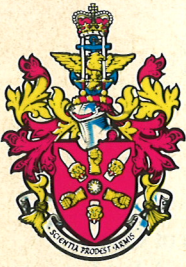


WASC 1924

RARDE News

1990

1991



RARDE **News**

Mr Abbott

ROYAL ARMAMENT RESEARCH AND DEVELOPMENT ESTABLISHMENT
HOUSE JOURNAL © 1990

Summer 1990 Issue 1

FIRST ISSUE OF THE NINETIES



The Main Gate at RARDE Headquarters, Fort Halstead.

At last RARDE News is back in circulation. The Editorial Board, chaired by the Secretary, with representatives from Chief Engineer's, DD(A)'s and DD(V)'s Departments and from the Trade Unions, will decide policy and make constructive suggestions for future editions. Our aim is to be interesting, impartial and readable, and all staff should get involved.

The Name

RARDE News was chosen as the emphasis is to be on information and news about RARDE and its sites.

A free copy for everyone

RARDE News will be published quarterly and everybody employed at the RARDE sites will receive a free copy.

Publishing

HMSO has been contracted to deal with the printing of RARDE News as we are unable to produce it ourselves in this format. RARDE News will be published quarterly for the first year and this will be reviewed at the end of the first year's contract.

In This Issue:

- A message from Dr. Warren
- DRA News
- British Gas Award
- Storm Damage
- Profile
- Conservation
- Sports and Social
- The Bailey Bridge
- Challenger 2

JOHN EVANS - FIREMAN



John Evans, his wife and colleagues at the medal presentation.

In December 1989 the Station Fire Officer at Fort Halstead, John Evans, was presented with the Fire Brigade Long Service and Good Conduct medal.

John Reid, John and their crew are always on the alert. On February 16 fire was reported in N2 building. They were

at the scene within a minute of call-out, using breathing apparatus to tackle a small blaze which caused a tank of liquid acid to overheat and give off toxic fumes. The fire was under control in 2 minutes.

THE WALTHAM ABBEY HERONS

The woodland at Waltham Abbey, a former alder plantation for charcoal manufacture, is also home to a heron colony. 13 nests have been counted of which 10 are definitely occupied. This is a reduction compared to former years when 20 to 25 nests was the norm.

Storm damage to the nests and the old alder and crack willow used for nesting probably account for this trend. Herons return to the same nests each year so finding some nests gone the birds may have 'moved' to other colonies. Sycamore is also becoming more prevalent in the woods which the herons do not seem to nest in.



STOP PRESS

RARDE Sports Day is to be held on Thursday 26 July this year on the sports field at Fort Halstead.

STORMY WEATHER

The high winds of 1990 notwithstanding, readers may be interested to hear that damage caused to the Headquarters building (A3) roof at Fort Halstead by the October 1987 hurricane has finally been repaired!



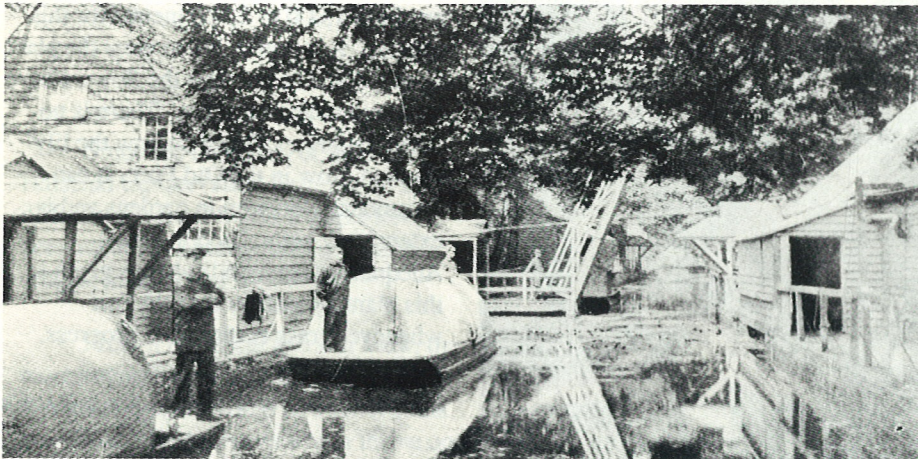
Fort Halstead lost some trees in the high winds of January this year. However Chertsey suffered the worst damage in losing some fifty plus trees. One of the test track facilities, the 'President's Chalet', was blown down and the remaining chalets very badly damaged - their future is now under discussion.

Christchurch lost their electricity for about half an hour, unfortunately in the lunch hour thus depriving staff of their hot drinks. The Hurn site was also without electricity for several days but this did not seriously affect staff there as they have their own generator.

Waltham Abbey and, obviously, Kirkcudbright suffered little or no damage; so all in all, although suffering slight damage, RARDE came off very lightly in this year's storms when compared with the rest of the country.

POWDER BOATS AND BARGES

by Elaine Morrison



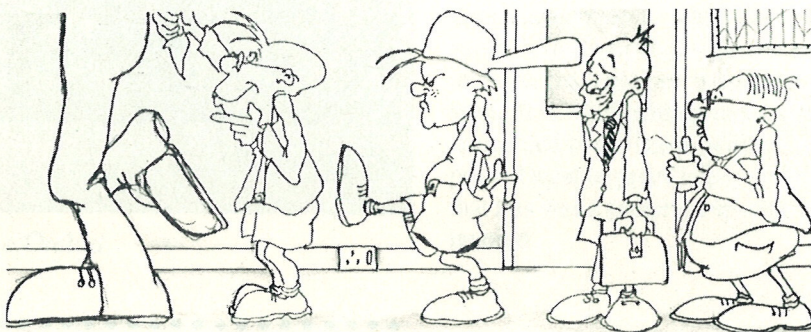
Powder Boat on a Waltham Abbey waterway.

I recently visited our Waltham Abbey site in search of material for future editions of RARDE News. Whilst talking to Malcolm McLaren, the resident historian, I learnt of Waltham Abbey's powder boats and barges. Powder boats were used on the internal waterways which were, and still are, part of the River Lee. They moved gunpowder from the stamping mills to the storehouses. The gunpowder was then loaded into powder barges which transported the gunpowder from the Royal Gunpowder Factory to Purfleet or Woolwich Arsenal. The barges displayed a red flag on these journeys and were specially designed to be sunk in five minutes if their lethal cargo proved to be of any danger.

In 1895 there were thirty-six powder boats and they only ceased being used in the 1940s. In 1962 Malcolm McLaren discovered the only remaining whole powder boat stranded on the bank of one of the waterways. He had it restored and placed on the River Lee outside the library.

The boat was moved to the South Site in the early 1980s when the possibility of closure for the North Site and transfer to the South Site was raised. The South Site was shared with the Royal Ordnance Factory at that time, however when the ROFs were privatised in 1985 the powder boat unfortunately became their property. RARDE is now negotiating to recover it.

SCHOOL STUDENTS



WOMENS' DISCUSSION GROUP

The MOD Womens' Discussion Group is now meeting at frequent intervals. I went to one in February where the speakers were 2 men: John Pitt-Book, Head of CM(IR) and Chris Furlong, Editor of 'Paperclips'.

The table below shows the proportion of women in the hierarchy of the civil service. Discussion showed that the MOD is, at last, actively working to change this by better use of part-timers, job-sharing, flexible working hours, career breaks and a nursery.

More women are moving up the promotion ladder. Although there are few women in senior management, this will change as women direct entrants were not recruited until the mid '60s and fast streamers in the early '70s.

Lack of space means I cannot report more fully but I will pursue this subject in future issues. Suffice to say that the MOD says it is broadly pro equality; that is, the same treatment for all.

Grade Level	Numbers	%Women
1-4	1,088	5
5	2,700	10
6	5,200	10
7	16,000	11
SEO	23,400	10
HCO	70,900	17
EO	123,400	39
AO	160,300	66
AA	92,800	74

Women
 Men

On the 1st March a group of 16 students from the Tunbridge Wells Grammar School visited Fort Halstead. They are studying for their Design and Technology 'A' level and came to see our computer aided design and manufacturing techniques. The visit was a great success and it is likely that similar visits will be arranged in the future.

SPORTS AND SOCIAL

By Andy Allison

The following pages deal with Sports or Social clubs at the various RARDE sites. If any information is wrong or your club/society has not been included and you wish it to be please do not hesitate to contact me. Similarly I would be pleased to hear about any forthcoming events concerning your society or any results of matches you might have had. All clubs require initial membership of the Civil Service Sports Club, contact the club of your choice for further details.

.....

SNOOKER CLUB (FH)

The snooker club meets at the far end of the canteen "Blue Room". It has 2 tables, club cues etc and although most members play at lunchtime, play is possible whenever access to the canteen can be obtained. **Membership:** Cost 2.00 per annum. The overhead lights are metered at 10p per 30 mins. **Contacts:** J Sullivan x2120 (H4), M Smith x2675 (Q27) and R Gibbs x2315 (H2)



.....

CIVIL SERVICE RIDING CLUB (FH)

The Riding Club is newly formed and although has a meeting place (N14.1) needs members. It is approved by the Fort Halstead Recreational Club and will cater for all standards of horsemanship. Activities will include (hopefully) Lunchtime/Evening lessons, lectures, videos, trips, Social Events etc. **Contact:** Miss L Shellard (Non-Ind Pers) x 2064 (H4)



KEEP FIT SOCIETY (FH)

It is open to all ages and sexes (although only 2 men currently attend!) and provides exercise to music to improve general health, fitness and flexibility. It meets on Tuesday and Thursday lunchtimes from 12.30 to 1.40, usually in the Canteen. **Membership:** Tuesdays cost £1.50 whilst Wednesdays only £1.00. **Contact:** J P Sullivan x2120 (H4)



.....

SAILING CLUB (CC)

Owns a 21ft diesel powered launch and an Enterprise Sailing Dinghy which, during the summer, are both used fairly regularly in either Poole or Christchurch Harbours. **Membership:** Cost is currently £10 per annum. **Contact:** E Hopkins x448



.....

GOLF CLUB(CH)

Barrow Hill Golf Club, formed in 1970 has 300 members. Affiliated to the Surrey County and English Golf Unions, it holds competitions for all standards of players twice a month and twelve matches a year are held with other local Golf Clubs and Societies. **Membership:** Open to all who work at Chersey. Cost is £32 p.a. **Contacts:** R W Routley 0932 848117 and J V Emms x 2649

GOLF CLUB (FH)

Bases sociable golf around 4 competitive meetings a year. Also runs a knockout competition and competes against teams from the Military and other establishments. Meetings are publicised before the competition dates and play is at various Clubs in the South East. **Membership:** Cost is £2 per annum (for admin). Each meeting is costed individually, to include green fees, prizes etc. **Contacts:** J P Sullivan x2120 (H4)



.....

POWDER MILL CLUB (WA)

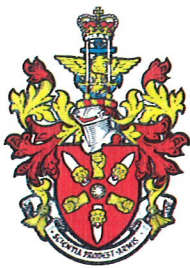
This is basically a Social Sports Club. In the past it has arranged Dances, Quizzes etc. and has a very popular bar. It also has a number of Sports Clubs, including amongst others Football, Cricket, Squash, Chess and Photography. Due to the move to Fort Halstead though it is anticipated that the club will slowly wind down towards the end of the year and the beginning of the next. **Membership:** It costs £2 which is payable through the CSSC. **Contacts:** T Arber x401

.....

TABLE TENNIS CLUB (FH)

Meets for lunchtime sessions in the Canteen. It has 3 teams in the Tonbridge Table Tennis League, 1 in Division 1 and 2 in Division 2. Home matches are played in the canteen on alternate Tuesday & Friday evenings. **Membership:** Cost is £1 per annum. **Contact:** P C Henderson x 2818 (H7)





RARDE **News**

ROYAL ARMAMENT RESEARCH AND DEVELOPMENT ESTABLISHMENT
HOUSE JOURNAL © 1991

Spring Issue No. 4

Into a New Era



The Library at Waltham Abbey.

As you all know by now Vesting Day was 1st April 1991 and we are now the Defence Research Agency.

The DRA is made up of four Divisions:

- RARDE — the Military Division,
- RAE — the Aerospace Division,
- ARE — the Maritime Division,
- RSRE — the Electronics Division.

This is an exciting time for us all when we will have the opportunity to earn income and prove ourselves as a viable concern. The whole purpose of our new organisation is to enable us to provide a better, more efficient service, principally to our MoD customers.

We will be operating under New Management Strategy for a while — time which should be seen as an interim phase on the way to Trading Fund status.

Launch Day is 10th April when the Secretary of State, Tom King, will hand authority for DRA operations over to Nigel Hughes. A video link is to be established between Pyestock and some of the DRA sites and staff at these sites will be welcome to view the ceremony.

Elaine Morrison

P.S. Copy date is 7th May.

In This Issue:

- Memories
- Supercomputer
- Profile
- DRA Q & As
- Christchurch
- Waltham Abbey Pt 2
- Sports & Social
- Business Units
- Relocation

RARDE WALTHAM ABBEY —

A well deserved place in history

In the 18th century the Government had realised the importance of controlling much of the gunpowder production and had, in 1759, purchased the mills at Faversham in Kent. However, following statements that the “private merchants can make better powder than the Government and that they can make it more cheaply” the Prime Minister, Pitt, was about to recommend the sale of the Faversham Mills in 1783, back to *private enterprise!*

Representations were made, through the Master General of Ordnance by Major William Congreve, who was Deputy Controller of the Royal Laboratory at Woolwich, to show that Government manufacture did, in fact, yield a profit, and that, if this profit were properly expended in improving the mills, it would be possible to make a powder which was more powerful and more durable than had ever been made previously.



Fortunately and justifiably — as shown later — he received a sympathetic hearing and not only were the Faversham Mills relieved but negotiations were opened with yet another John Walton for the purchase of the Mills at Waltham Abbey. Walton's Mills were purchased by the Government in October 1787 for £10,000 and placed under the control of Major Congreve who expended a further £35,000 on improvements and enlargements as the Mills were in a state of neglect.

by Malcolm McLaren Part II Government Ownership

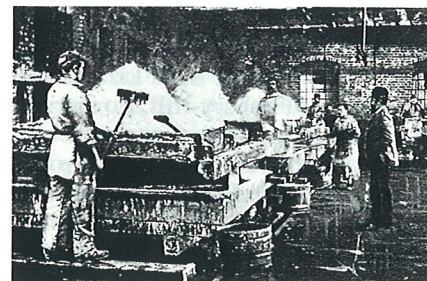
By 1811 Congreve was able to justify his actions by publishing a statement of savings arising from the manufacture of gunpowder at the Royal Mills. Between 1789 and 1810 407,408 barrels of powder, each of 100lb were produced at Faversham and Waltham Abbey. The savings to the Government, being the difference between the merchants price and actual cost, amounted to £288,357 6s 0d. Taking the Waltham Abbey Mills alone, even after deducting £45,000 spent on the mills, a saving of over £50,000 was made. Much was also done at this time to improve the quality of the powder produced and Congreve demonstrated the improvements by trials on Marlborough Downs where 10-inch shells were fired by 9lb lots of powder from different makers including six private merchants. That from the Royal Gunpowder Factory at Waltham had the greatest range of 4,430 yards exceeding its closest rival by 160 yards and most of the others by over 500 yards.

Congreve, now Sir William, was succeeded in both title and position by his son who continued the process improvements but is probably better known for his development of the gunpowder rocket for military purposes. Between them the Congreves introduced the definitive method for the production of gunpowder.

During the Napoleonic Wars the annual gunpowder production at Waltham Abbey mounted. By 1809, 20,000 barrels were produced, by 1811 21,000 and by 1813 it had risen to 22,000. After Wellington's victory in 1814 every effort was made to decrease output and only 10,000 barrels were produced. On Napoleon's escape from Elba in 1815 powder production was maintained but, after Waterloo, output was reduced drastically to 3,000 barrels in 1816 and to 1,000 barrels less in 1819 and the following years. Employment in the factory had been 250 in 1813 but by 1822 the figure was down to 34! Waltham Abbey survived this contraction but the other Government factories at Faversham and Ballincollig in Ireland were sold back into private ownership.

Details of the processes for the making of gunpowder were given in a pamphlet by Major Fraser Baddeley entitled “The Manufacture of Gunpowder, as carried out at the Government Factory, Waltham Abbey” which was published in 1857. It is significant that this pamphlet, and by implication the work by the Waltham Mills, could have influenced world history. At the start of the American Civil War only three powder mills are known to have been in existence in the Southern States. Major George Washington Rains was given the task of supplying the confederate Army with gunpowder and it is recorded by him that he had the “great good luck” to come by Baddeley's Pamphlet. Both Rains himself and the United States Ordnance Manual of 1862 express the opinion that “nobody makes better powder than the British”. The one drawback of Baddeley's pamphlet is that, whilst it gives precise details of all the processes, it contains no drawings of machinery or equipment. Major Rains however, managed to obtain the services of a James Wright, the grandson of the first Storekeeper of the Waltham Mills, who had emigrated to Tennessee. Rains wrote: “But one man — Wright — could be found in the Southern States who had seen the making of gunpowder by an incorporating mill; he had been a workman in the Waltham Abbey Mill in England . . . I was much indebted to his knowledge and experience”. But the Royal Gunpowder Factory appeared to have been backing both sides for it is known that Antoine Biderman and his nephew Lamot du Pont, both of the large Northern powder company of Du Pont, paid separate visits to Waltham Abbey *before* the Civil War.

Mention has been made of the accidental explosions referred to by Fuller and the first fatal accident. Although other explosions did occur in the era of private ownership very little is known about them, but from the time the Government took over the Mills the records of explosions are virtually





complete. There was a change of attitude from one of inevitability of explosions to one of understanding why they took place. In the early years of government ownership regulations were made tighter and precautions were introduced whenever they were seen to be necessary and advice was sought from the leading authorities in the country. Explosions in the incorporating mill were frequent but not usually serious because the "green" charges had weaker explosive powder and did not damage the machinery. It was in the later states of manufacture that the possibility of a serious explosion was greatest. The first of these occurred in 1801 when a corning house blew up killing nine men and four horses. After

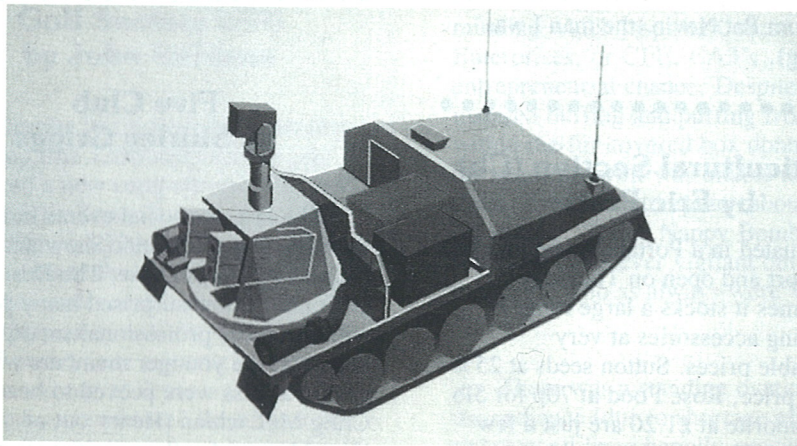
this incident an approach was made to the Royal Society to suggest the best floor coverings and a visit was made to the mills by a party which included the President, Sir Joseph Banks, Count Rumford and Henry Cavendish. Their report stated that there was no hazard from "electrical excitations in the practice of rolling barrels on floors covered in hide nor from the use of silk dusting screens", but recommended the use of painted floor cloth to cover the whole floor.

In 1893 after an explosion in a building in which granulated powder was being pressed had caused the loss of nine lives, there was serious public concern. The Press was critical and questions were asked in the House of Commons. The report of the Committee of Enquiry, which included Lord Sandhurst and Sir Frederick Abel, can be said to be the basis of modern safety practice in explosives manufacture, for not only did it indicate the probable cause of the incident, but it discussed at some length the deficiencies of procedures and regulations.

Continued next issue . . .

2nd Mardi Symposium

by P J Bateman



The second symposium organised as part of the Mobile Advanced Robotics Defence Initiative was staged at Chertsey in November 1990.

The first symposium was a 2 day event held at a Heathrow hotel in October 1990 after the programme had been running for 12 months. This year the symposium concentrated on reviewing the progress of the research activities being carried out by the twelve industrial collaborators, by the universities at Bristol and Southampton, and by RARDE in MS5 Division. 14 papers were presented during the day and these included an update on the Technology Demonstrator vehicle and

its Command Centre. (The illustration shows a schematic of the Remote Vehicle which is scheduled for trials in mid 1991.)

The audience of about 60 included representatives from the collaborating organisations, OR and DScLand. Mr Geoff Cockett of DScLand closed the proceedings by supporting the value of collaborative programmes such as MARDI in producing Technology Demonstrators which allow the User to gain "hands on" experience of hardware designed to perform military tasks. Research funding alone would not be sufficient to allow such equipment to be built and trialled.

Bat Cave

by Andrew Dams and Stuart Beauchamp

In June 1990 Dr Roger Warren received a letter from Major D Counsell, a retired officer who used to work for RARDE and was instrumental in setting up the RARDE Conservation Group at Fort Halstead, asking if RARDE would be willing to help in a conservation project.

As June 21 to 27 last year was declared 'National Bat Week', Major Counsell wondered if RARDE would help in a bat cave project. This would involve the construction of a bat cave grille which would cover the entrance to an artificial cave, allowing ventilation for the cave and free access to bats but keeping out any vandals.

Dr Warren readily agreed to Major Counsell's request and gave the project to second and third year apprentices at Chertsey, giving them a chance to help both the local community and environment, and also to aid in their 4 year apprenticeship.

The construction of the grille was fitted inbetween the apprentices' formal training, but by working on it during their spare time it was completed within five weeks. The finished item was then displayed at our 1990 Chertsey Apprentice Prize Giving Ceremony before being officially handed over to Tonbridge and Malling Borough Council at the Hayden Country Park on November 19th. The excavation and installation of the cave will be completed in Autumn 1991 and is being sponsored by local firms and helped by the British Trust for Conservation Volunteers (BTVC) and other voluntary help.



Malcolm Hackett (Field Officer BTVC), Richard Squires, Stephen Carter and Ralph Kelly.

The Business Unit

by Colin Oxlee – Technical Director

To be a BU or not to be a BU, that was the question. Whether 't' was nobler in the mind to retain the status quo of the Group structure and suffer the slings and arrows of outrageous fortune, or reorganise to meet the challenge of the DRA as a Trading Organisation'. (Apologies to Will Shakespeare)

Since the aim of the DRA was to achieve a sharper relationship with the MoD as prime customer by entering a trading relationship similar to those found in the commercial world, it was clear that we needed to restructure RARDE to meet the challenges of the market place. So far as the 'production' element of RARDE was concerned, it made sense to reorganise by aggregating scientific and technical specialisations and capabilities into BUs which best match the major customer markets. Hence, in October 1990, the Weapon Systems (WS) BU was formed from the GS and IW Groups and the Mobile Systems (MS) BU was formed from the VS, VT and TE Groups. The Trials element of TE was formed into the Trials and Facilities BU, the Design and Manufacturing capability in the former CE Department into the Technical Services BU. Both of these are now within the Directorate of Engineering and Services (D/E&S). The trial facilities BU will sell its services to both RARDE BUs and outside customers.

The NP and AA Groups, which were primarily engaged in technologies rather than systems, were combined to form the Energetic Materials and Terminal Effects (ET) BU, producing a strong technology based unit as the DRA's centre of expertise for explosives, propellants, pyrotechnics and related terminal effects. The CA and EC Groups have remained unchanged since they well matched their customer markets although the Computer Support sections in CA2 have been formed into a BU to be lodged in the D/E&S area to provide a service to the whole of RARDE and sell spare capacity to outside customers.

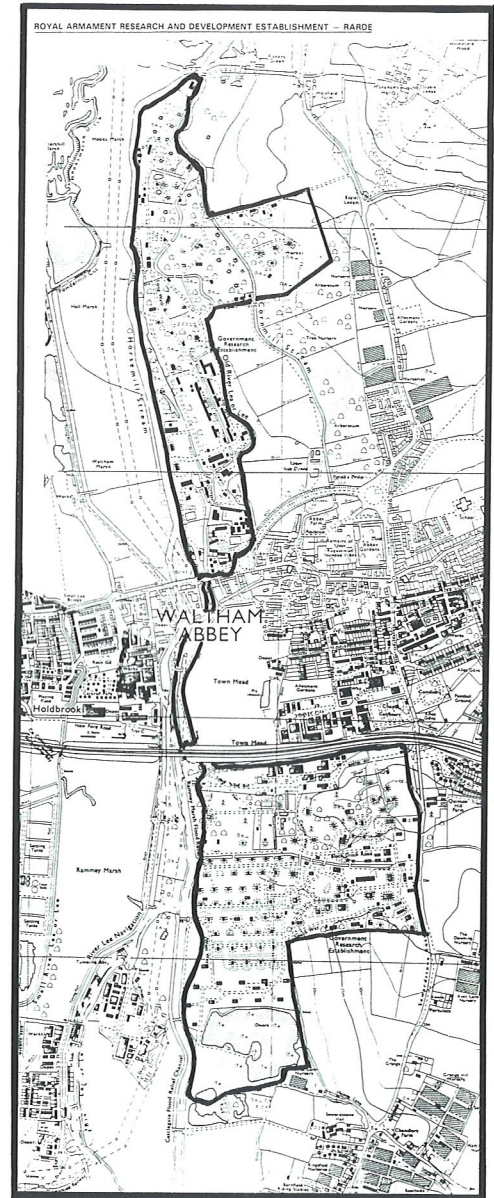
BUs consist of a number of cost centres (CCs), each equating to a Division and having its own charge-out rate. In the Technical Directorate these are classed as 'Direct' CCs since their resources are booked direct to research programmes and projects, unlike those in the Administrative, Finance and Commercial Departments which are not direct bookers and are classed as 'Indirect'.

When Package Management came on the scene in 1989, Research Package Managers (RPMs) were appointed in Groups and were either a Group Head or Superintendent. In the new structure, RPMs are part of the Programme Management (PM) section of the Commercial Department (CD).

So will life in a BU be significantly different from that in the 'old' Group? Well it should be, particularly under Trading Fund (TF). We will all experience a culture change in the DRA and not least the BUs. Managers in BUs will be responsible for 'selling' their capabilities and facilities, and budgets will be allocated to BUs based on contracts won by the CD. Greater accountability will ensue and programmes of work planned and executed in a much tauter regime of milestones, deliverables and costs agreed with the customer. Income will come from payments made by the customers on receipt of invoices to recover manpower and consumables used to carry out the work, provided the customer is satisfied with progress and deliverables. This means that within the BUs estimating for resources, stores, workshop support, EMR and contingencies will have to be more realistic than in the past and the recording of manpower and consumables more accurate. We will also be subject to Government auditing.

It will be a challenging time in the BUs to achieve programmes to time and cost and at the same time maintain our hitherto high professional standards. There will be the challenge to improve efficiency and keep overheads to a minimum. BU managers should however have greater flexibility to achieve milestones and deliverables within their budgets under TF. However, the degree of flexibility has not yet been established and for FY 1991/92 we will still be on the Vote under NMS.

There are exciting but demanding times ahead, not least in the BUs. Certainly one thing we should all look forward to is freedom from the current, rigid Vote system and all the traumas of running cost constraints as experienced in the past year. This should not imply a free-for-all scenario and indeed it will require a disciplined approach to any such freedoms that will hopefully come our way. Managers in BUs will find the new ways of operating both challenging



The Waltham Abbey Site.

and at times traumatic — life certainly will not be the same again!

To end on a lighter note, one challenging problem yet to be resolved is what to call the Heads of BUs. As Head of Groups they were affectionately known as HOGs. The suggestion of 'Business Unit Manager' did not top the popularity stakes so pro tem, we have stayed with HBUs. One could extract the acronym HUB, (Head of Unit Business) which at least would give the impression of being at the centre of things. One establishment has opted for Business Unit Director (BUD) but that clashes with other 'Director' posts. We could well end up with a standard title across the DRA. Any suggestions?

A New Chapter in the History of RARDE

Waltham Abbey

by Dr Geoff Hooper

1991 heralds the closure of RARDE Waltham Abbey and the relocation of the staff and facilities to Fort Halstead. Those of you at the Fort will have seen various odd-looking new buildings being constructed by armies of contractors, and will have suffered the dust by summer and the mud by winter that is inevitably attendant upon such works. So who are the people coming to use these buildings? Why are they coming now, and how do they fit in with the rest of RARDE?

The answer to the first question is that the Waltham Abbey staff are for the most part chemists engaged in research into energetic materials, that is the ingredients that go to make up the explosives for guided weapon warheads, the propellants that power missiles and launch projectiles from guns, and the pyrotechnics that go to make up flares and decoys.

To answer the second question as to why they are coming to Fort Halstead now, we need to look at the post-World War 2 history of the Waltham Abbey site.

Malcolm McLaren's series of articles currently running in RARDE News chronicles the early history of the site as the Royal Gunpowder and its transition to a research and development establishment after the War. Just as the armaments research at Fort Halstead owes its ancestry to Woolwich Arsenal, so also the Chemistry research at Waltham Abbey started in 1946 with a nucleus of staff drawn from the Woolwich Arsenal's Armaments Research Department to establish an organisation for research into explosives and their ingredients from the fundamental processes to pilot scale production. It was the intention that roughly one third of the Armament Research Department's staff and programme would be taken over by Waltham Abbey.

As such Waltham Abbey prospered as a research establishment, employing at its peak some 1000 staff, 600 being industrial grades. The ability and enthusiasm of the Waltham Abbey staff earned an enviable world-wide reputation for scientific excellence. The establishment boasted two Individual Merit DCSO's and up to five Individual Merit SPSO's. The site was widely accorded the epithet of "the University of Waltham Abbey". Whilst the numbers have now dropped to under 100, the tradition of top quality science continues unabated.

The key event which cast the die for the future of Waltham Abbey was the government decision in 1983 to privatise the Royal Ordnance Factories, and as part of that privatisation exercise to give them a research and development capability in propellants and rocketry.



Dr. Geoff Hooper and Dr. Steve Pike in front of one of ET's new buildings.

Thus in 1984 the assets of Waltham Abbey, the staff, the equipment and the real estate, were divided between the Ministry of Defence and what was to become Royal Ordnance plc. Two-thirds of the staff, for the most part those engaged in process development went to the embryo company, which acquired the South Site of the establishment. The remainder, principally those undertaking the fundamental research, became part of RARDE, as did the North Site of the Establishment, which had been the home of the original gunpowder mills.

Following the privatisation of the factories in 1985, RO plc became part of British Aerospace, and the company undertook a process of site rationalisation, with the Royal Ordnance Research and Development Centre at Waltham Abbey being dispersed to the company's various production facilities.

At this time, however, synthetic chemistry was going through a significant renaissance, and in the field of energetic materials, as so many times previously, the pioneering work came out of Waltham Abbey.

A whole new branch of chemistry was opening up which could offer the Armed Services weapons which were more effective when called into action, but safer at all other times. This was made possible by the advent of a novel chemical, dinitrogen pentoxide, which gave to the energetic materials chemist a new technique or tool of the trade which permitted chemical reactions to be undertaken which were hitherto difficult or impossible. An analogy in everyday life is the revolutionary impact that microwave ovens have had upon catering. Greville Bagg has told the "Dinitrogen pentoxide" story in a previous issue of RARDE News.

Along with this the Waltham Abbey scientists were making breakthroughs in understanding, and, more importantly, controlling the ageing process in weapon systems, thus extending their safe serviceable life with attendant huge cost savings for the customer. The breakthroughs that were achieved were the most significant for decades. Most of our scientists were working in laboratories on the RARDE-owned North Site of the establishment, however some of the key facilities lay on the South Site, on Royal Ordnance-owned real estate, which RARDE leased from the company.

In 1987 we were served with notice to quit the South Site in preparation for its sale by the company as part of its site rationalisation programme, which also included closure of the adjacent Royal Small Arms Factory.

Throughout 1987, therefore, investment appraisals, surveys and studies were carried out to determine the best way ahead.

The solution endorsed by the then Under Secretary of State for Defence Procurement (Timothy Sainsbury) in March 1988 was the relocation of RARDE Waltham Abbey to Fort Halstead. Plans were developed and designs produced and refined apace. Recognising the critical importance of the Waltham Abbey work to the needs of the armed services, the Chief of Defence Procurement (Peter Levene), with Treasury blessing, approved the plan in 1989, and with it the £25 million necessary to implement the plan.

Royal Ordnance plc were most cooperative during this period extending our lease on the South Site to minimise the hiatus occasioned by our relocation.

What are the new buildings?

The various new structures that are taking shape include laboratories for the synthesis and testing of new energetic materials, and the impressive array of chimneys are part of the extracting equipment for the fume cupboards in the laboratories. Needless to say all the new buildings, and especially the laboratories, are built to the highest safety standards and to the principles of energy efficiency.

A28, located where the gardening club hut used to be until the 1987 storms wreaked their havoc, is where the new and exotic chemicals will be made, hence the positive profusion of chimneys.

X48, the largest of the new buildings, is on Crow Road and is to contain the majority of the Energetic Materials Chemistry Division. It is concerned with the investigation of the utility of the new materials and understanding the principles of how they behave.

Other smaller new buildings have been constructed and many existing buildings refurbished not just for the Waltham Abbey staff but also for the current Fort Halstead staff, since the influx of three Divisions from Waltham Abbey has presented the opportunity to rationalise and improve the efficiency of other buildings on the site. Indeed a number of the refurbished buildings are now housing staff already transferred



Mill stone bed used in the Gunpowder Incorporating Mill.

from Waltham Abbey and from Westcott to enable our equally important programmes on rocketry and materials science to be continued and strengthened.

The building works are due for completion in June this year, and the relocation of the Waltham Abbey staff is due to be completed by the 1st July 1991. One noteworthy point is that whereas many MoD capital projects have in recent years suffered considerable cost over-runs after the contract was let, this project is coming in within budget and only a few weeks behind time, a creditable feat when the technical complexity of some of the buildings is considered.



Water wheel for the Gunpowder Press House.

How will the Waltham Abbey staff fit in? In a sense this is a poor question since they have been part of RARDE for the past seven years. Perhaps a better question would be, how will the expected improvements in operation and interaction manifest themselves?

The main advantage is that the vital flow of ideas will be greatly improved by collocation. The impetus for moving research into a particular field comes from two sources. The first is essentially threat driven and emanates from the Technical Intelligence community, and manifests itself in a basic research project sponsored by the Chief Scientific Advisor or an applied research project sponsored by a military customer. The second source is feedback from the more systems-orientated divisions. For instance, it is not uncommon for those researching other aspects of weapon design to observe that if a particular property of an energetic material were to be changed then certain greater goals might be achieved by a weapon system. If the various research groups are co-located rather than 40 miles apart then effective feedback is facilitated. The Waltham Abbey staff whose work comprises a high percentage of so-

called "Category 5" Strategic Research, thereby placing it at the top end of the ideas chain and hence remote from the warmth of the middle ground, will benefit particularly.

Getting the organisation right is a fundamental part of the exercise of accruing the most benefit from the new facilities and their close proximity to the users of their products. Advantage was taken in the October 1990 reorganisation of RARDE to structure ET Group so that from a technology viewpoint there is a coherent and efficient pathway down which ideas related to new energetic materials flow. This starts with the Division engaged in fundamental research, passes through

Divisions where the potential can be developed and thence to Divisions that can apply the output. Feedback is similarly facilitated. From a Package Management point of view the clean organisation should go a long way towards straightening and shortening the communications trees, with a welcome reduction in the associated paperwork mountain.

So in summary there are several far-reaching consequences of the relocation of RARDE Waltham Abbey to Fort Halstead. Foremost amongst these has to be the increased efficiency in the generation and application of new energetic materials. Waltham Abbey staff will bring to bear their impressive pedigree of ability and expertise in some of the finest facilities of their type in the world. Fort Halstead staff with their equally impressive but more diverse skills will get better things to work with and hence will be able to realise more ambitious goals technically. Finally, RARDE will benefit from a coherent integrated operation which will be uniquely well placed to take on the challenges of the Defence Research Agency and to provide the customer with what he wants.