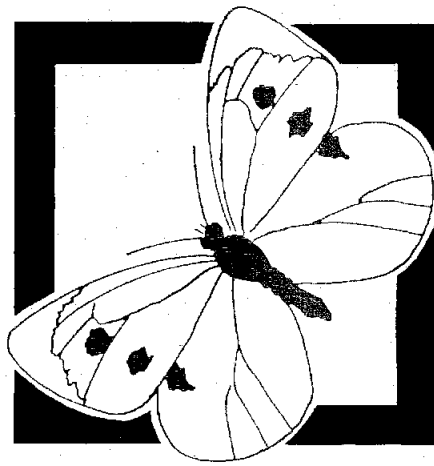
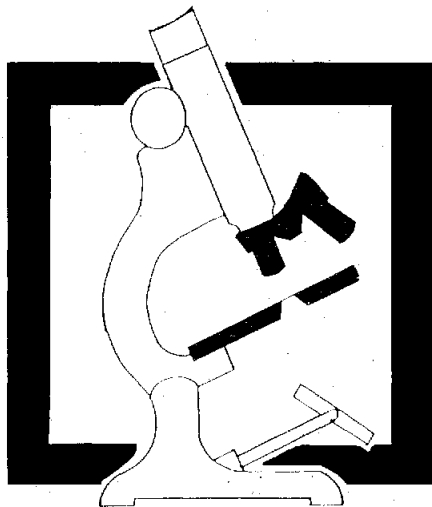
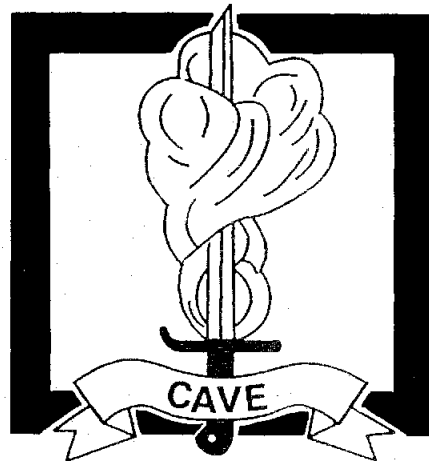
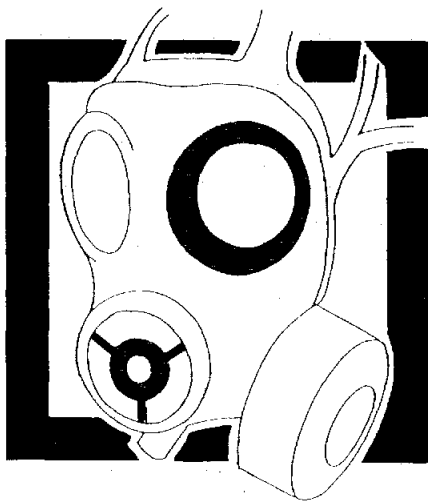


# CHEMICAL & BIOLOGICAL DEFENCE ESTABLISHMENT

PROTECTING BY SCIENTIFIC UNDERSTANDING



**Annual Report and Accounts 1992/93**



# CHEMICAL AND BIOLOGICAL DEFENCE ESTABLISHMENT

A Defence Agency of the Ministry of Defence

## ANNUAL REPORT AND ACCOUNTS 1992/93

Protecting by Scientific Understanding

Presented to Parliament in pursuance of the Exchequer  
and Audit Departments Act 1921

Ordered by the House of Commons to be printed  
26 July 1993

LONDON: HMSO

	Page No
<b>FOREWORD</b>	3
<b>REVIEW OF ACTIVITIES</b>	
– The Threat	4
– CBW Proliferation	5
– CBW Spectrum	5
– Chemical and Biological Arms Control	6
– United Nations Special Commission	7
– Investigations into Allegations of Use of Chemical Weapons	8
<b>SCIENTIFIC ACHIEVEMENTS</b>	
– Trial MADONA	9
– BRACIS	10
– Gene Probes	11
– Chemical Modification of Activated Carbons	13
– Electron Microscopy	14
– Transdermal Drug Delivery	15
<b>AGENCY PERFORMANCE</b>	
– 1992/93 Key Targets Outturn	16
– 1992 Customer Satisfaction Survey	18
– 1993/94 Key Targets	19
– Citizens' Charter	19
– Financial Performance	19
– Receipts/Business Opportunities	19
<b>OTHER AGENCY ACTIVITIES</b>	
– Safety	20
– Parliamentary Questions	20
– Animal Experiments	21
– Service Volunteers	21
– IUPAC Task Force	22
<b>ACHIEVEMENTS AND PUBLICATIONS</b>	
– Presentations and Publications	24
– 75th Anniversary	24
<b>FACILITIES AND ESTATE</b>	25
<b>THE MANAGEMENT TEAM</b>	25
<b>CONSERVATION</b>	26
<b>ACCOUNTS</b>	i-xxi

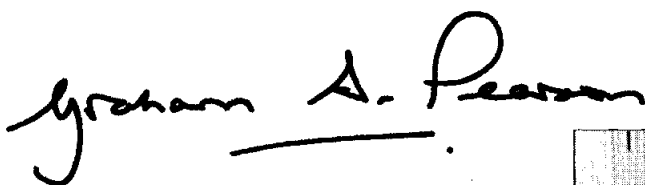
# Foreword

Our second year as a Defence Agency has enabled us to further realise some of the benefits of Agency status. In particular I welcome the additional motivation that cascades down to staff at all levels from the key published targets for the Chemical and Biological Defence Establishment as an agency. These targets are still being developed and I believe this will lead to further motivation.

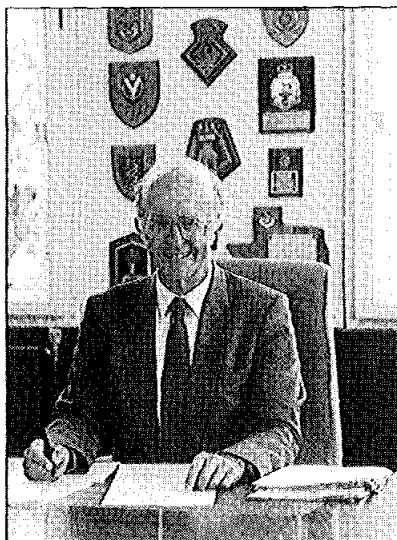
The central aim of our work has continued to be the provision of the technology base to enable the UK Armed Forces to operate effectively in a chemical and biological warfare environment and protective measures to save lives and maintain health and fitness. Some examples of the scientific work being carried out at Porton Down to meet this aim are included in this Annual Report.

We welcomed the agreement of the Chemical Weapons Convention during 1992 and its opening for signature in Paris on 13-15 January 1993. The Convention bans the development, production, stockpiling and use of chemical weapons. My staff were directly involved in the work that led to this and are now involved in assisting the Preparatory Commission and Government Departments in preparing the way for the entry into force of the Convention which could be as early as January 1995. It has become evident that the maintenance of effective protective measures for the UK Armed Forces is an essential partner to the Chemical Weapons Convention. Effective protective measures reduce the military utility of many possible chemical warfare agents and thereby also reduce the range of chemicals which need to be subject to arms and export controls.

As a Defence Agency we have successfully won contracts from outside the Ministry of Defence which benefit the Ministry of Defence as such contracts help to ensure that the expertise at CBDE is maintained and strengthened – and is available to the Ministry of Defence when required in an emergency such as Operation GRANBY. An additional benefit of such work as an Agency is that we have been able to build a much needed replacement Staff Restaurant which should open late in 1993.



Graham S Pearson CB  
Director General and Chief Executive



---

## The Threat

---

The UK unilaterally abandoned work on offensive chemical and biological weapons over 30 years ago in the late 1950s and since then our role has been to ensure that the UK Armed Forces are effectively protected against chemical and biological weapons; our central purpose is providing protection against chemical and biological warfare through scientific understanding.

The main elements of our programme are:

### ■ Assessment of the Hazard

This involves the evaluation of the potential materials that might be used by an aggressor including their toxicity and producibility and the analysis of how they might be used against British Forces on land or at sea. Such hazard studies lead to the technical specification of requirements for detection, protection and medical countermeasures.

### ■ Detection, Identification, Monitoring and Reconnaissance

A key capability in effective protection is the detection and warning of a chemical

or biological weapons attack before unprotected personnel inhale a harmful concentration. Closely related requirements are to identify the nature of the agent so that the appropriate medical and other countermeasures can be taken, to monitor the level of the hazard so that protection can be relaxed when it is safe to do so and to carry out reconnaissance to determine whether a planned route is free from contamination.

### ■ Protection

Personnel need to be protected either through personal protective measures such as a respirator and suit or through entering collective protection - an enclosed space in a building, vehicle or ship supplied with filtered air.

### ■ Contamination Management

Some chemical agents such as mustard or some nerve agents are very persistent and will remain on surfaces following an attack for several days. Such contaminated surfaces present both a vapour and a contact hazard requiring measures to decontaminate equipment and personnel. A related requirement, known as chemical hardening, is to design military equipment so as to minimise the retention of persistent agents in cracks and crevices.

### ■ Medical Countermeasures

Another key capability is to increase the ability of the body to withstand chemical or biological agents and to treat those exposed to such agents. Although the aim of detection and protection is to prevent service personnel from inhaling a harmful dose, this cannot be guaranteed and medical countermeasures are an essential element of chemical and biological defence.

*Soldier wearing full individual protective equipment using a Chemical Agent Monitor (CAM).*



## CBW Proliferation

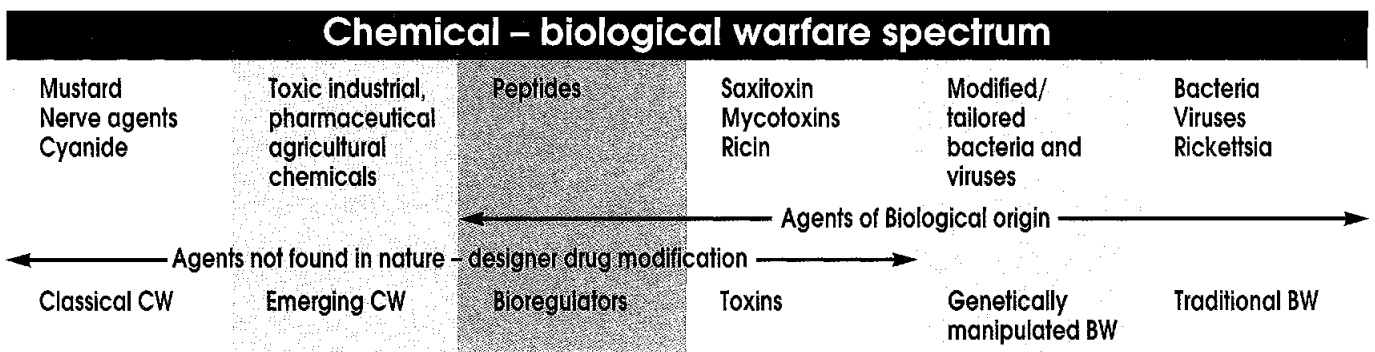
Proliferation of CBW around the world continues to be a major concern. The Statement on the Defence Estimates published in July 1992 said:

“A number of states are seeking chemical, biological or nuclear weapons and the means to deliver them. About ten countries are assessed

as having biological weapon programmes. Almost twice that number have, or are aiming to acquire, chemical weapons. More than 20 non-NATO countries possess ballistic missiles.”

Continued work is needed to ensure that the protective measures available to the UK Armed Forces are effective for the possible scenarios world wide in which CBW may be used against them:

## The CBW Spectrum



The potential threat is a spectrum ranging from the classical warfare agents through industrial, agricultural and pharmaceutical chemicals to bioregulators, toxins and biological agents such as bacteria, rickettsia and viruses. The thrust of our programme is to achieve broad band protective measures effective against as much of the spectrum as possible. Following the Gulf conflict additional emphasis is being given in the research programme to biological defence. The Statement on the Defence Estimates published in July 1992 stated:

“The expertise established at the Chemical and Biological Defence Establishment at Porton Down enabled the United Kingdom to make a timely response to a number of threats which emerged during the crisis. The implications of Iraq’s CBW capabilities were assessed. New detection capabilities were deployed against both chemical and biological agents and medical countermeasures against biological agents were also developed and deployed. In addition, work was carried out on the physical demands and effects of operating in protective clothing in a hot climate.”

and went on to say:

“Preparations for the operation revealed a number of areas where improvements could be made. . . . Work will continue on evaluating the threat and hazard, particularly from biological agents, and on the research and development of detection equipment, physical protection and medical countermeasures.”

“The effectiveness of protective measures against chemical and biological weapons must, however, be ensured to reduce the utility of chemical and biological warfare agents that may be available to a potential aggressor.”

## Chemical and Biological Arms Control

The past year saw the final agreement in late 1992 of the Chemical Weapons Convention that provides for a comprehensive, verifiable and global ban on Chemical Weapons. This Convention opened for signature in Paris on 13-15 January 1993 and currently some 145 nations have signed and 4 have ratified the Convention. The earliest possible date for entry into force is 2 years after it opened for signature provided that 65 nations have by then ratified the Convention.

We have continued to provide our direct scientific and technical support through the Defence Arms Control Unit to the Foreign and Commonwealth Office (FCO) and the UK delegation at the Conference on Disarmament in Geneva. With the agreement of the Chemical Weapons Convention, our effort is now largely directed towards supporting the UK delegation to and

*The Right Honourable Douglas Hurd, MP, Foreign Secretary, signing the Chemical Weapons Convention.*

participating in the Preparatory Commission meeting at The Hague in the Netherlands which will be the site of the eventual Organisation for the Prohibition of Chemical Weapons (OPCW). In addition, work is being carried out on the preparation of the declarations which are required to be made by the UK when the Convention enters into force.

I and my staff have been active during the past year in the work of the Ad Hoc Group of Governmental Experts charged with examining possible verification measures for the Biological and Toxin Weapons Convention from a scientific and technical viewpoint. This work should lead to a final report in 1993/94. In addition, we have been active in advising on the preparation and introduction of the new export controls for micro-organisms and toxins of potential biological warfare significance and for dual purpose equipment.

Increasingly during the year, we have developed the concept of the web of deterrence involving:

- effective CB protective measures (reducing utility and reducing the number of materials presenting a risk)
- verifiable CB arms control
- monitoring and control of CB exports

Our appreciation has grown that these are essential interacting elements; any one alone is insufficient.



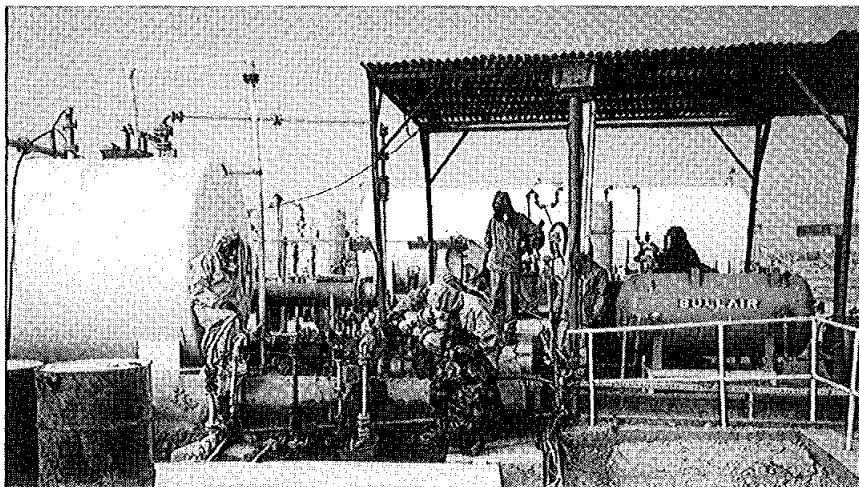


## The United Nations Special Commission (UNSCOM)

1992 saw the beginning of UNSCOM's programme to destroy Iraq's stockpile of chemical agents and chemical munitions.

CBDE has again made a major contribution to this work. Professor Bryan Barrass of CBDE was the UK Special Commissioner who had the responsibility for overseeing the CW destruction programme. At the end of March 1993, Mr Ron Manley, also of CBDE, became the UK Special Commissioner with the retirement of Professor Barrass. Mr Ron Manley continued to serve as Chairman of the Advisory Panel on CW Destruction to the Special Commission and during the year led three UN missions to Iraq to commission different phases of the CW destruction operation. CBDE has continued to provide assistance to the Special Commission through provision of equipment and members of inspection teams.

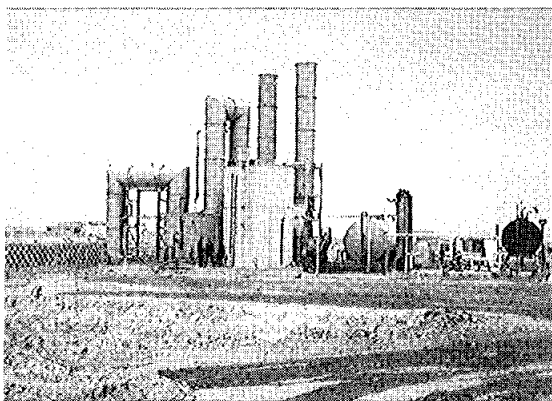
Chemical munitions from depots throughout Iraq were first transferred to the chemical weapons production site at Al Muthanna, located approximately 80 miles north west of Baghdad. These



*UN and Iraqi personnel  
commissioning the mustard gas  
destruction plant at Muthanna, Iraq.*

munitions are now being drained, decontaminated and then destroyed – a slow and very hazardous task. The agent drained from the munitions is being bulked in storage tanks to await destruction in one of the two plants constructed by Iraq under UN supervision and direction. By the end of 1992 approximately 1200 filled munitions, including 122 mm nerve agent rockets, 250 and 500 lb mustard bombs, binary nerve gas bombs and binary nerve gas Al Hussein warheads had been processed.

The nerve agents GB (Sarin) and GF are being destroyed by chemical hydrolysis in a nerve agent production plant which has been converted, under UN direction, to a destruction facility. This plant was commissioned by a UN team during September 1992 and by February 1993 had processed some 70 tonnes of nerve agent. Mustard gas is being destroyed by incineration in a plant constructed by Iraq specifically for this purpose, again under UN supervision and direction. The plant, which can process between 5 to 8 tonnes of mustard per day, was commissioned by a UN team during November 1992 and is now being used to destroy the stockpile of approximately 400 tonnes of mustard gas. Destruction operations at Muthanna are planned to be completed by the end of 1993.



*The exhaust gas cleansing plant of the  
mustard gas destruction facility.*

## Investigations into Allegations of Use of Chemical Weapons

The Chemical Weapons Convention (CWC) that opened for signature on 13-15 January 1993 provides for a more intrusive verification regime than any other previous global arms control agreement. One important aspect of the CWC that requires verification is the alleged use of chemical weapons. In 1992 CBDE was invited on two occasions to visit Mozambique to investigate the alleged use of CW agents against the Mozambique Government Forces. The preliminary visit was in January 1992 following an urgent request for the UK to provide a medical expert to carry out an independent assessment of the casualties. The second visit was in March 1992 following a request for the UK to send out a team to carry out sampling at the site of the incident, as part of a United Nations investigation team visit.

The UK team together with the representatives from the UN were transported by helicopter from Maputo to the vicinity of the site of the alleged incident. The site of the incident was identified by two Mozambican soldiers who had been present during the attack. The team first took receipt of some military equipment which was stated to have been dropped by personnel who had been affected in the incident. The team then went forward on foot to collect soil and vegetation samples from five locations. In order for the team to obtain unequivocal evidence of sample type and location, recording equipment was used including a Global Positioning System (GPS), video and still cameras. Prior to departure the team collected some soil samples from an area which was some distance from the attack to provide the necessary control samples required.

The twenty one samples obtained were returned to CBDE for official receipt and sample division into three to enable

independent chemical analyses to be carried out by the UK, Sweden and Switzerland. The samples at CBDE were screened for the presence of twenty CW agents which included nerve agents, vesicants, irritants and a psychochemical. The samples were also analysed for the presence of trace levels of certain agents. No CW agents were identified in any of the samples. An insecticide was detected in a control soil sample which confirmed that the analytical techniques used would have identified any unusual material if present. No CW agents were identified in the samples analysed by Sweden and Switzerland.

The results of the chemical analyses carried out by the UK, Sweden and Switzerland were published as Appendices to the UN report S/24065 dated 12 June 1992 of the incident. The UN report concluded:

“The effect on the troops was consistent with the use of an atropine-like chemical warfare agent and also with severe heat stress.

A considerable delay occurred between the attack and the investigation being mounted. For this reason it may not be possible to detect traces of agent if a chemical warfare agent had been used in the attack.”

The UK participation in this investigation enabled a number of important lessons to be learnt on the procedures and technical requirements which have been used in our work in support of the Chemical Weapons Convention and the Biological Weapons Convention. The ability to carry out a rapid and thorough investigation into an allegation of use of chemical weapons is one of the essential strands in maintaining the web of deterrence.



*CBDE and UN experts investigating the alleged use of chemical weapons in Mozambique.*

# Scientific Achievements

## MADONA

**M**ADONA is an acronym for Meteorology and Dispersion Over Non-uniform Areas. Estimates of the dispersion of smoke and vapours in the atmosphere have until now been largely limited to flat terrain. There is a clear need to assess the magnitude and extent of the hazard presented by airborne chemical and biological agents over actual terrain which is not flat. This requirement also exists in the civil sphere, where new legislation requires more rigorous estimation of potentially damaging industrial emissions to the atmosphere.

It was fitting that an international group of seven nations chose Porton Down at which to conduct experiments to measure the wind flow pattern and the dispersion that it produces; much of the classical work on dispersion has been performed at Porton Down. Teams from the United States, Sweden, Denmark, Germany, Holland and Spain joined with CBDE staff and other UK scientists, including those from the Meteorological Office, to mount what will be the definitive experiment of its kind for some years to come.

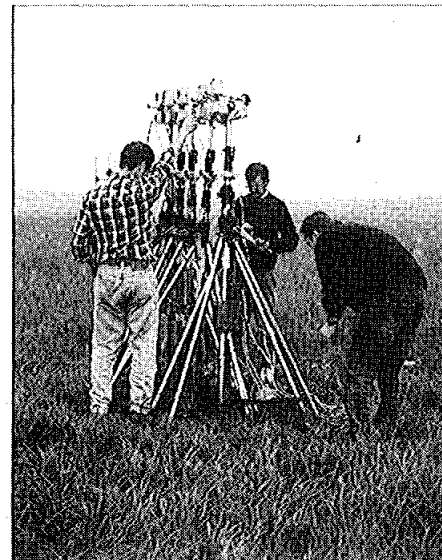
For thirty days, spanning September and October 1992, the wind speeds and directions were logged every six seconds using fifteen anemometers distributed across the range, enabling high definition patterns of wind flow to be determined. These patterns were compared with the predictions from several computer models which had been fed with the height contour patterns of the range. The comparisons allowed the performances of the models to be critically assessed.

During ten days within this period, both continuous plumes of smoke and instantaneously generated puffs were

released. Their movement and dilution were measured with high resolution laser devices. Two other tracer materials were also employed as further checks on how the dispersion mechanism functioned over the rolling downland. A large array of additional meteorological instruments was employed to gather essential data on the atmosphere, all of which is now undergoing analysis.

Successful experiments were conducted on nine of the ten days, far exceeding the expectations of the scientists – and despite the complex and vigorous weather systems which moved and developed over the British Isles.

MADONA was judged by all the participants to be a model of cooperation between the civil and defence worlds and between the different national teams who visited CBDE. It has provided a body of high quality data which will enhance the protection of British Forces against chemical and biological warfare, and which will be available to scientists world wide for developing new environmental impact models.

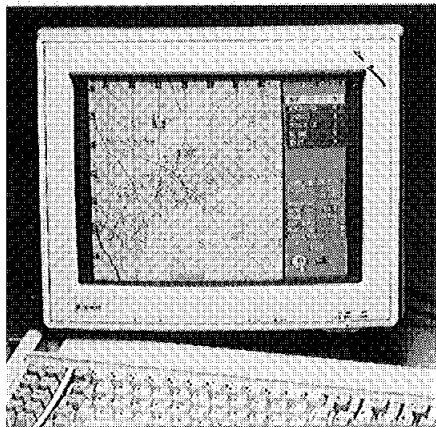


*Instruments designed at CBDE for detection of a tracer gas being prepared for trial MADONA.*



*Dispersion of a smoke plume during an evening trial.*

## BRACIS (Biological, Radiological And Chemical Information System)



*BRACIS showing a downwind hazard area; the hazard cloud is shown in red.*

A key requirement for effective defence against chemical or biological weapons is the detection and timely warning of an attack before harmful concentrations are inhaled by personnel. Once an attack has occurred, personnel likely to be affected must be identified and warned.

British Forces' warning and reporting procedures for nuclear, chemical or biological attacks are based on standard NATO procedures, whereby personnel predict the passage of a hazard, based on meteorology, using a series of standard templates to draw the region of possible hazard on a map. Once plotted, all units whose locations are within the template boundaries must be warned of the approaching hazard, and given an estimate of its likely duration.

Increasing the speed and efficiency of the warning and reporting process is the aim of one of the items in CBDE's programme, through the development of decision aids which will enable Force commanders to make informed decisions quickly. By early 1994, the NBC warning and reporting tasks currently performed by hand will be computerised. The new program will be called BRACIS (the Biological, Radiological And Chemical Information System), and its design is based on a prototype program called N-CHEBDA (Nuclear, Chemical and Biological Defence Adviser), developed at CBDE,

with advice on nuclear aspects from AEA Harwell laboratories.

The program has been designed to be used with the minimum of training, and the photograph shows the simplicity of the prototype user-interface. The photograph also shows the standard templates, after BRACIS has performed all the necessary calculations, for both persistent and non-persistent chemical agent attacks. BRACIS will then overlay on the map a list of the units that are within the template boundaries, and provide estimates of the time when the hazard may reach a unit, and how long it is likely to stay. The red stripes in the templates show the calculated position of the front and rear edges of the hazard cloud, and the box on the right of the screen shows the weather on which the calculations are based. General, medical, and operational information from British Forces NBC manuals will also be incorporated into the program, where it can be instantly retrieved. This feature of the N-CHEBDA prototype was initially developed as a computer program for British Forces in the Gulf in 1991, and was well received by novice and experienced personnel alike.

User trials of the prototype system N-CHEBDA were very successful; even experienced personnel trained in NBC warning and reporting could not match the speed and accuracy of the system.

---

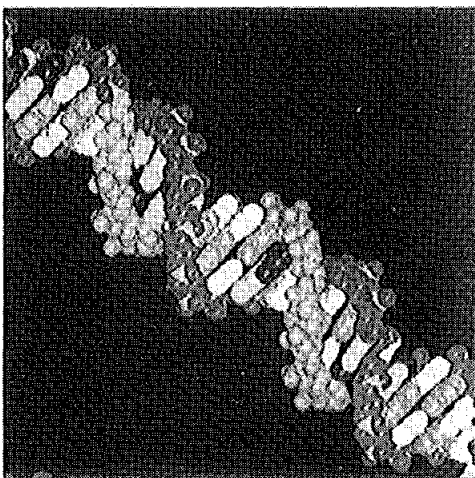
## Gene Probes for BW Agent Identification

---

Gene probes enable micro-organisms to be identified at the most fundamental level – by analysis of the nucleic acids which form their genetic blueprint. This gives gene probes the potential to provide definitive identification, not only of conventional biological warfare agents, but also of genetically engineered pathogens which may be produced by a potential BW aggressor.

Until recently, the potential of gene probes has been hampered by the paucity of technologies for rapid, sensitive microbial identification. However, recent developments in the field of molecular biology have brought significant advances in these areas.

At CBDE, these developments have been recognised and an expanding programme to monitor and exploit the best current technologies and to develop gene probes for the identification of BW agents has been implemented.



*A gene probe (in green) is shown binding to a complimentary region of a DNA duplex.*

The technology upon which CBDE's present strategy is based is the Polymerase Chain Reaction (PCR) which is a biochemical technique for the rapid amplification of minute quantities of genetic material into easily detectable quantities. It is a relatively new technique whose use has spread rapidly throughout the scientific community, and which is currently the subject of great interest in the fields of medical and environmental microbial detection. The technique has many advantages: it is highly sensitive, it is suitable for bacteria and viruses, it works on both living and inactivated microbes, and it can be fine-tuned for specific or wider spectrum tests. Initial results from PCR gene probe tests may be available in hours, and the PCRs yield a product which can be subjected to a range of further analysis after the initial test has been completed. This can provide definitive genetic information on microbes in the samples which may allow identification of microbes at strain level, and differentiation of virulent and attenuated variants. Hence, the technique has a range of applications from confirmation of early warning system results to in-depth investigation of samples for verification purposes.

CBDE has developed a system which involves the computer-aided design of PCR gene probe reagents followed by rigorous laboratory testing. Gene probes are optimised in laboratory tests and then checked against an extensive test panel of environmental organisms to eliminate any unwanted cross reactions. Gene probes which are successful in these tests will be subjected to further tests simulating more realistic environments and challenges. Using this system CBDE has designed a range of PCR gene probes for the identification of some of the main bacterial BW agents. Although these reagents have not yet passed through

---

## Gene Probes for BW Agent Identification (continued)

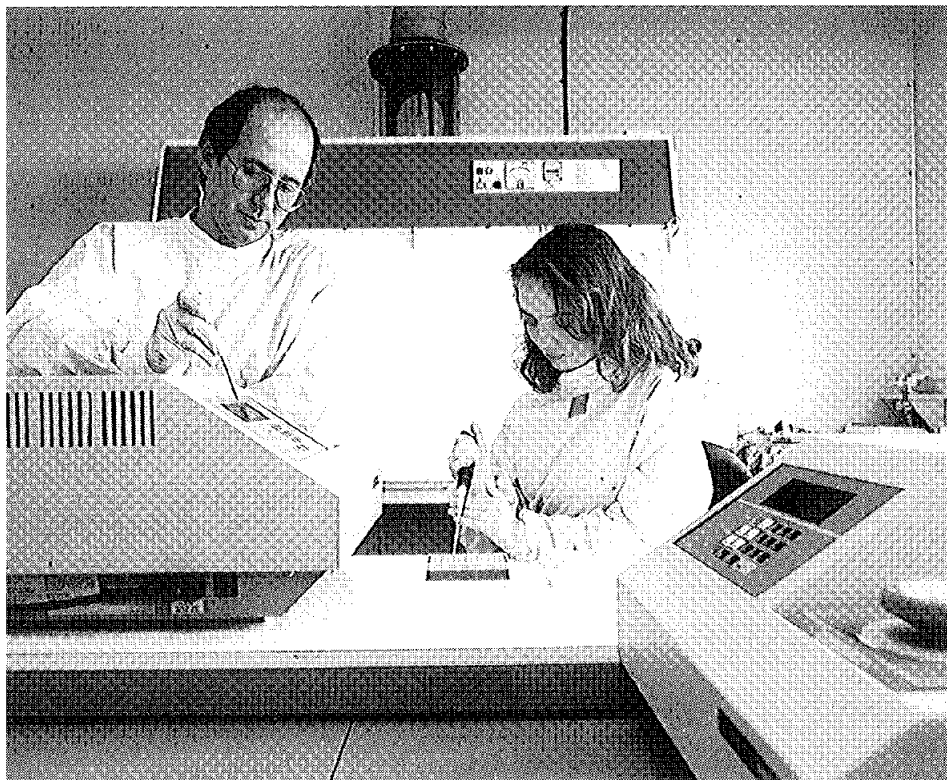
---

the complete testing regime, they have already been shown to perform well when they were used successfully in UK operations during and after the 1991 Gulf Conflict. As a result of our acknowledged capability in this area, we were also able to support the operations of the US Naval Forces during this conflict.

Viruses provide more of a challenge than bacteria in the field of identification and detection.

However, initial studies on the applicability of PCR gene probes to the identification of even the most demanding viruses are showing promise. It is envisaged that a similar programme to that for bacterial gene probes will be used to develop PCR gene probes against viral BW agents.

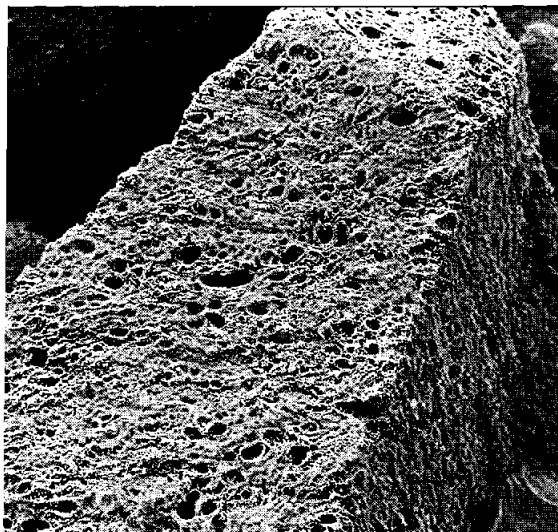
In summary, CBDE has initiated a programme to develop and extensively evaluate a range of gene probe reagents for the identification of BW agents. The technology is in its infancy, and can be expected to yield better performance in terms of speed and breadth of applicability as it is developed both at CBDE and in the civilian sector.



*An automatic thermal cycling machine for polymerase chain reaction (PCR) studies.*

## Chemical Modification of Activated Carbons

One of the CBDE's most important roles is to provide the UK Armed Services with adequate physical protection against the toxic materials which may be used against them. The critical component of any physical protection system is the activated carbon vapour filter which provides breathable quality air to the user. Activated carbons are the adsorbents of choice because they have a high internal surface area (often exceeding  $1000\text{m}^2\text{g}^{-1}$ ) and a pore size and shape distribution which can accommodate the wide range of molecular species likely to be encountered. The electron micrograph illustrates the sponge like nature of activated carbon.



An electron micrograph of activated carbon.

The most demanding requirement of a vapour filter is the adsorption of low concentrations of volatile hydrophobic vapours from humid air. In such situations, water vapour reduces the efficiency of the filter. In addition, water vapour further degrades filter

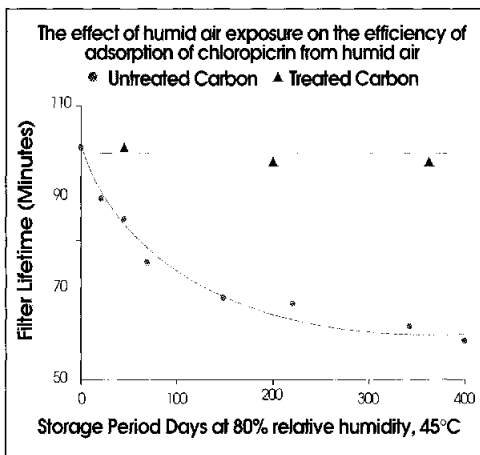
performance because it chemically reacts with the carbon during long term exposure to humid air.

The result of this process, which is usually known as ageing, is that water vapour is more strongly adsorbed than the toxic vapour. Fundamental research at CBDE has successfully identified ways in which the influence of water vapour on filter performance can be limited.

An understanding of these factors has enabled chemical treatments to be developed which result in carbons of enhanced surface hydrophobicity which also resist the ageing effects normally observed during storage and use in humid air.

The figure below illustrates the substantial effects that these treatments have on the levels of protection provided against a model volatile hydrophobic vapour, such as chloropicrin.

These advances will allow the construction of vapour filters with improved performance and lifetimes for military use. These adsorbents also have potential uses in industry to provide respiratory protection, to control emissions and for solvent recovery.

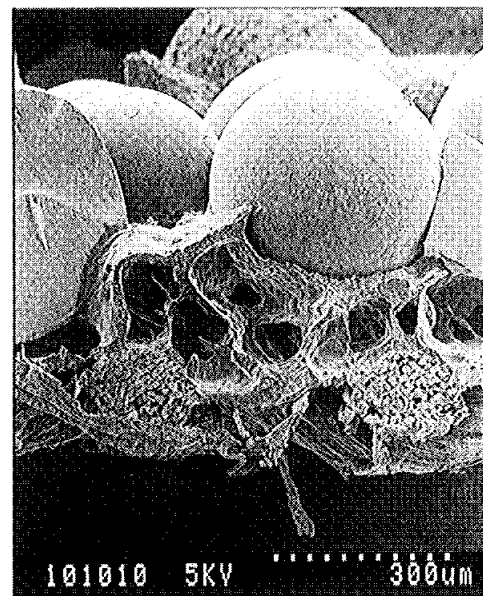


## Electron Microscopy

The electron microscopy section at CBDE works on a wide range of specimens in support of work in all divisions. The group has two scanning and two transmission electron microscopes fitted with a large range of accessories to make them exceptionally versatile.

Typical materials science applications for the high resolution scanning electron microscope (SEM) include studies into the structure of experimental clothing materials and the damage caused by treatment with chemical agents.

A second SEM is fitted with a cryostage which is used to study materials which melt under the electron beam. Its use includes the examination of the multilaminar structure of liposomes at



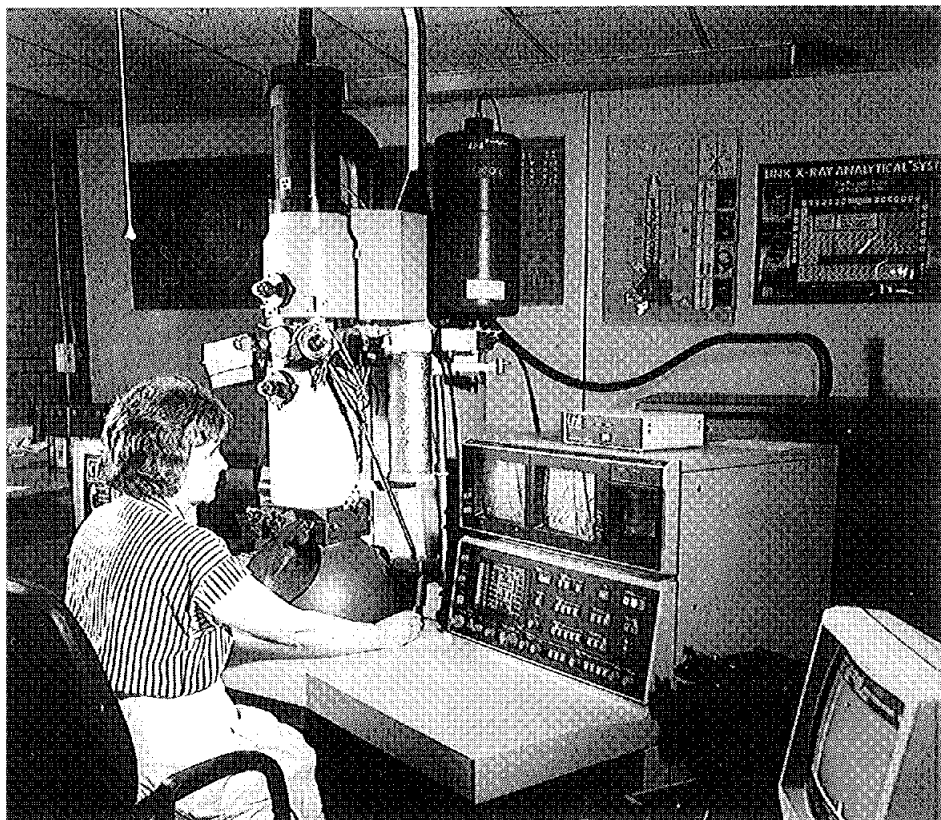
*A cross section of an experimental material for a CB suit.*

temperatures below  $-135^{\circ}\text{C}$ . This instrument provides a particularly powerful capability for examining biological samples.

The transmission microscopes are used for high resolution studies of the structure of charcoal and other powdered material. Energy dispersive X-ray (EDX) analysis is routinely used for elemental analysis of fibres in particulate filters.

A comprehensively equipped in-house darkroom provides the capability to develop negatives and produce high quality micrographs.

*The CM12 Transmission Electron Microscope with EDX analysis system.*





## Transdermal Drug Delivery for Nerve Agent Pretreatment

The British Armed Forces are currently issued with a Nerve Agent Pretreatment Set (NAPS) which consists of tablets to be taken every eight hours, supported by a treatment consisting of up to three automatic self-injectors (combopens). The pretreatment is based upon an understanding of the mechanisms of action of nerve agents which irreversibly inhibit an enzyme, acetylcholinesterase, that is essential for proper nerve function. The drug in NAPS, pyridostigmine, reversibly combines with the acetylcholinesterase protecting it against attack by nerve agents. A disadvantage of NAPS is that taking tablets is difficult in combat conditions and requires the respirator to be removed briefly. To improve nerve agent pretreatment we are developing a transdermal patch, or medicated plaster, to deliver a drug through the skin.

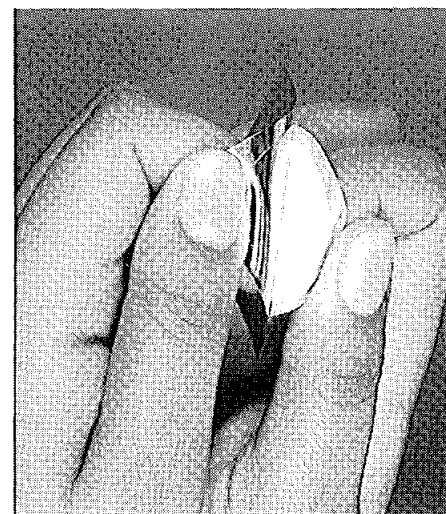
Pyridostigmine, itself, is unsuitable for delivery through the skin because it is a charged molecule so a different but related drug had to be found. Physostigmine, which has been used to treat Alzheimer's disease, does not carry a charge and was selected for study.

Initial work was carried out in-vitro to minimise the number of animals used. Formulations could be excluded in this way where they were unable to deliver drugs at a high enough rate. A further advantage of this approach is that it is possible to use human epidermis in such experiments allowing more meaningful predictions of drug delivery in man. Physostigmine was dissolved in a number of different delivery vehicles (eg polyethylene glycols or organic acids) and the rates at which it diffused

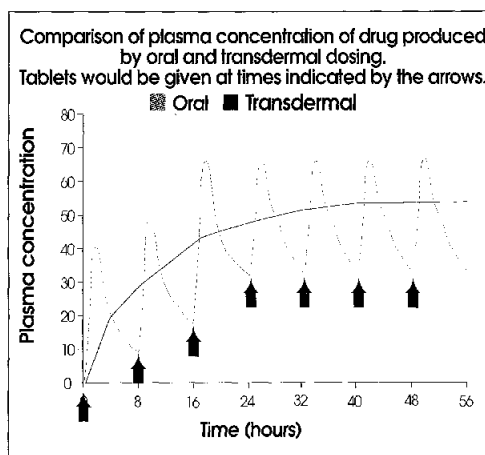
through the epidermis from each were measured. By including chemicals known to enhance the penetration of chemicals through the skin, CBDE has developed a formulation which delivered physostigmine quickly enough to reduce the predicted size of a transdermal patch to 4cm square.

The next step is to include a second valuable drug, hyoscine, in the formulation. This will help in preventing the initial transient 'crisis' effects which occur immediately after nerve agent poisoning, even in the presence of pyridostigmine or physostigmine. Hyoscine is similar to the atropine in the automatic injectors issued to personnel as a self administered nerve agent treatment and its inclusion in the patch will simplify the required treatment.

The formulation which delivers physostigmine has been patented and is generating considerable interest outside the MOD. The advantages of physostigmine/ hyoscine transdermal patch are highly important. Replacing a pretreatment which currently must be taken three times a day by mouth, perhaps in a contaminated environment, with one which can be stuck to a convenient part of the body and changed no more than once each day will greatly help the Armed Forces.



A Transdermal Patch.



The challenge associated with CBDE being an Agency has been enthusiastically welcomed by the entire management team of CBDE. The additional freedoms and flexibilities given to CBDE as a Defence Agency have enabled us to make a good start towards functioning more effectively and giving better value for money.

Eight challenging key targets were set for CBDE in its second year as an Agency which built upon the achievement against the key targets for 1991/92; one relates to market testing.

---

## 1992/93 Key Targets Outturn

---

### Improved Delivery of the Programme

To achieve within agreed timescales 85% of CBD programme milestones required by the Service Chiefs of Staff and other customers.	<b>86.8%. Target achieved</b>
--	-------------------------------

To achieve to agreed cost 80% of the CBD programme milestones required by the Service Chiefs of Staff and other customers and to seek progressive improvements in performance in future years.	<b>79.3%. Target 99% achieved</b>
--	-----------------------------------

To sustain the CB research programme and the capability of CBDE to respond effectively to operational emergencies by maintaining scientific and technical staff to at least 66% of the total planned manpower.	<b>68.2%. Target achieved</b>
--	-------------------------------

## More Efficient Use of Resources

To increase the overall efficiency by more than 2.5% with emphasis on improving output efficiency.

**Target achieved**

To establish a database by 31 March 1993 to enable the percentage of indirect to direct costs to be determined more accurately with a view to improving value for money for MOD by reducing the percentage of indirect costs in subsequent years.

**Target achieved**

To complete the programme of efficiency reviews of the remainder of the support services by 31 March 1993 and to initiate market testing, where appropriate and to implement the recommendations which would lead to greater efficiency.

**Target achieved**

## Development of Management Systems

To extend the improved resource allocation and cost attribution system by inclusion of major and minor works and maintenance costs by March 1993.

**Target achieved**

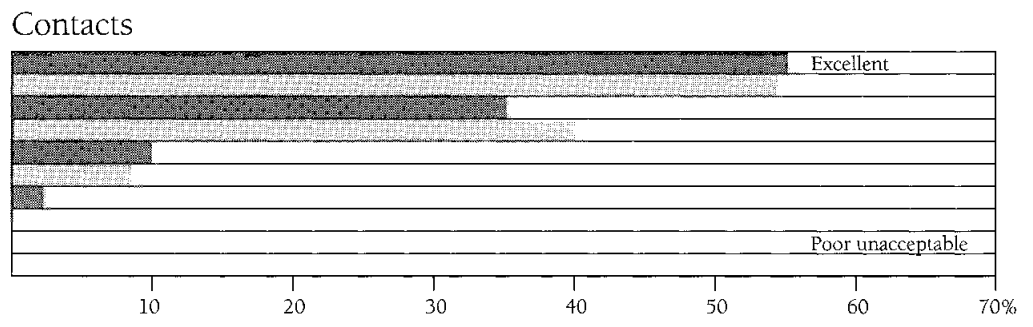
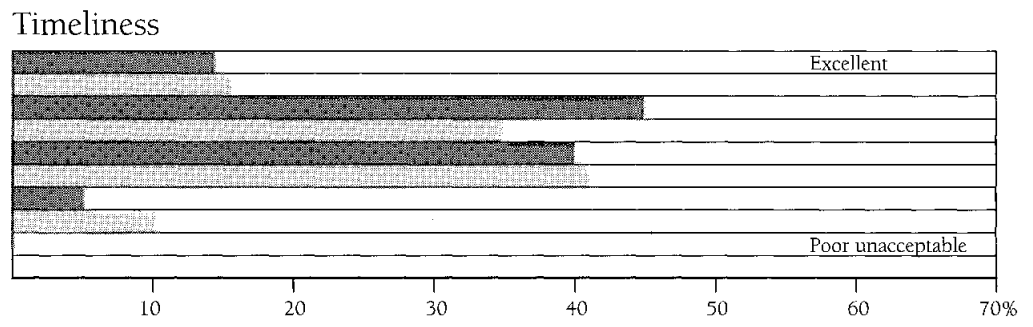
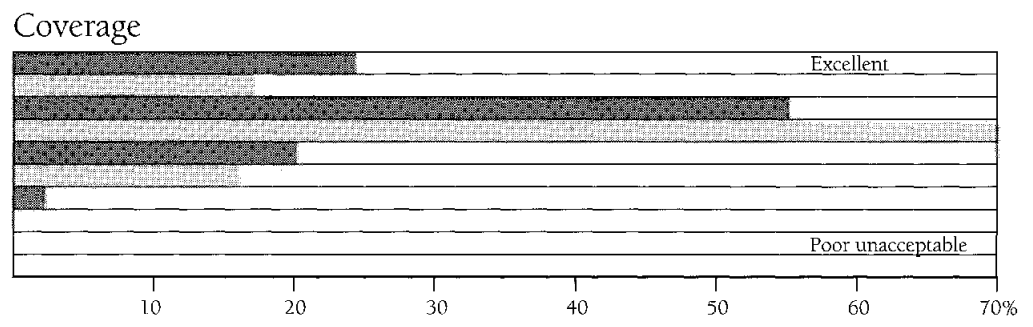
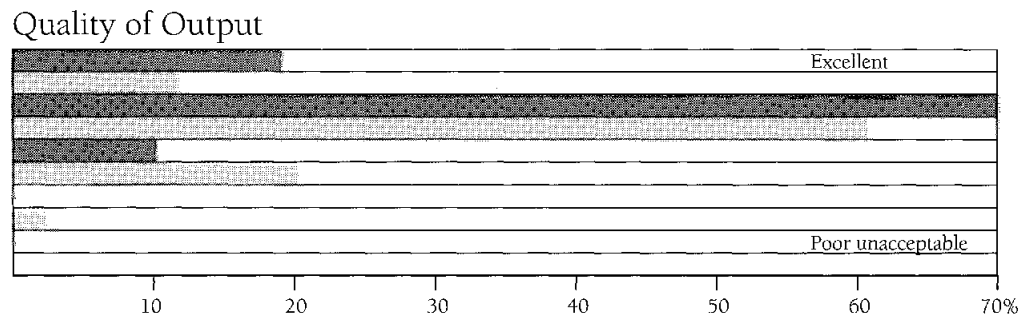
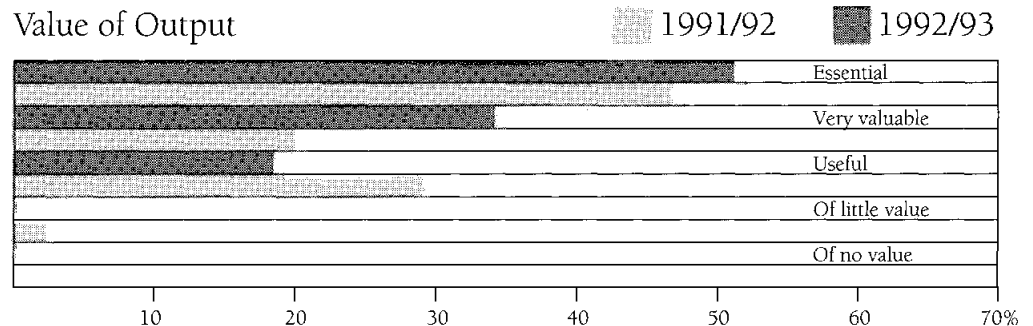
## Quality and the Customer

To improve the means of assessing the quality of the scientific and technical outputs by March 1993 and to apply this to the outputs for MOD and other key customers by March 1994.

**A second customer satisfaction survey was carried out – see histogram over page.  
A system for assessing scientific quality is also being developed.**

# Agency Performance

## 1992 CBDE Quality Survey



---

## 1993/94 Key Targets

---

The key targets for 1993/94 reflect the experience gained in 1991/92 and 1992/93. A key target sets a specific programme for market testing. Otherwise they are broadly similar so that trends can be established; some have been made more demanding.

---

## Citizens' Charter

---

Although CBDE has limited contact with the public, the principles of the Citizens' Charter are applied to our internal relationships both with the Ministry of Defence and with our other customers outside defence as well as in our contacts with the public. Progress against each of the Charter principles can be summarised as follows:

### ■ Standards

The Establishment has sought to improve the taut customer-supplier relationship by introducing two key targets relating to the delivery of the programme to time and cost. When each milestone is reached the customer is provided with a Milestone Report. Parallel approaches are being adopted for other customers. In addition we are developing a means of evaluation of the quality of science at CBDE which will be validated by the Defence Scientific Advisory Council Chemical and Biological Defence Board and its Committees.

### ■ Information and Openness

Full and accurate information is provided to our customers on the forward programme and what has been accomplished.

### ■ Choice and Consultation

Regular and systematic consultations are held with our customers who determine priorities. A customer satisfaction

survey has been carried out (Key Target 8) and work is in hand to evaluate the scientific quality of our output.

### ■ Courtesy and Helpfulness

We endeavour to be as helpful and courteous as we can and to provide the output when required.

### ■ Putting Things Right

If things go wrong, we will provide a full explanation and take effective action to prevent a recurrence.

### ■ Value for Money

A number of our key targets are aimed at providing better use of resources and thus to give our customer better value for money.

---

## Financial Performance

---

The Establishment in 1992/93 achieved its programme of work and remained within its cash budget. There was an underspend on capital works due to factors beyond the Agency's control. The key targets relating to the more efficient use of resources were all achieved. The total paybill outturn for 1992/93 was £13.2M and was within budget.

---

## Receipts/Business Opportunities

---

Opportunities are sought for work funded from outside the Ministry of Defence which will enhance the expertise and capabilities of CBDE to meet the requirements of MOD. In 1992/93, the receipts amounted to £3.1M or 9% of gross expenditure. They arose from sales and services provided to industry, other Government Departments and lodger units. During the year, work began on a contract with the Strategic Defence Initiative Participation Office.

## Safety

Safety is of paramount importance at CBDE. It is the responsibility of every individual to ensure that their activities are safe for themselves and their colleagues. An expert safety section is available to give advice on possible hazards, safety standards and requirements. Safety standards are audited independently on an annual basis through the Directorate of Defence Health and Safety as well as the Health and Safety Executive.

## Parliamentary Questions

The opportunity to reply directly to MPs in response to Parliamentary Questions within the scope of the Framework document has been particularly welcomed during the past year as has the publication of the reply in Hansard. 1992/93 saw a four-fold increase in the number of questions answered by the Director General and Chief Executive of CBDE and the tables below indicate both the subjects and the MPs who asked the questions. In addition we contributed to another 35 Parliamentary Questions which were answered by Ministers.

SUBJECT	NUMBER
International Collaboration and Agreements	14
Chemical and Biological Defence	11
Scientific Papers and Visits	7
Personnel/General	5
Funding	4
Scientific Procedures	2
Conservation	1
Chemical Weapons Convention	1
Patents	1
<b>TOTAL</b>	<b>46</b>

MP	CONSTITUENCY	NUMBER
Ken Livingstone	Brent East	35
Martin Redmond	Don Valley	5
Harry Cohen	Leyton	2
Tam Dalyell	Linlithgow	1
John McAllion	Dundee East	1
Callum MacDonald	Western Isles	1
Llew Smith	Blaenau Gwent	1
<b>TOTAL</b>		<b>46</b>

---

## Animal Experiments

---

Alternatives to animals are used whenever possible. The total number of animal experiments in 1992 was less than one half of one per cent of the total number of animal experiments in the UK. The majority involve mice, rats and guinea-pigs.

Such experiments are a small but essential part of the programme; they meet both the spirit and the letter of the Animals (Scientific Procedures) Act 1986 and the Home Office inspectors make unannounced visits. Such experiments are necessary:

- To assess whether a potential agent is indeed harmful.
- To devise medical countermeasures based on an understanding of how a material interacts with the body.
- To demonstrate that such medical countermeasures are effective as this cannot be done in man.
- To show that the medical countermeasures are safe to take before trials are carried out with Service volunteers.

---

## Service Volunteers

---

The programme involving Service volunteers began in the 1920s and now involves about 100-200 volunteers a year. No studies involving volunteers are carried out unless there is a clear military need and a detailed protocol has been reviewed and approved by an independent Ethics Committee in accordance with the guidelines laid down by the Royal College of Physicians.

The aim is to provide the Armed Forces with medical countermeasures that meet the same standards of safety as the drugs supplied to the public by a chemist's shop.

CBDE has now completed its first 5 years under the Animals (Scientific Procedures) Act which replaced the 1876 Act on 1 January 1987. Project licences run for 5 years so that 1992 saw the termination of all the original licences and their replacement by new ones. Considerable dialogue between the Home Office inspector and the licensees is necessary during the draft stages of most project licences but no major difficulty has been experienced in gaining the necessary licences for the research work at CBDE.

We also comply with the Royal College of Veterinary Surgeons (RCVS) Code of Practice for Named Veterinary Surgeons employed in Scientific Procedure Establishments and Breeding and Supplying Establishments.

Such volunteer studies are carried out:

- To assess the ability of Service personnel to function with new equipment and procedures.
- To develop medical countermeasures to protect Service personnel.
- To evaluate the effects of very low and medically safe concentrations of CW agents on the ability of unprotected personnel to operate normally.

## IUPAC Task Force



The Task Force examining old chemical munitions at CBDE.

The Establishment hosted the first meeting on 22-24 February 1993 of an International Union of Pure and Applied Chemistry (IUPAC) Task Force on scientific aspects of the destruction of chemical warfare agents. This Task Force comprises 13 scientists from 9 countries with Professor Joe Bunnett of the University of California as Chairman and Professor Irina Beletskaya of the Lomonosov Moscow State University as Vice Chairman.

The objectives of the task force are:

- To identify scientific questions related to destruction of chemical warfare agents ("poison gases") that need further investigation by research.
- To obtain and disseminate information about potential destruction processes.

It wishes to be helpful to authorities faced with chemical munitions destruction problems.



The IUPAC Task Force meeting in progress.



# Achievements and Publications

The British Empire Medal was awarded to two members of staff in the 1992 Birthday Honours list and the MBE to one member of staff in the 1993 New Year's Honours list.

A member of Medical Division gained the equal 3rd award in the MOD's

MIDAS (Make Ideas Develop Assets Successfully) green competition for energy saving ideas.

The number of graduates at CBDE exceeded 200 for the first time in March 1993.



The Director General welcoming the 200th graduate to CBDE.

## Graduates by Discipline

DISCIPLINE	1991	1992	1993
Life Sciences	71	80	88
Chemistry	62	68	72
Physics	12	14	16
Operational Analysis	8	8	7
Computer Science	3	6	5
Medicine	3	5	4
Mechanical Engineering	2	2	2
Materials Science	2	1	1
Veterinary	1	1	1
Other	4	4	4
<b>Total</b>	<b>168</b>	<b>189</b>	<b>200</b>
<b>% of Scientific Staff</b>	<b>59.4%</b>	<b>62.3%</b>	<b>64.3%</b>

A Graduate Scientist Trainee scheme was introduced into the Ministry of Defence during the year and we are pleased that 8 such graduates are at CBDE.

The number of staff undertaking further education increased and PhD and MSc degree qualifications were gained during the year by four members of staff.

Two senior members of staff gained individual merit promotion to Grade 5 which was marked by their appointment as Senior Advisers to the Director General on Biological Defence and on Trauma.

Promotions were gained by several members of staff in 1992/93:

7 to Grade 7 (July 1992)

4 to Senior Scientific Officer (March 1993)

8 to Higher Scientific Officer (April 1992)

2 to Scientific Officer (January 1993).

Courses	88/89	Number of Courses			
		89/90	90/91	91/92	92/93
Postgraduate Degree	10	16	18	18	14
First Degree	8	5	5	10	11
GCSE, GCE 'O' and 'A'	14	10	13	19	22
BTEC	12	13	13	23	30
Other Courses	24	16	15	15	11
<b>Total Courses</b>	<b>68</b>	<b>60</b>	<b>64</b>	<b>85</b>	<b>88</b>
<b>Total Staff taking part-time courses</b>	<b>62</b>	<b>58</b>	<b>58</b>	<b>76</b>	<b>79</b>

\* Some staff have taken more than one course

## Presentations and Publications

The principal outputs of the Establishment are written reports of work that have been carried out. All staff are required to write up their work and our publication policy is to

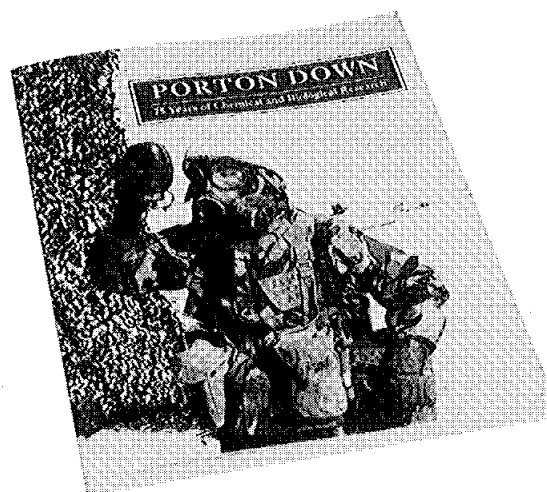
encourage them to publish their research and to contribute to the scientific community through presentation at national and international meetings.

The number of presentations and publications for the calendar years of 1991 and 1992 are summarised below.

ORIGIN	PRESENTATIONS		PUBLICATIONS			
			OPEN		CBDE REPORTS	
	1991	1992	1991	1992	1991	1992
Biology Division	9	9	14	15	13	29
Chemistry and Decontamination Division	1	-	5	4	16	9
Medical Division	3	2	16	5	7	15
Defence Microbiology Division	6	4	7	12	8	12
Assessment and Modelling Division	2	-	-	-	7	11
Detection and Aerosol Division	3	2	8	13	5	12
Protection Division	5	6	5	10	11	35
Other	2	2	8	10	16	9
Extramural Research	2	2	-	-	5	6
<b>Totals</b>						

## 75th Anniversary

A book to mark the 75th Anniversary called 'Porton Down - 75 Years of Chemical and Biological Research' was published by HMSO in December 1992 and is available from book shops at a cost of £9.95.



## Facilities and Estate

Construction is in progress on two new facilities which should be commissioned and in use in the coming year. A contract has been let to produce a capital development plan

with the aim over the next 15 years of rationalising old facilities and buildings that are costing increasing amounts to maintain and are no longer cost effective.

## The Management Team

The CBDE Executive Board is the forum for operational and strategic decisions in running the CBDE and comprises:

---

Director General and Chief Executive, Dr Graham S Pearson CB, Grade 3

---

Director Physical Sciences, Dr David A Anderson, Grade 5

---

Director Life Sciences, Dr Levence Leadbeater, Grade 5

---

Establishment Secretary, Mr Graham Wright, Grade 6

The Management Board consists of the Executive Board augmented by:

---

Senior Adviser, Strategic Studies

---

Senior Adviser, Biological Defence

---

Superintendent Assessment and Modelling Division

---

Superintendent Biology Division

---

Superintendent Chemistry and Decontamination Division

---

Superintendent Detection and Aerosol Division

---

Superintendent Defence Microbiology Division

---

Superintendent Medical Division

---

Superintendent Protection Division

---

Superintendent Trials, Engineering and Facilities Division

---

Senior Military Officer

---

Technical Staff Officer to the Director General (Secretary)

---

The Management Board meets monthly to ensure the maximum participation in and contribution to the development of CBDE's business. Twice a year the Management Board meets in plenary session with three senior representatives from academia, industry and research

foundations and a Trade Union representative. The members from outside the Civil Service provide a valuable source of managerial advice based on experience outside MOD and ensure that broad and informed advice is available.



*The signing of the Management Plan for the Site of Special Scientific Interest (SSSI) at Porton Down.*

*Left to right:*

*Earl of Cranbrook – Chairman English Nature  
Eddy Idle – Director of Operations, English Nature  
Dr Graham Pearson – Director General, CBDE  
Lord Cranborne – Under Secretary of State for Defence.*

Just under half of the 7,000 acres that provide an outdoor laboratory for CBDE is designated as a Site of Special Scientific Interest (SSSI). A management plan for the SSSI at Porton Down was signed on Friday 3 July 1992 by CBDE, on behalf of the Ministry of Defence, and English Nature. This management plan is an agreed programme of measures which enables CBDE to continue to use the site in a way that is both compatible with its defence needs whilst protecting and enhancing the environment.

It was announced on the same day that Porton Down had been declared a Special Protection Area (SPA) under the European Commission Directive on the Conservation of Wild Birds. We particularly welcomed this announcement as Porton Down is home to the relatively rare Stone Curlew.

The volunteer Conservation Group now has a membership of 205 and its activities at CBDE were featured in two television programmes during the year. TVS (now Meridian) broadcast an item about the Stone Curlew on its 'Coast to Coast' programme and BBC2 included an item in the Natural World series entitled 'Sanctuaries of Defence'.

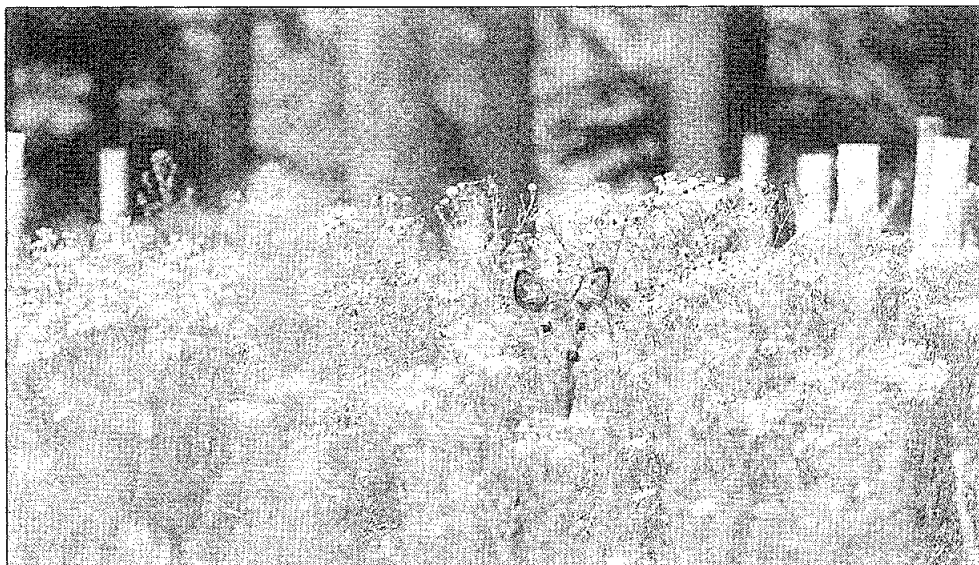


*The Stone Curlew  
(Photo by G Downey/RSPB).*

Visits were made to Porton Down by the following groups in 1992:

Sunday 17 May	RSPB (Chichester Group)
Tuesday 19 May	Hants Ornithological Society
Sunday 24 May	New Dorset Bird Club
Sunday 31 May	BBCS (Beds and Northants)
Tuesday 2 June	Bourne Valley Wives Group
Sunday 7 June	BBCS (Norfolk)
Tuesday 9 June	Wilts Trust for Nature Conservation
Saturday 13 June	Kintbury Wildlife Group
Sunday 14 June	Camberley Natural History Society
Saturday 20 June	Stevenage College
Sunday 21 June	RSPB (North Wilts Group)
Saturday 27 June	Institute of Biology
Wednesday 1 July	Chilmark Roof Appeal
Tuesday 7 July	Winterslow Cubs
Tuesday 14 July	The Amesbury Society
Sunday 19 July	Dorset Trust for Nature Conservation
Sunday 26 July	South Hill Park Natural History Society
Sunday 9 August	BBCS (Dorset Group)
Sunday 16 August	Fontana's Group
Sunday 25 October	Salisbury and District Natural History Society

Visits to the conservation area usually take place at weekends between May and August with occasional visits on a weekday evening. Groups wishing to arrange a visit are invited to write to the Chairman of the Conservation Group, CBDE Porton Down, Salisbury, Wilts SP4 0JQ about 12 to 24 months in advance.



*A Female Roe Deer on the SSSI  
(Photo by permission of  
Evening Standard).*

---

## Accounts for the Year Ended 31st March 1993

---

	Contents	Page
Foreword		ii – iv
Accounts Direction		v – vi
Net Expenditure Account		vii
Balance Sheet		viii
Cash Flow Statement		ix
Notes to the Accounts		x – xix
Certificate and Report of the Comptroller and Auditor General		xx
Statistical Information		xxi

---

## Foreword to the Accounts

---

### Accounts Direction

1. The accounts have been prepared in accordance with a Direction given by the Treasury in pursuance of Section 5 (1) of the Exchequer and Audit Departments Act 1921; the Direction is reproduced at pages v to vi.

### History

2. In 1915 chemical weapons were used against British forces and in 1916 Porton Down was selected as a site for work on a retaliatory capability and later protective measures for the UK Armed Forces. During World War II an autonomous Establishment known as Biology Department, Porton, was co-located with the then Chemical Defence Experimental Station to study biological warfare; in due course this became the Microbiological Research Establishment of the Ministry of Defence adjacent to the separate Chemical Defence Establishment.

3. In the late 1950s all offensive work on chemical and biological weapons ceased and both Establishments were concerned with the provision of effective protective measures for the UK Armed Forces. In 1979, the Microbiological Research Establishment was transferred to the Department of Health and became the Centre for Applied Microbiology and Research (CAMR) of the Public Health Laboratory Service; responsibility for biological defence was taken over by the Chemical Defence Establishment.

4. In the 75th year of Porton Down, the Establishment became a Defence Support Agency (now known as a Defence Agency) on 1 April 1991 and changed its name to the Chemical and Biological Defence Establishment (CBDE) Porton Down, thereby reflecting more accurately the role and function of the Establishment to ensure that effective protective measures are available to the UK Armed Forces so that they can maintain their operational effectiveness should chemical or biological weapons be used against them.

### Principal Activities

5. The principal activities of the Chemical and Biological Defence Establishment are to:

- a. Provide expertise to ensure that the UK Armed Forces are able to operate effectively and utilise their weapons systems and platforms in a chemical or biological warfare environment.
- b. Carry out research to provide effective protective measures against the threat of chemical and biological weapons for UK Service personnel.
- c. Provide scientific and technical advice on chemical and biological matters to the Ministry of Defence and to other Government Departments.

### Financial Review

6. CBDE operates under a gross running cost regime funded from the Ministry of Defence Vote. In the year we sought authority to move to a net running cost regime to aid business development; this attempt was however unsuccessful. The Ministry

of Defence considered that sufficient flexibility could be forthcoming in-year to enable CBDE to take advantage of business opportunities. The cash receipts of £3.1M reflects the extra business from the two large contracts mentioned in paragraph 9 below. Expenditure for the year was kept within cash limits but there was again some slippage on major works programmes due to factors beyond our control.

7. These are CBDE's first accruals accounts in accordance with the Treasury Accounts Direction. There are currently no financial targets for 1992/93; these will be introduced next year now that a Treasury Accounts Direction has been issued. During the course of the year, a scoping/feasibility study identified a substantial package of work for market testing.

8. On pages vii to xix are a set of accounts together with the notes which form part of the accounts.

## Business Development

9. The Framework Document was published in 1991 and the Establishment has a 10 year Corporate Plan setting out its management and business strategy; this plan will be amended during 1993/94. Opportunities have been taken to fund work from outside of the Ministry of Defence. The Establishment currently has a substantial contract with another Government Department and has been successful in winning a contract from the Strategic Defence Initiative Participation Office to evaluate the effectiveness of theatre missile defence against incoming weapons with chemical or biological warheads. This work has augmented the expertise and skills of the Establishment.

## Fixed Assets

10. Two new facilities are under construction to replace buildings built shortly after World War I and no longer meeting modern safety standards; these will be commissioned during 1993/94. The Establishment has engaged a team of consultants to produce a capital development plan aimed at rationalising the large number of old facilities which cost increasing amounts to maintain. In addition, a new major defence microbiology laboratory is about to enter its full design stage. However, there have been no significant changes in land and buildings during the year ended 31 March 1993. The buildings and land have been valued during the year by the Valuation Office Agency in accordance with the Statements of Asset Valuation Practice and Guidance Notes prepared by the Assets Valuation Standards Committee of the Royal Institution of Chartered Surveyors (The Red Book).

## Research and Development

11. The research and development work at the Establishment is primarily research to identify and demonstrate new concepts and approaches to the provision of effective protective measures against the potential chemical and biological warfare spectrum. Intramural research is supported by extramural research contracts placed with academic institutions and with industry. Such contracts are generally for a three year period. During the year, the number of such contracts was 116 with 74 at academic and research institutions and hospitals and 42 at industrial concerns; the total expenditure during the year was £4.1M. Development work is carried out



by industry and is the responsibility of the Procurement Executive of the Ministry of Defence; CBDE is normally tasked to provide technical support to the project.

#### CBDE Council

12. The Secretary of State delegates to the Deputy Chief Scientific Adviser (DCSA) ownership responsibilities. The Owner is responsible for approving CBDE's plans including performance targets and for monitoring performance against these. DCSA is assisted by a Chemical and Biological Defence Establishment Council made up of 9 senior members of the Ministry of Defence reflecting customer interests and policy and financial aspects and of four external members from academia and industry. The Council assist in looking at the operation of CBDE from a strategic viewpoint.

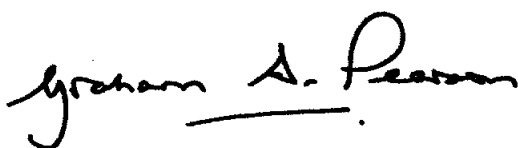
#### Disabled Persons Policy

13. The Establishment Policy is the same as that of the Ministry of Defence. Disablement itself is not seen as a bar to advancement or recruitment, the test being the ability to do the job.

#### Staff Involvement

14. Staff involvement is actively encouraged at the Chemical and Biological Defence Establishment as part of the day to day process of line management, supplemented by a Staff Suggestions Scheme. The Framework Document, the Corporate Plan and Business Plans are widely disseminated. A monthly newsletter, regular briefings and Establishment notes supplemented by staff meetings in the various Divisions are the main channels.

15. Formal and informal negotiations and consultations are carried out at quarterly Whitley meetings held separately with the non-industrial and industrial Trade Union representatives and chaired by the Director General and Chief Executive. Additional consultations are being carried out because of the Establishment's market testing programme. The National and Departmental agreements on consultation procedures continue to apply to the Establishment.



Graham S Pearson CB  
Director General and Chief Executive  
2 July 1993

---

## Accounts Direction Given by The Treasury

---

The Treasury, in pursuance of Section 5(1) of the Exchequer and Audit Departments Act 1921, hereby gives the following Direction:

1. The statement of accounts which it is the duty of the Chemical and Biological Defence Establishment to prepare in respect of the financial year ended 31 March 1993 and in respect of any subsequent financial year shall comprise:

- a. a foreword;
- b. a net expenditure account;
- c. a balance sheet;
- d. a cash flow statement; and
- e. (1993-94 onwards) a statement of recognised gains and losses;

including in each case such notes as may be necessary for the purposes referred to in the following paragraphs.

2. The Chemical and Biological Defence Establishment shall observe all relevant accounting and disclosure requirements given in "Government Accounting" and in the Treasury booklet "Trading Accounts: a Guide for Government Departments and Non-Departmental Public Bodies" (the "Trading Accounts booklet") as amended or augmented from time to time.

3. The statement of accounts referred to above shall give a true and fair view of the income and expenditure, state of affairs and cash flow of the Chemical and Biological Defence Establishment. Subject to the foregoing requirement, the statement of accounts shall also, without limiting the information given and as described in Schedule 1 of this Direction, meet:

- a. the accounting and disclosure requirements of the Companies Act;
- b. best commercial accounting practice including accounting standards issued or adopted by the Accounting Standards Board, with the exception of the requirement contained in FRS 3 for the inclusion of a note showing historical cost profits and losses;
- c. any disclosure and accounting requirements which the Treasury may issue from time to time in respect of accounts which are required to give a true and fair view; and
- d. any additional disclosure requirements contained in "The Fees and Charges Guide", in particular those relating to the need for segmental information for different services provided,

insofar as these are appropriate to the Chemical and Biological Defence Establishment and are in force for the financial period for which the statement of accounts is to be prepared.

4. Additional disclosure requirements are set out in Schedule 2 of this Direction.

5. The net expenditure account and balance sheet shall be prepared under the historical cost convention modified by the inclusion of:

- a. fixed assets at their value to the business by reference to current costs; and
- b. stocks valued at the lower of cost, or net current replacement cost if materially different, and net realisable value.

Signed:  .....

Treasury Officer of Accounts

Dated: 1 July 1993

---

## Schedule 1

### Application of the Companies Act's Requirements

---

1. The disclosure exemptions permitted by the Companies Act in force for the financial period for which the statement of accounts is to be prepared shall not apply to the Chemical and Biological Defence Establishment unless specifically approved by the Treasury.
2. The foreword shall contain the information required by the Companies Act to be disclosed in the Directors' Report, to the extent that such requirements are appropriate to the Chemical and Biological Defence Establishment. The Chemical and Biological Defence Establishment is exempted from complying with section 235(2) of the act relating to the Director's Report except insofar as it relates to disclosing details of principal activities.
3. The profit and loss account formats prescribed in Schedule 4 to the Companies Act shall not apply to the Chemical and Biological Defence Establishment's net expenditure account which shall be in the form set out in the annex to this direction. Minor changes may be introduced subject to Treasury agreement.
4. In preparing its balance sheet, the Chemical and Biological Defence Establishment shall adopt format 1 prescribed in Schedule 4 to the Companies Act to the extent that such requirements are appropriate to the Chemical and Biological Defence Establishment. Regard should be had to the examples in Annex C of the Trading Accounts booklet, in particular the need to strike the balance sheet totals at "Total Assets less Current Liabilities".
5. The foreword and balance sheet shall be signed and dated by the Chief Executive.
6. The Chemical and Biological Defence Establishment prepares its accounts under the modified historical cost convention, but is exempted from providing the additional information required by paragraph 33(3) of Schedule 4 to the Companies Act.
7. (1992-93 accounts only) The balance sheet shall show comparative figures as at 1 April 1992; the net expenditure account and cash flow statement shall not include any figures relating to the prior year.

---

## Schedule 2

### Additional Disclosure Requirements

---

1. The foreword shall state that the accounts have been prepared in accordance with a direction given by the Treasury in pursuance of Section 5(1) of the Exchequer and Audit Departments Act 1921.
2. The foreword shall include a brief history of the Chemical and Biological Defence Establishment and its statutory background. Regard should be had to Annexes B and C of the Trading Accounts booklet.
3. The notes to the accounts shall include details of key corporate financial targets set by the Owner on behalf of the Secretary of State for Defence for the year being reported on and performance achieved against those targets (when targets based on full cost accrual accounts have been set).
4. The Accounts Direction (but not the annex) shall be reproduced as an appendix to the accounts.

---

## Net Expenditure Account for the year ended 31st March 1993

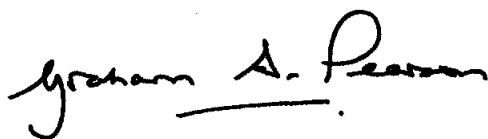
---

	Note	1992-93 £ 000
<b>EXPENDITURE</b>		
Staff Costs	2	13209
Supplies and Services Consumed	3	7301
Accommodation Costs	4	5243
Other Administration Costs	5	6628
Interest Charge on Capital	6	2984
		<hr/>
<b>GROSS EXPENDITURE</b>		<b>35365</b>
<b>INCOME</b>		
<u>Less Income from Non-MOD Customers</u>	7	3091
		<hr/>
<b>NET EXPENDITURE</b> (representing THE NET DEPARTMENTAL COST OF OUTPUT)		<b><u>32274</u></b>

The notes on pages x to xix form an integral part of these accounts.

**Balance Sheet**  
**at 31st March 1993**

	Note	1992-93 £ 000	RESTATED 1991-92 £ 000
<b>FIXED ASSETS</b>			
Tangible Assets	8	42928	41236
Assets in the Course of Construction	9	7513	3073
		<u>50441</u>	<u>44309</u>
<b>CURRENT ASSETS</b>			
Stock		1109	0
Debtors	10	178	359
Cash in hand		2	0
		<u>1289</u>	<u>359</u>
<b>CURRENT LIABILITES</b>			
Creditors: amounts falling due within one year	11	673	309
		<u>616</u>	<u>50</u>
<b>NET CURRENT ASSETS</b>			
<b>TOTAL ASSETS LESS CURRENT LIABILITES</b>		<u>51057</u>	<u>44359</u>
<b>FINANCED BY:</b>			
Revaluation Reserve	12	3306	0
General Reserve	13	47751	44359
		<u>51057</u>	<u>44359</u>



Graham S Pearson CB  
 Director General and Chief Executive  
 July 1993

The notes on pages x to xix form an integral part of these accounts.

## Cash Flow Statement at 31st March 1993

	1992-93 £ 000
Net Expenditure (from Net Expenditure Account)	32274
Adjustment for items not involving the movement of funds:	
Depreciation of buildings	1067
Depreciation on plant, computers and vehicles	1894
Ministry of Defence Police	2052
Insurance	19
Contribution in lieu of rates	303
Notional interest payable	2984
MOD supplies and services	385
Permanent transfer cost	261
Superannuation	1767
Charge for MOD central overhead	757
Profit on disposal of assets	(10)
Audit Fee	23
Net current expenditure in year	<u>20772</u>
Movement in net current assets:	
Increase in Stocks	1109
Decrease in Debtors	(181)
Increase in Creditors	(364)
<b>NET CASH OUTFLOW FROM OPERATING ACTIVITIES</b>	<u>21336</u>
<b>INVESTING ACTIVITIES</b>	
Purchase of tangible fixed assets	1487
Purchase of assets in the course of construction	4316
Receipts from sale of fixed assets	(26)
<b>NET CASH OUTFLOW BEFORE FINANCING</b>	<u>27113</u>
<b>FINANCING</b>	
Payments on Defence Appropriation Accounts	33297
Receipts on Defence Appropriation Accounts	(3777)
Adjustment for non-recoverable VAT	(2405)
<b>NET CASH INFLOW FROM FINANCING</b>	<u>27115</u>
Net increase in cash	<u>2</u>

The notes on pages x to xix form an integral part of these accounts.

---

## Notes to the Accounts for the year ended 31st March 1993

---

### **1** ACCOUNTING POLICIES

#### **a) Basis of Accounting**

The accounts for the Chemical and Biological Defence Establishment have been prepared in accordance with the Accounts Direction issued by HM Treasury on 1 July 1993 pursuant to Section 5(1) of the Exchequer and Audit Departments Act 1921.

The accounts follow the accruals concept of accounting and the historical cost convention, modified to include revaluations of Fixed Assets and stocks as set out in notes c) and e).

Subject only to compliance with the requirements set out in the Accounts Direction, the accounts also:

- a. Comply with the accounting and disclosure requirements of the Companies Act 1985; insofar as they are consistent with the status of a Vote-Funded Defence Agency of the Ministry of Defence.
- b. Comply with accounting standards issued by the Accounting Standards Board except to the extent that they are advised inapplicable by the Treasury.

#### **b) Income**

Income comprises of the amounts, excluding Value Added Tax, receivable during the year for goods and services supplied to the Private Sector, the wider Public Sector and other Government Departments.

#### **c) Fixed Asset Valuation**

##### **i) Freehold Land and Buildings**

Departmental Estate is treated as an asset of the Chemical and Biological Defence Establishment, although legal ownership rests with the Secretary of State for Defence. This reflects the Chemical and Biological Defence Establishment's position as the principal beneficial user of such property.

Valuation of land and buildings is on the basis of open market value for existing use, revalued at current market values on a five year rolling cycle.

Surpluses and deficits arising on revaluation are taken to the revaluation reserve. A valuation of the Departmental Estate assets of the Agency was carried out in December 1992 by the Valuation Office, Land Services Division,

---

## Notes to the Accounts for the year ended 31st March 1993

---

in accordance with the statements of Asset Valuation Practice and Guidance Notes issued by the Royal Institution of Chartered Surveyors. In order to meet HM Treasury's requirement for Current Cost Accounting land and buildings are revalued in the years between professional valuations using the following indices:

Land	– GDP Deflator Index
Buildings	– Index of Building Tender Price Levels

ii) Plant and equipment, vehicles and computers.

These are capitalised where items have a value exceeding 1992/93 £4300 (1991/92: £4050) excluding VAT, and an estimated useful life of one year or more, in accordance with Ministry of Defence guidance.

The cost of capitalised plant and equipment, vehicles and computers is also revalued annually and adjustments made for technological obsolescence using specific industry indices if available or the GDP Deflator Index.

### d) Depreciation

Depreciation is provided on all tangible fixed assets, other than freehold land, at rates calculated to write-off the cost or valuation, to the estimated residual value, of each asset on a straight line method, from the date of acquisition, as follows:

	Estimated Useful Life In Years
Buildings	10-88
Fixed equipment	15
Plant and machinery	10
Vehicles	3-10
Mainframe computers	10
Personal computers	3
Land is not depreciated.	

Additional depreciation is the difference between the current and historic cost depreciation for the year.

### e) Stocks

Stocks are valued at the lower of current replacement cost and net realisable value. At 1 April 1992, stocks were treated as consumables, the balance being zero. Development of systems during the year has resulted in greater visibility of stocks and hence the change in accounting policy.



---

## Notes to the Accounts for the year ended 31st March 1993

---

### **f) Research and Development**

Expenditure on research and development is written off in the year in which it is incurred.

### **g) Other Notional Central Charges**

So as to provide a complete picture of the costs associated with the Chemical and Biological Defence Establishment the Net Expenditure Account includes notional charges for insurance, interest on capital and central administration as advised by MOD central accounting policy staff and the Treasury, under the appropriate headings. These figures are separately disclosed in note 5.

#### **i) Notional Interest Payable**

A notional charge for interest on capital is included in the Net Expenditure Account. This is calculated as 6% of the average net book value of current cost of total assets less current liabilities at the start and end of the year.

#### **ii) Superannuation**

Civilian staff are covered by the provisions of the Principal Civil Service Pension Scheme and Service personnel by the Armed Forces Pension Scheme. A percentage uplift (currently 17% for non-industrial civilians and 16% for industrial grades, 31% for officers and 21% for other ranks), is added to the appropriate figure for Salaries and Wages to reflect a notional contribution by the Chemical and Biological Defence Establishment to the schemes, although no actual payment is made into the Consolidated Fund in this respect.

iii) Notional amounts are included in the Net Expenditure Account for charges in respect of services provided from other areas of the MOD. The amounts so charged are calculated to reflect the full cost of providing these services to the Agency and the main services for which the charge is made are set out in Note 3 to the accounts.

### **h) Value Added Tax**

The Agency is not registered for Value Added Tax (VAT) and VAT collected is accounted for centrally by MOD. Amounts included in the Net Expenditure Account and in the Balance Sheet are shown excluding VAT.

Where amounts are credited to the Agency by the central MOD accounting organisation to represent VAT repaid, these are included as a reconciling item in the cash flow statement.

---

## Notes to the Accounts for the year ended 31st March 1993

---

### i) Debtors

Debtors represent the value of amounts due from fee-paying customers and prepayments for goods and services received.

### j) Creditors due within one year

Creditors represent the amounts due to suppliers within one year for goods and services received including accrued expenses and liabilities.

## 2 STAFF COSTS

The average number of employees during the period was made up as follows:

Non Industrial	407
Industrial	180
Service	19
	<u>606</u>

1992-93  
£000

Staff Costs:

Wages and Salaries	10425
Social Security Costs	756
Permanent Transfer Costs	261
Superannuation	1767
	<u>13209</u>

The Chief Executive's total remuneration was £57640. The Chief Executive is an ordinary member of the Principal Civil Service Pension Scheme.

Number of senior CBDE staff in pay bands:

£	£
30,000 – 39,999	36
40,000 – 49,999	12
50,000 – 59,000	1
60,000 – 69,999	Nil

The council comprises of nine MOD and four external members, none of whom are full time employees of the establishment. Of the nine internal members three are at grade 2 and six at grade 3. The external members are paid £200.00 plus expenses for each day they attend.

---

## Notes to the Accounts for the year ended 31st March 1993

---

1992-93

£ 000

### 3 SUPPLIES AND SERVICES CONSUMED

External Stores and Services	3923
MOD Stores and Services	385
Extra Mural Research	4102
Opening Stock Balance	0
Closing Stock Balance	(1109)
	<u>7301</u>

### 4 ACCOMMODATION

Accommodation	136
Laundry	3
Fuel	60
Heat and light	579
Water/sewerage	3
Telephone and postage	35
Works and Maintenance	2107
Works fees	764
Depreciation on buildings	1030
Additional depreciation on buildings	37
Contribution in Lieu of Rates	303
Security	186
	<u>5243</u>

### 5 OTHER ADMINISTRATION

Consultancy fees	0
Travel and subsistence	202
Freight costs	5
Repairs and renewals	899
Computer costs	93
Miscellaneous overheads	136
Training	131
Stationery and publications	427

---

## Notes to the Accounts for the year ended 31st March 1993

---

	1992-93 £ 000
<b>OTHER ADMINISTRATION (Continued)</b>	
Depreciation on plant, computers and vehicles	1509
Additional depreciation on plant, computers and vehicles	385
Profit on disposal of plant, computers and vehicles	(10)
Ministry of Defence Police	2052
Charge for MOD Central overhead	757
Audit fee	23
Insurance	19
	<u>6628</u>
<b>6 INTEREST CHARGE ON CAPITAL</b>	
Interest on land and buildings	1956
Interest on plant and machinery	584
Interest on vehicles	67
Interest on computers	36
Interest on assets in course of construction	321
Interest on net current assets	20
	<u>2984</u>
<b>7 INCOME FROM NON-DEPARTMENTAL CUSTOMERS</b>	
Lettings	220
Lodger Units	128
Other Government Departments	1722
Miscellaneous	1021
	<u>3091</u>

---

Notes to the Accounts  
for the year ended 31st March 1993

---

**8 TANGIBLE FIXED ASSETS**

	Land & Buildings	Plant & Machinery	Vehicles	Computers & Office Equipment	Total
	£000	£000	£000	£000	£000
<b>COST/VALUATION</b>					
At 1 April 1992	53257	13981	741	1461	69440
Additions	4	1292	95	96	1487
Disposals	442	48	13	35	538
Revaluation	1887	4559	221	409	7076
At 31 March 1993	<u>54706</u>	<u>19784</u>	<u>1044</u>	<u>1931</u>	<u>77465</u>
<b>DEPRECIATION</b>					
At 1 April 1992	21009	5938	330	927	28204
Charge for year	1067	1600	85	209	2961
Disposals	442	32	13	35	522
Revaluation	779	2704	106	305	3894
At 31 March 1993	<u>22413</u>	<u>10210</u>	<u>508</u>	<u>1406</u>	<u>34537</u>
<b>NET BOOK VALUE</b>					
At 31 March 1992	<u>32248</u>	<u>8043</u>	<u>411</u>	<u>534</u>	<u>41236</u>
At 31 March 1993	<u>32293</u>	<u>9574</u>	<u>536</u>	<u>525</u>	<u>42928</u>

## Notes to the Accounts for the year ended 31st March 1993

### 9 ASSETS IN THE COURSE OF CONSTRUCTION

	1992-93 £000
<b>COST/VALUATION</b>	
At 1 April 1992	3073
Additions	4316
Revaluation	124
At 31 March 1993	<u>7513</u>

### COST/VALUATION

At 31 March 1992	3073
At 31 March 1993	<u>7513</u>

### 10 DEBTORS

Trade debtors	40
Prepayments	138
	<u>178</u>

### 11 CREDITORS – amounts falling due within one year

Trade creditors	1
Other creditors	41
Accruals	631
	<u>673</u>

### 12 REVALUATION RESERVE

	Total £000	Realised £000	Unrealised £000
Revaluation Reserve brought forward	–	–	–
Revaluation of Fixed Assets	(7200)	(422)	(6778)
Revalued Depreciation	3894	–	3894
	<u>(3306)</u>	<u>(422)</u>	<u>(2884)</u>

---

## Notes to the Accounts for the year ended 31st March 1993

---

	1992-93 £000
<b>13 GENERAL RESERVE</b>	
General Reserve brought forward	44359
Add:	
Net Voted Expenditure	27115
Non-Cash Items	8551
Less:	
Net Expenditure	32274
General Reserve carried forward	<u>47751</u>

<b>14 NON CASH ITEMS</b>	
MOD Stores and Services	385
Interest Charge on Capital	2984
Payment of Audit Fee	23
Superannuation	1767
Insurance	19
Ministry of Defence Police	2052
Permanent Transfer Cost	261
Contribution in Lieu of Rates	303
Charge for MOD Central Overhead	757
	<u>8551</u>

---

## Notes to the Accounts for the year ended 31st March 1993

---

### 15 NOTIONAL INCOME

Notional income is the cost of services provided to other MOD establishments for which no actual charge has been made, and is not included in the financial statements.

	£000
Training facilities	213

### 16 RESTATEMENT OF OPENING BALANCES

	31 March 1992 £000	1 April 1992 £000
Tangible Assets	21471	41236
Assets in the Course of Construction	2934	3073
Stock	0	0
Debtors	284	359
Cash in Hand		
Creditors	(887)	(309)
	<u>23802</u>	<u>44359</u>
Revaluation Reserve	0	0
General Reserve	23802	44359
	<u>23802</u>	<u>44359</u>

The opening balances have been adjusted due to improved systems which were developed during 1992-93. Tangible assets have also increased due to the revaluation of land and buildings. It was not possible to derive an opening balance for stock, although this is unlikely to have been significantly different from the closing stock balance.



# Certificate and Report

---

## Certificate and Report of the Comptroller and Auditor General

---

I certify that I have examined the financial statements on pages vii to xix in accordance with the Exchequer and Audit Departments Act 1921 and the National Audit Office auditing standards.

In my opinion the financial statements give a true and fair view of the state of affairs of the Chemical and Biological Defence Establishment at 31 March 1993 and of its net cost of operations and cash flows for the year then ended and have been properly prepared in accordance with the Exchequer and Audit Departments Act 1921 and directions made thereunder by the Treasury.

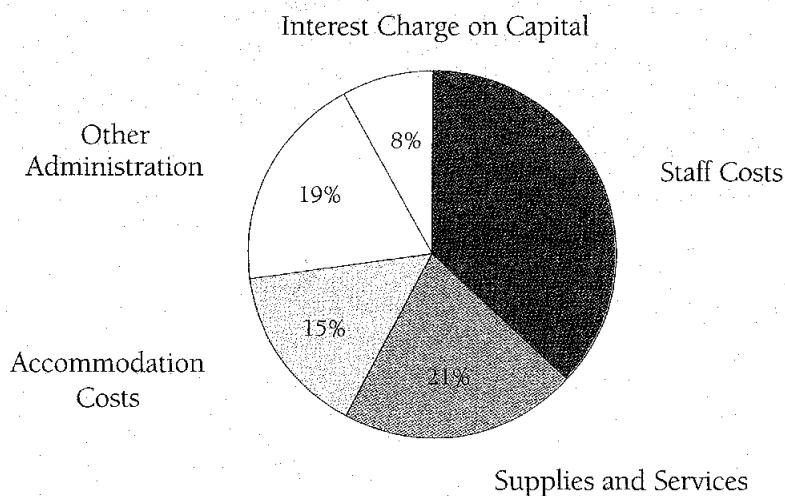
I have no observations to make on these financial statements.



John Bourn  
Comptroller and Auditor General  
National Audit Office  
7 July 1993

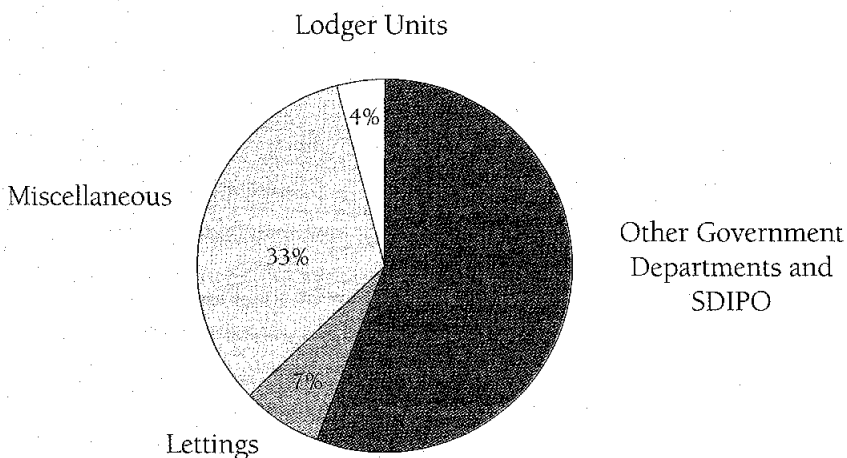
## Statistical Information

### Total Gross Expenditure VAT Exclusive (£35.365m)



- Accommodation = Utilities, works and maintenance.
- Other Administration = Repairs and renewals, depreciation, Ministry of Defence Police and general overheads.
- Supplies and Services = MOD and external suppliers and extra mural research contracts.

### Total Non MOD Income VAT Exclusive (£3.091m)



- Miscellaneous = British industry, farm sales, royalties and small miscellaneous payments



HMSO publications are available from:

**HMSO Publications Centre**

(Mail, fax and telephone orders only)

PO Box 276, London, SW8 5DT

Telephone orders 071-873 9090

General enquiries 071-873 0011

(queuing system in operation for both numbers)

Fax orders 071-873 8200

**HMSO Bookshops**

49 High Holborn, London, WC1V 6HB

(Counter service only)

071-873 0011 Fax 071-873 8200

258 Broad Street, Birmingham, B1 2HE

021-643 3740 Fax 021-643 6510

33 Wine Street, Bristol, BS1 2BQ

0272 264306 Fax 0272 294515

9-21 Princess Street, Manchester, M60 8AS

061-834 7201 Fax 061-833 0634

16 Arthur Street, Belfast, BT1 4GD

0232 238451 Fax 0232 235401

71 Lothian Road, Edinburgh, EH3 9AZ

031-228 4181 Fax 031-229 2734

**HMSO's Accredited Agents**

(see Yellow Pages)

and through good booksellers

ISBN 0-10-022323-0



9 780100 223233