

Autumn 2013

# TOUCHPAPER

The Newsletter of the Royal Gunpowder Mills Friends Association

**Dambusters Raid 1943**

**Book Review - Company of Spears**

**More South Site History**

**Some progress on the Waterwheel**

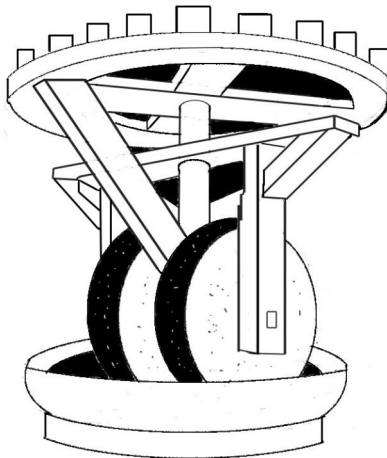
**Obituaries:**

**Ron Treadgold**

**Jill Kemp**

**Letters:**

**Life Down Under**  
**South Site History**  
**Badminton**



# Officers of the Friends Association

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**Deadline for the next issue is 8th November**

# Chairman's Chat

For many years until 2010 we exchanged newsletters with the Royal Small Arms Factory Apprentices Association. I have now heard from Ray Tuthill, for many years chairman, and latterly president, that the Association has folded.. At their last AGM they were unable to fill the posts of chairman, secretary or treasurer and therefore closure was the only option. We are very sorry that this has had to happen but send our best wishes to their members and hope that that they may be able to keep going on an informal social basis.

I understand that their heritage items will be distributed mainly to Enfield Museums Service with some going to the RSA Trust.

Although visitor numbers at the Mills have not been as high every day in the school holidays as we might have wished, the August Bank Holiday saw many people here for Robin Hood which was a very enjoyable show. Unfortunately one of their rockets malfunctioned, resulting in three children suffering minor injuries.

The modification and move of the water wheel dedicated to Norman Paul, our previous chairman, is nearing completion and we hope to switch it on soon. Its move has taken more time and effort than I had expected but our particular thanks go to Peter Hart who has played a major part in it and has funded some of the new components.

Best wishes to you all and hopefully continuation of the good weather we are having (as the children are about to go back to school!).

*John Wright*

# Editorial

Bryan Howard's article in the last issue requesting information on South Site generated four replies, all responding rapidly. Many thanks to all; the letters appear in this issue. Bryan has another request (large CDB 'Greenplane' charge) so I hope we can have a similar response.

I'm glad to say that once more I have more material than would fit in this issue, so I've already started on the Winter version!

We are gathering material for an article on Harold Young, I would be happy to receive contributions and pass them on to whoever does the final write up. If you have email that would be the preferred method, I cannot guarantee return of original material.

The last few issues have been larger than in the past and postage costs have risen significantly. This means that we shall be increasing the subscription of those members still requesting paper copies by £1 next year, there will be no increase for those taking the email version.

Brian Clements

# **Dambusters Raid 1943 - 70th. Anniversary**

## **The Bouncing Bomb ('Upkeep') and the RGPF Waltham Abbey Connection**

On 16th. May 1943 19 Lancaster bombers of 617 Squadron, led by Wing Commander Guy Gibson, took off from RAF Scampton in three waves on one of the boldest bombing actions of WW2 – Operation Chastise, employing the 'Bouncing Bomb'. The following outlines the story and the connection of RGPF Waltham Abbey with the bomb.

The objective was to breach the dams which held the reservoirs serving the vital Ruhr industrial area, inundating its factories and power stations. Three dams were targeted – Mohne, Eder, Sorpe.

The project originated in British military interest in finding a means of attacking targets such as the battleship Tirpitz, moored in a Norwegian fjord, and the dams holding the water for German hydroelectric schemes. In April 1942 Barnes Wallis, working for Vickers Armstrong, wrote a paper entitled 'Spherical Bomb – Surface Torpedo' describing a method of attack involving bouncing a bomb across the water at a target with the explosion occurring under water, taking advantage of the 'bubble pulse' effect of underwater explosions to increase explosive power. Strictly speaking the bomb did not bounce, it ricocheted – a technique to improve range in maritime warfare first postulated by Wm. Bourne, a master gunner in the reign of Elizabeth I.

At that time the subject was being examined by several governmental research organisations and it was decided to carry out test explosions. One of the organisations in the forefront of investigation at that time was the Road Research Laboratory at Harmondsworth and they set up a test, conducted by a RRL scientific officer Dr. A.R. Collins, involving the detonation of a naval mine against the face of a redundant dam at Nant-y-Gro in the Elan Valley in North Wales. Barnes Wallis attended as an observer. The result, in May 1942, was

spectacularly successful.<sup>(1)</sup>

Encouraged, Wallis pursued his plan, alongside his normal work. In the meantime development continued at the RRL and other centres but Wallis, partly by virtue of his position as designer of the necessary modifications to the Wellington bomber, which was selected as the vehicle for the first airborne test (Lancasters were used on the actual raid), gradually assumed the role of the driving



### **Result of test explosion at Nant-y-Gro dam**

force of the project. This continued to be in parallel with his normal duties and did not attract unqualified support. At one point he was hauled up in front of his boss, the CEO of Vickers, given a severe ticking off and told ‘to stop making a nuisance of himself’.

Legend has it that Wallis, in the finest British backroom tradition, started his first experiments in his garden with marbles and a tin bath. He obtained permission to use the test facilities of the National Physical Laboratory and there he pursued the idea of imparting back spin to the bomb, as in driven golf balls. This increased the ability to bounce, improved height and stability of flight and ensured that when it hit the dam face it would then bounce away but the

remaining back spin would draw it back to where it would sink as near as possible to the face <sup>(2)</sup>.

In August 1942 he convinced the Ministry of Aircraft Production that the idea was feasible and justified trials from aircraft and in November 1942 approval was given for the manufacture of test examples of a bomb designed for use against dams, code name 'Upkeep' later termed the Bouncing Bomb, to be manufactured by Vickers, Type No. 464. The first trial, using a concrete filled bomb, was carried out in December 1942 on the Fleet Lagoon at Chesil Beach, Dorset, where there was a long lagoon between the land and a shingle bank stretching to Portland, in a Wellington bomber flown by Captain Matt Summers, chief test pilot of Vickers. Testing was a hazardous undertaking. A later test drop programme of the naval version of Upkeep by the Americans in 1945 was abandoned after the bomb bounced back on the aircraft causing it to crash with the loss of the pilot. There was one fatality at the Chesil Beach.

Originally Upkeep comprised an inner cylinder filled with explosive and an outer spherical case. It was found that the outer cases were shattering on impact and they were abandoned, with the cylinder remaining. (It has been reported that in the film *The Dam Busters*, made in 1955, the bomb depicted was shown as spherical, not the final cylindrical. Apparently this was done at the insistence of the Authorities, for security reasons).

Not surprisingly many subsidiary problems were encountered, e.g. there was no bomb trolley existing which could carry Upkeep, a special one had to be made. It was not possible to move it into the bomb cradle by the normal method underneath, instead the tail of the aircraft was lifted by crane and the bomb wheeled in from behind. It was found that the weight of metal involved was affecting the compass of the aircraft. This was countered by employing two compass deviation cards, one for flying without the bomb and one for



## **Bouncing Bomb**

when flying loaded. Denting of the casing on impact was a problem – the dents could affect the underwater dynamics. This was countered by the use of a phenolic resin expanded into a foam.

Critical to success was maintenance of the correct spinning speed. The bomb was given a backspin at 500rpm 10 minutes before release. Originally the intention was to use a Ford V8 engine but this was later replaced by a Vickers Jassey hydraulic motor, powered by the hydraulic system of the upper gun turret, which had been removed, with the speed of rotation monitored on a rev counter and controlled by a valve linked to a gear box and a pulley which drove a rubber belt which spun the bomb via a pulley. The crew member deputed to this control function was the wireless operator, presumably because he would be free on the run in. To counter vibration each bomb was balanced on a test rig in the same way as car wheels with small weights fitted on the ends of the casing until it span without vibration. It was held in place by two spring loaded calipers which were flipped open allowing it to drop.

To trigger explosion there were three fuze pockets containing



hydrostatic pistols. These operated by water pressure and when the bomb reached a certain depth they triggered an initiating explosion which triggered the main explosion – similar to the system in naval depth charges. There was also a self destruct celluloid / acid delay time fuze similar to that on aerial bombs.

Aiming was via a pair of intersecting spotlight beams and a hand held device. This proved awkward and some crews resorted to a chinagraph and string!

By February 1943 the trials and necessary improvements had progressed to the extent that Wallis could claim that the bomb was a practical proposition. The scheme encountered considerable scepticism. A special presentation was made to Air Chief Marshal Arthur ‘Bomber’ Harris. Harris returned the subsequent write up with the hand written comment - ‘This is tripe of the wildest description. There are so many if and buts and there is not the smallest chance of it working’. However by this time the ultimate arbiter, the Air Ministry, had decided that the project should go ahead. The time given to make all preparations for modification to



**Guy Gibson and Lancaster aircrew**

aircraft, obtaining equipment, crew training etc. was extremely short – the latest the drop could be made was May, after that the estimated water level in the dams would be seasonally lower, reducing the effectiveness of the bomb.

Wing Commander Guy Gibson DFC, aged 24, was appointed to lead the mission and he began an intensive period of crew selection and training, including practice flights over the Derwent reservoir dam in Derbyshire. Projected flying heights – 100 feet on the journey – to dodge anti-aircraft fire and night fighters, and 60 feet, the height of a medium size tree, on the approach to the dams were regarded by some as suicide.

By this time it had been determined that the only aircraft capable of carrying the weight and dimension of Upkeep was the Avro Lancaster. The Lancaster was designed to fly at an operational height of 10,000 feet and substantial modifications were required to enable flying at these lower levels. As Gibson said of the 60 feet - ‘At that height you would only have to hiccough and you would be in the drink’.

## **The Waltham Abbey Connection**

Although little mentioned in accounts, the explosive filling of the bomb was of crucial importance. It was found that an explosive composition named Torpex, originally developed for torpedo warheads, providing a longer explosive pulse for greater effect on underwater targets, was eminently suitable. Torpex comprised 42% RDX, 40% TNT and 18% aluminium powder. The total weight of the bomb was 9250lbs. and the explosive filling 6600lbs. RDX was an extremely powerful explosive and the practice was normally to use it in conjunction with TNT. Aluminium powder was added to increase energetic performance.

Both the two main elements of Torpex and development of the product were closely linked to the Royal Gunpowder Factory at Waltham Abbey.

RDX was a crucial explosive of WW2. After initial development of a manufacturing method by the Armament Research Department at Woolwich the Royal Gunpowder Factory at Waltham Abbey had taken on the vital function of establishing, early in 1939, and operating a pilot plant. This would enable ironing out any problems, engineering the design and gaining the experience of a system which would enable production on an industrial scale at a new Ordnance Factory being built at Bridgwater, Somerset. Events were moving very quickly. By the time war was declared in 1939 Bridgwater was still being built and was not, in fact, ready for production until August 1941. Over the first two years of the War therefore the Waltham Abbey RDX plant, which was intended as a small scale pilot plant, was pitchforked into the role of sole supplier of RDX to the Forces and it is to its considerable credit and the staff that it successfully fulfilled this role.

The development of TNT followed a similar pattern. Although TNT had been used in WW1 there were doubts as to the use of the manufacturing process employed. Development staff at Waltham Abbey produced a plan for a vastly improved continuous nitration process which was successfully tested in a pilot plant erected at Waltham Abbey in 1939 and provided the template for TNT production at the new ordnance factories which were built.

Having played a crucial role in establishing manufacturing processes, the underwater facility at Newtons Pool to the north of the gunpowder factory was then used extensively for testing.

## **Catalin**

The connection of Waltham Abbey with the Bouncing Bomb did not end with Torpex. The use of an expanded phenolic resin foam to protect against denting has been mentioned above. This was a proprietary product termed Catalex, made by Catalin Ltd.

Catalin were the UK offshoot of the Catalin Corporation of America, resin manufacturers, established here in 1937 on the site in Farm Hill Road previously occupied by Joyce & Co. manufacturers of percussion caps for small arms ammunition.

The details of the outcome of the mission are well known.

The first wave, of nine Lancasters, led by Gibson, in the face of fierce anti-aircraft fire successfully breached Mohne, releasing a torrent of water.

Similar success was achieved with Eder.

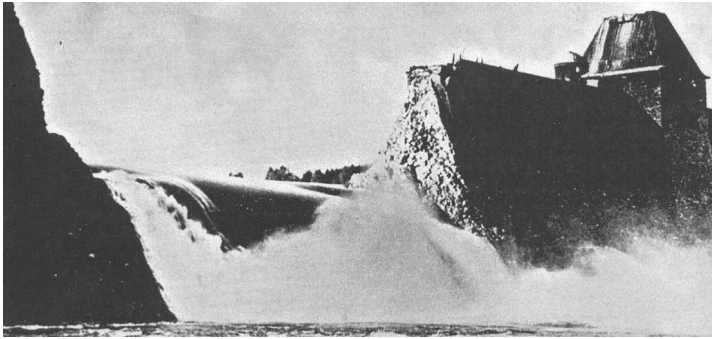
Gibson's bomb, at Mohne, the first to be dropped, failed to reach its target, but he then took on the highly dangerous task of circling to direct subsequent attacks and draw anti-aircraft fire away from those making their bombing runs.

The attack on Sorpe was less successful, damaging but not destroying it. Large waves were generated and one of the Lancasters was flying so low that it lost its bomb to the spout created by the previous aircraft.

Not surprisingly there was a huge sigh of relief when a bomb was successfully released and the Lancaster involved could turn for home.

Navigators were required to maintain flight logs. The log of Flight Sergeant Vivian Nicholson,<sup>20</sup> navigator on the Lancaster AJ-J 'Johnny' piloted by Flight Lt. David Maltby, has recently come to light. This aircraft was in Gibson's first wave and Nicholson was on his first bombing mission. Although the logs were obviously meant to be written in correct official language, he couldn't resist a note of youthful exuberance in the General Observations column of the log.

One of his first entries reads 'Chocks away' and revealingly when



## **Mohne breach**

their bomb is dropped ‘Bomb dropped – Wizard’.

His navigation system was jammed by enemy counter measures and Maltby had to take violent evasive action to avoid anti-aircraft fire – this in a plane designed to lumber along at 10,000 feet.

Maltby was in fact to play a vital role at Mohne. After damage had been caused by previous bombs but not a breach Gibson ordered Maltby to attack and his bomb successfully caused the breach. Having dropped his bomb, at 49 minutes past midnight, Maltby brought his unscathed Lancaster back to RAF Scampton at just after 3 in the morning of 17th. May 1943.

As always, there was a price to pay. Eight of the Lancasters out of the original 19 did not return. Of the total 133 aircrew 53 men of 617 Squadron lost their lives and three were taken prisoner.

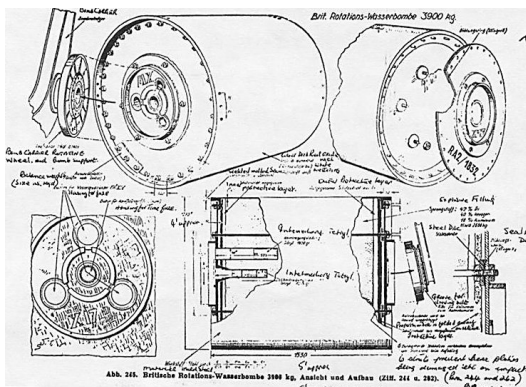
Gibson was decorated with the Victoria Cross and in total 33 of the surviving Dambusters received honours.

## The Aftermath

One of the aircraft intended to attack Sorpe – AJ-E ‘Easy’ piloted by Flight Lt. RNG Barlow, from Australia, hit an electricity pylon just inside the German-Dutch border. It crashed in a field outside the village of Haldern and all seven members of the crew were lost.

German bomb disposal units, led by one of if not the foremost German bomb disposal expert, Heinz Schweizer, rushed to the scene when it was realised that something extraordinary had been thrown clear of the aircraft. As the bomb had not been released and the aircraft crashed on land none of the detonation devices had fired and the bomb was recovered intact. It was taken urgently to the Luftwaffe’s test ground at Rechlin, where its mechanism and intention were analysed.

By an historical irony we are indebted to Rechlin for a drawing of the bomb. It was filed at the Royal Ordnance Factory Chorley and in a history of the Factory its authors comment – No English drawing of the bomb appears to have survived to the present day, but amazingly a German drawing does exist!



**German drawing of captured Bouncing Bomb**

A copy version 'Emil' was built and tested at the Luftwaffe test site at Travemünde on the Baltic. Again a hazardous operation. The importance of back spin had not been grasped and the pilot of the test plane had the disconcerting experience of seeing the bomb match the speed at which it was dropped. The project was discontinued in 1944.

The implications of the crash and the realisation that a bomb might have been recovered intact caused considerable perturbation in Britain and as a result anti-aircraft defences at all British dams were considerably strengthened.

For his action, and previous bomb disposal work, Heinz Schweitzer was awarded the Knight's Cross of the Iron Cross. At considerable risk to himself he later saved a large numbers of prisoners from being shot by the SS.

Debate still continues as to the strategic significance of the damage caused by the raid. Some opinion has it that it wasn't quite as much as Wallis might have claimed – the ability of German industry to recover after apparently catastrophic damage was not fully appreciated until after the war's end.

However public morale was an important part of total war and the Dambusters Raid was undoubtedly an important boost to public morale in the dark days of 1943.

In a spirit of reconciliation, and with the agreement of the farmer who owns the field, a local police officer has placed a plaque at the site of the crash of AJ-Easy. It is hoped that it will be replaced by an official plaque.

(1) History has not been too kind to Collins and the contribution made by other prominent members of the Road Research Laboratory and other research organisations. In a paper read in 1982 he said that the importance of the role played by Sir William Glanville, Dr. G. Charlesworth and others had been overlooked and implied the role of Barnes Wallis had been overplayed to that extent. However the fact remains that the man who ultimately drove the project through to completion was Barnes Wallis.

(2) Again the edges of history become blurred. Barnes Wallis is credited with introduction of the idea of back spin. However also in 1982 in a lecture delivered by Sir George Edwards, former chairman of British Aircraft Corporation, he said that in fact he had persuaded Wallis to employ the idea.

## **Post Script**

1. In New Zealand at the Museum of Transport and Technology there is a mechanical differential analyser analogue computer. It is alleged that this was used in the design of Upkeep. Can the computer experts say anything on this?

2. National memorials have high maintenance costs. The maintenance bill from Westminster Council for the Bomber Command memorial, opened by the Queen last year, is £1.5 million. To meet this an appeal has been launched, under the aegis of a club, patron Dame Judi Dench. Someone has neatly made the connection between the alternative name for maintenance – upkeep and the bomb employed in the raid and has named the club the Upkeep Club.

**Les Tucker**



## **Book Review**

### **Company of Spears by Alan Mallison**

Allan Mallinson, a former Cavalry Officer, has written a series of novels based on the exploits of Matthew Hervey of the fictitious 6th Light Dragoons and he refers to an incident at 'the gunpowder mills at Waltham Abbey' in his eighth novel, 'Company of Spears'.

The incident involved an attempt by armed men to make off with a large quantity of gunpowder in 1827. As a result it was decided that the mills and magazines would be reinforced by posting three companies of the Sixtieth Rifles and a troop furnished by Hervey there after dark in order to intercept the conspirators. It was considered that they could be Irish as part of their campaign under O'Connell for Catholic emancipation. Much detail is provided by way of features of the Mills resulting from research by the author on the local area as well as initial advice from Les Tucker. Thus we have various references including those to the (former) Four Swans in Waltham Cross, Powdermill Lane in the Abbey, sailing barges taking gunpowder to Woolwich, the part canalized Mill Head and the Grand Magazine. The author builds up the atmosphere and resulting skirmishes very well and these are described in a Chapter appropriately entitled 'Gunpowder, Treason and Plot'. The troops feared that the intruders would be armed but had underestimated how well armed! There was a fierce exchange of fire in the darkness and there was much confusion as the troops tried to gain the ascendancy. One soldier was killed and three injured; a dozen intruders were killed and half a dozen more captured. The latter are described as a bunch of ruffians, much the worse for drink, resulting in them shooting two of their own. As they were so ill disciplined and incompetent Hervey was certain that, in addition, expert marksmen had fired on the soldiers but they were never captured. There were rumours that they could have been agents provocateurs, possibly part

of a papal plot. However, the official summary of events was that ‘the 6th Light Dragoons, commanded by Acting Major Matthew Hervey had done their duty with economy and efficiency’. A Plan of the Mills in 1830, taken from Frederick Drayson's ‘A Treatise on Gunpowder’, appears at the beginning of the book and is reproduced alongside this review.

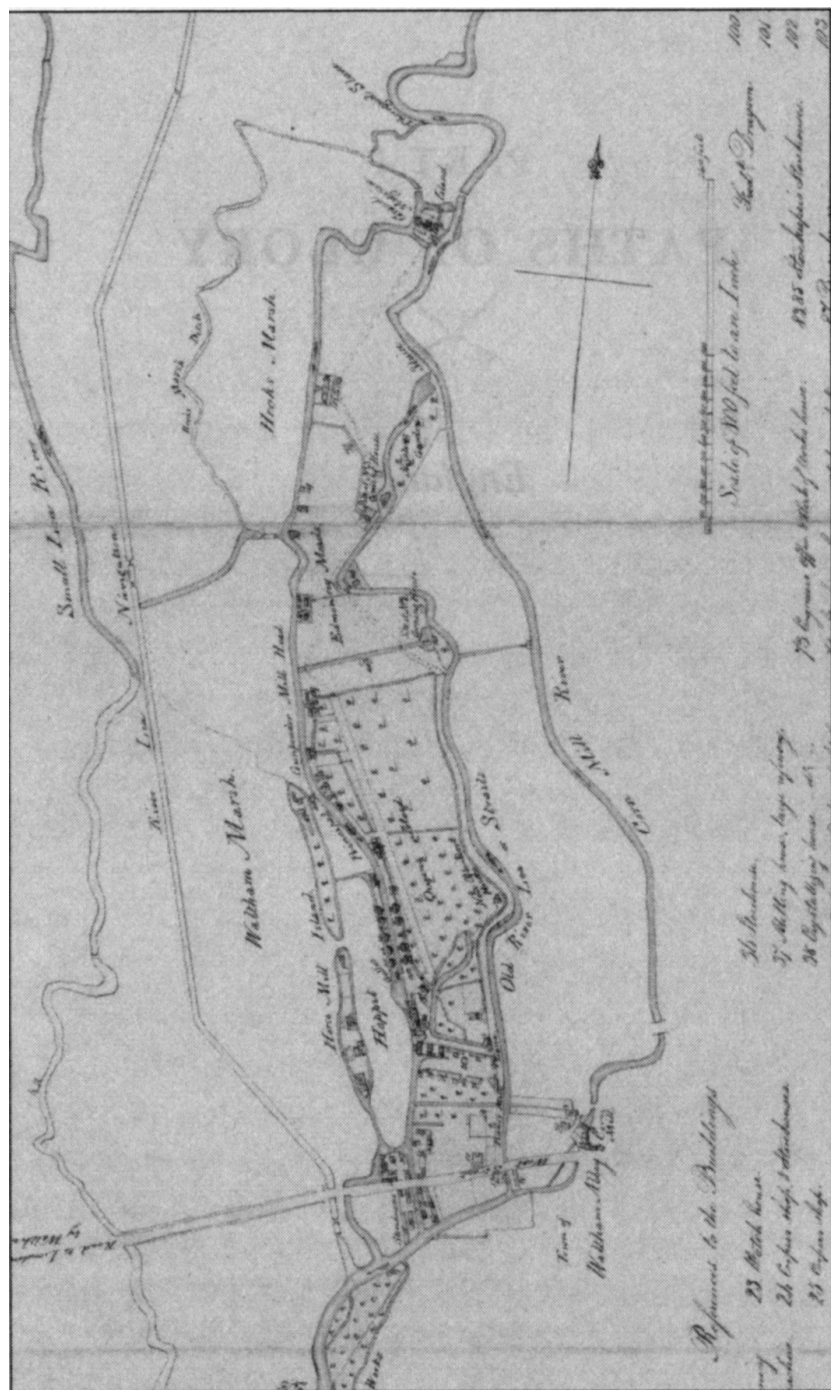
Although members will no doubt be most interested on the sections of the book referring to the Mills, there is much more to enjoy in this well written and exciting novel. The reader benefits from the author's intimate knowledge of cavalry and military matters generally. This includes the weapons used on both sides of various battles and the well being of the horses on which the Troop so much depends. He brings out the importance of being able to rely on comrades in the heat of battle. He is also well versed in army politics and the related hierarchy. Hervey is a brave, dashing hero and, as an eligible widower, he has more than one lady admirer, thus providing the romantic interest.

The book culminates on the plains of South Africa, where he confronts the savage Zulu. The input of a mixed-race captain from the disbanded Royal Africa Corps, who has the necessary local knowledge, is vital as the Zulus fight like no army Hervey has encountered before.

I hope you will enjoy 'Company of Spears'

Michael Seymour

Note the ‘Treatise on Gunpowder’ is being prepared for printing and it is hoped it will be available in the near future. Ed



Plan of the Royal Gunpowder Manufactory at Waltham Abbey in 1830  
by Frederick Drayson from his *A Treatise on Gunpowder*. The National Archive, ref. MF11 15/31

# Letters to Touchpaper

## **Life down under... Do I qualify?**

Visiting Australia on business was, for a few, one of the perks of a career at Waltham... remember the Joint Tropical Testing Unit at Innisfail and attending collaborative get-togethers?... Some staff even stayed for good. But what defines down under? If it is living in the southern hemisphere then I just squeeze in by 150 miles.

Kenya is not a typical retirement destination but a complicated background, that actually started long ago from when I took a 5 year secondment from MOD to Overseas Development, now sees me writing from the family “shamba” (Swahili for smallholding). We are just south of the equator overlooking the Great Rift Valley of Africa. It’s a glorious 7 acres with all the animals of an English farm plus visitations of zebra, eland and baboon. Of course it’s a far cry from the gentle nature of English country life but I’m not the first to be hooked by East Africa with its ups and downs.

A cold beer on the veranda as the sun goes down, which on the equator is at 7pm all the year round, soothes the occasional frustrations brought about by, for example, the state of the roads or those baboons raiding and making off with the maize cobs.

Our neighbours are as diverse as can be, from the famous anthropologist Richard Leakey to pastoral Masai whose assets are in the cattle and goats they herd. Some young people need help and I run a UK charity which assists them with school fees. Our website is [sket.org.uk](http://sket.org.uk).

It is true to say that for me all this has come about from an era of career opportunity that many of us enjoyed at Waltham, unlikely in the Civil Service of today.

David Debenham

Kiserian  
Kajiado District  
Kenya

and Sevenoaks, Kent

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## South Site History

With reference to Bryan Howard's query in the summer touchpaper,  $S_o$  is the symbol for specific surface area, e.g. the surface area of a powder, in  $\text{cm}^2$ , derived from  $1 \text{ cm}^3$  of solid material.

During my time at ERDE ammonium perchlorate was usually milled to  $S_o = 2000 \text{ cm}^{-1}$ .

In Ernie Cooke's lab this value was routinely determined using an air-permeability technique and the Carman-Kozeny equation.

Tony Maddison

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In the latest edition Bryan Howard poses a few questions and I suspect you will be inundated with responses but here's my two pennyworth.

Dalterol is a brand name for a specific (US) supplier of hydroxyl terminated polybutadiene (HTPB), an inert binder for propellants and explosives. The key variant for different sources of HTPB is its

viscosity (from differences in the distribution and range of molecular weights comprising it).

If my memory serves me correctly,  $S_o$  numbers (specific surface) are in units of  $\text{cm}^{-1}$  and the relationship between diameter (approximating the particles to spheres) is given by

$60,000 = S_o \times \text{Diameter}$ , where the diameter is in microns.

Bryan mentions a picrate-carbamite complex and here my memory may be letting me down, but I think it was a picrite (i.e. nitroguanidine) –carbamite complex. I don't see it doing much for ballistics, but maybe it was intended to improve chemical stability?

Dave Mullenger

I must accept responsibility for the typo! It should have been picrite-carbamate as Dave correctly states. Ed.

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The first purpose of this email is to try and establish email contact with Bryan Howard, who might be the last person in Britain to have a personal secretary and typist, and zero knowledge of computers. How come you let him get away with it?

Hi Bryan,

I think the idea of a history is great, and I must kick off by saying I don't want to redirect the objectives that WARGMFA has in mind. Nevertheless I have a viewpoint that you might like to consider. Here it is.

I believe that the staff of P1 Branch Waltham Abbey, and the originating department that gave rise to it – The Cordite Factory at Woolwich Arsenal -- made a significant and beneficial contribution to

the Defence of the UK over an extended period. The story has not been revealed and I think it should be.

The origins of cordite and its applications have been well-reported up to and including its use in World War I. If there has been a review of its performance in that conflict, with critical conclusions, I am unaware of it. However, there must have been some appraisal since, at a date we don't know, facilities were established at Woolwich Arsenal to carry out R and D. Who wrote the technical case for that, and what politician approved it? (I'd like to contrast that judgement with considerations prior to closure around 1980, or whenever it was.)

We know some of the staff involved pre-WW2, and we inherited their records and added to them. But where are those records now? We also have a folklore of partially-remembered anecdotes involving characters who acquired something like reverence, with some names linked eternally to pieces of apparatus or to test procedures, still in use around the world. This experience must have been the basis of the scale-up to production factories at Bishopton, Caerwent, and to recognisably identical factories in Australia, India, Pakistan and so on, some of which remain active today. And the same team must have designed the south-site facilities for P1, where, amazingly, I never heard a single complaint about what had been designed or constructed. Where else in the field of anything can one match that?

Those chaps did wonderful things, not just from a parochial view, but in a world context. We stood on their shoulders, and did more. Let us draw attention to their achievements, and while we are at it, list and explain our own. We too have a fair number of world firsts, I believe. I have just had a conversation with Eric, who tells me he no longer has a functioning email address, but since the grandson (?) with whom he lives is in the computer business he can get online with little difficulty. He will let me know when he is on.

I found his memory impressive, particularly with names of those who worked at Woolwich and who moved to WA, with details of what they did. There is no doubt of a long-time link with Woolwich, that also



extended to P2 topics and materials. The "big green books" with formulations and such should be at SRS and were rescued by Eric. Somebody should be able to find them there. P1 records of gun propellants he fears could have been thrown on the skip as the site was abandoned however. He will start drafting notes on this and that. We thought a map of the South Site could be handy in triggering memories: do you think we might be able to find one? One in pdf or jpeg format would be best.

Can we get a staff list of these old days from old civil service records?

Steve Bell

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## **Specific Surface, $S_o$**

I hope that others connected with P2 and AP milling will give more detail, but I believe the units for this term were  $\text{cm}^2\text{g}^{-1}$ . I needed to mill some RDX (remotely -with care- in a swing hammer mill) and took a sample over to P2 for measurement. I believe an air permeability method was used, but can't remember any details or who did it for me. These days laser methods provide size distributions in microns or other suitable lengths.

## **Picrite carbamate complex**

The following paragraph is copied from Science of Explosives, JSP333 Ch 8 -39 (The Blue Book):

“Brief reference must be made to a problem peculiar to the picrite (flashless) propellants which arose during the Second World War. At one plant it was decided to add the carbamate to the wet mix of GC and NG instead of to the cordite paste in the incorporator; however, this led to higher rates of burning in the final propellant, and this effect was correlated with a lower, and variable, density of the propellant. It was found that in the wet mix process there were



coarse crystalline agglomerates in the final mix which consisted of an equimolecular compound of picrite and carbamite. This compound, which melts at 90°C, is (unlike carbamite) insoluble in benzene. It is, of course, present in picrite cordites made by the process in which finely ground carbamite is added to the premixed paste in the incorporator, but it is there in the form of a well dispersed microcrystal which does not cause irregular ballistics.”

The chemical formulae for these compounds are given in Ch6. At ERDE, as far as I remember, we always premixed the dry paste, picrite and any dry NC with solvent before adding carbamite and any other small quantities required on the manufacture sheet. I think that ROF Bishopton found this was not necessary — possibly because they did not store wet paste for lengthy periods, as was the practice at ERDE, but mixed pressed cut the whole paste batch as a continuous process. Cordite batches at ERDE were routinely 3001b (140Kg), of which roughly half would be NC/NG paste, but wet paste was produced in considerably larger quantities.

Dave Hewkin

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We are pleased to note that Jean Richards has become ‘Granny’ Richards since her daughter Siân gave birth to a daughter in May, exact date and weight of baby not known (but it has to be in Kg).

Bryan Howard

Name Abigail Victoria, Weight 9 (pounds, not Kg!) Ed

## **Badminton**

Having read Sheilagh Owens and Byan Howard's articles on their heart-warming badminton playing days in the last century, reawakened my happy memories of playing shuttlecock.

Badminton is a game I played in the 1950s with family, granddad and friends in the back garden. We played badminton as a social outdoor sport. In order to beat my elders, badminton demanded concentration, focus, strength. I played at lightning speed, which demanded constant running, jumping, twisting, stretching, and striking. The will to win and beat my elders was the stuff of gold medal winners.

Nowadays, I let my grandchildren think they thrashed me! Anyway, I prefer shuttle-cock to badminton my kind of racquet science.

Apparently, Badminton is the fastest racquet sport in the world with shuttles reaching speeds of up to 206 mph, faster than the speed of the Eurostar train (330 kph in new money). The shuttlecock is set to enter the Guinness Book of Records at 162 miles per hour, compared to squash's at 151 mph and a mere 138 mph for tennis. Unlike tennis or squash the ball never touches the ground.

**Ray Stelzner**

## Some progress on the new waterwheel



**Peter Hart, aided by his neighbour, provided a firm base for the project**

**Construction is well under way now**



## **More History of South Site**

In April 1950, a committee was appointed to plan the future of South Site for large scale development of solid propellants.

The Site had been used as a transit store for booty from WWII so the first task was to disperse these items to their appropriate destinations.

It was envisaged that the future lay with plastic propellants and cast double base. Plans were made to cater for filling plastic propellant motors up to 18 inch diameter. CDB charges up to 24 inch diameter and 9 feet long were to be cast in building N550 which was eventually used for filling composite charges for the ill-fated 'Blue Water' project.

I have often wondered if the large CDB 'Greenplane' charge was cast in N550; can anyone shed light on this?

It has been pointed out by Steve Bell and Eric Baker that staff from Woolwich were transferred to South Site and there were close links between the two establishments, indeed one proposal was not to build a laundry on site but to send everything to Woolwich!

One final surprise for me was that the committee were aware of plans to build an East/West trunk road next to the site as long ago as 1951!

**Bryan Howard**

# Obituaries



## **Ron Treadgold 1921 - 2013**

As one of the founding members of LSW the meetings will never be quite the same, although his handwritten 'Reserved' sign is still in use. We're missing his cheeky

presence both at LSW and on the Mills site

Ron was gifted both scientifically and artistically and had a love of historical things. As a practical handyman he devised a practical watering device for Freda's garden by the incorporation of a cistern under the lawn with a choice of electrical or hand pumping.

He is survived by 'Betsy', the Morris Minor whose rust was kept at bay by Ron's anti-rust treatment. Freda's Aga cooker was converted by Ron from a coal-burner to electrical operation for low maintenance.

When South Site was being prepared for 'thermal remediation' and eventual destruction, Ron's photographic records show how the Site finally ended its days. (At least we collected a few artefacts with the help of Dennis Mansell).

I suspect Ron was one of the very last members who worked on North Site in the Main Lab before WWII. He moved to de Havilland during the war years but returned to 'the fold' to work on plastic propellant in P2 branch where he remained until he retired.

The story is told of how he persuaded Bob Brown to give up smoking by opening the window of their shared office with the ultimatum ‘either give up smoking or freeze to death!’.

A truly remarkable character, his cheerful personality is sorely missed.

Bryan Howard

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**Ron Fletcher** died on 4th June 2013.

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**Gillian Barbara Kemp      10/2/1942 - 10/8/2013**

Jill died on 10th August aged 71. Her funeral, which was well attended, was in the Abbey Church on the 23rd of August.

Jill started on South Site after working at the Walthamstow dog stadium and later moved to North Site. She met her first husband when he was working on site as a fireman. Unfortunately he died after only four years together. Her second husband, John worked on South Site as a scientist. He too died leaving Jill a widow once more.

Although she did not have the happiest of lives she was always cheerful and very helpful.

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Text may be sent as emails or attached to emails as plain text or Word documents. Pictures should be sent as separate images, either jpg or png although other formats may be useable.

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Paper originals should be scanned at 300dpi, digital photos can be resized to 1200 x 900 or larger, full size pictures from modern cameras are bigger than necessary and waste time uploading and downloading.

Pictures should be in colour if possible, they may only appear as grey scale in print but this is to keep costs down, normally they will be in colour in the electronic version.

We are happy to receive paper copies of text and pictures but cannot guarantee their return, if you cannot send items by email consider bringing them into the Mills or passing them to someone who does come in or can email them

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## **Events at the Royal Gunpowder Mills**

For information visit the Web Site:

<http://www.royalgunpowdermills.com/whats-on-and-events/>





Heron by old water mill on Hoppit Island

Photo by John Wilson