated when he was the establishment librarian. Without his pioneering work on the Waltham Abbey Special Collection we would not still have the enormous number of documents, photographs, maps, drawings and artefacts that form the main basis of today's archive.

This was followed by a talk given by Les Tucker, currently in charge of the site archive, on the challenges of sorting and listing the surviving material.

The distinguished historian of science and technology, Professor Seymour Mauskopf of Duke University, North Carolina gave a fascinating insight into the career of Sir Frederick Abel. Sir Frederick was a War department chemist noted for his work on guncotton and cordite in the late 19th century. Recently discovered papers, now on loan to the WARGM by his descendants, brought to life his character and thinking in a way not apparent from official records. Some his family descendants were present at the meeting, their surname Wallis, gives an interesting link with another famous scientist and inventor, Barnes Wallis.

The afternoon session saw a talk by Jenny Webb and Anne Donaldson with 'News from Ballincolig" - the Royal Gunpowder Works in County Cork, Ireland. The bad news is that the visitor centre there has closed through lack of support and money and many of the surviving structures are very overgrown and inaccessible. The speakers were trying to resurrect interest in the site and appealed for any assistance and ideas that would help.

The final talk was by Wayne Cocroft of English Heritage on 'Some of the Surviving Physical Structures at WA associated with Sir Frederick Abel' followed by a tour of these features led by Wayne.

It was a rare treat to be allowed to attend this meeting and a thoroughly enjoyable and stimulating day.

Norman Paul

THINGS MY MOTHER TAUGHT ME

My mother taught me:-

TO APPRECIATE A JOB WELL DONE - "If you're going to kill each other, do it outside. I just finished cleaning"

RELIGION - "You better pray that will come out of the carpet"

TIME TRAVEL - "Straighten up or I'll knock you into the middle of next week'

LOGIC - "Because I said so, that's why"

IRONY - "Stop crying or I'll give you something to cry for"

OSMOSIS - "Shut your mouth and eat your supper"

CONTORTIONISM - "Just look at the dirt on the back of neck"

WEATHER - "It looks as if a tornado swept through your room"

PHYSICS PROBLEM - "If I yelled that a meteor was coming towards you, would you listen THEN?"

HYPOCRISY - "If I've told you once, I've told you a million times. Don't exaggerate"

THE CIRCLE OF LIFE - "I brought you into this world and I can take you out"

SACRIFICE - "One of these days I'll swing for you"

BEHAVIOUR MODIFICATION - "Stop acting like your father"

ENVY - "There are millions of less fortunate children in this world who don't have wonderful parents like you do"

ANTICIPATION - "Just wait until I get you home"

RECEIVING - "You're going to get it when I get you home"

MEDICAL SCIENCE - "If you don't stop crossing your eyes they're going to freeze that way'

THINK AHEAD - "If you don't pass your exams you'll never get a job" **HUMOUR** - "When that lawn mower cuts off your toes don't come running to me"

HOW TO BECOME AN ADULT - "Eat your vegetables or you'll never grow up"

GENETICS - "You're just like your father"

WISDOM OF AGE - "When you get to my age you'll understand"

and my all time favourite:

JUSTICE - "One day you'll have kids AND I HOPE THEY TURN OUT JUST LIKE YOU!"

EVENT CALENDAR

MAY	1,2	English Civil War
	7,8	V E Day Celebrations
	21, 22	Napoleonic Association
	28-30	Meet the US Cavalry
JUNE	4,5	Military Vehicles Show
	11,12	Essex Militia
JULY	2,3	Martial Arts Display
	16,17	English Civil War
	23,24	National Archaeological Days
AUG	6,7	American Civil War
	28,29	Napoleonic Association
SEP	3,4	Essex Militia
	10,11	Robert Catesby's Last Stand Remember, Remember
	24,25	Guy Fawkes Experience
ост	8,9	BLAST2!
		(E15 Acting School)

Latest information at time of press For updates: see www.royalgunpowdermills.com or ring 01992 707370