Reflecting on 60 years

Continued from page 15

Consequently Harwell's reputation changed from a 'secret atom station' to a world-renowned laboratory solving technical problems and by 1985 was earning £50m a year from 1200 diverse contracts that included finding defects in railway lines at 60 mph, radiocarbon dating and metal fatigue in Big Ben.

The main reactors supported the nuclear programme for more than 30 years, produced medical isotopes and irradiated silicon for the semi-conductor industries.

Harwell's CRAY supercomputer graphically demonstrated why 31 people died in the Kings Cross inferno in 1987 and chemical experts advised on the recovery of wastes from the stricken Herald of Free Enterprise ferry. Cosmic ray doses were measured in Concorde and scientific protocols determined for dating the Turin Shroud. Novel sodium-sulphur and lithium-ion fuel cells were developed and Harwell batteries used in telecommunications satellites. In 1989 a multi-disciplinary team investigated 'Cold Fusion' proving it to be an electro-chemical phenomenon, but not fusion.

Government-funded programmes, including Fast Reactor development, were reduced in the late 1980s and from the early 1990s nuclear work now concentrated on waste management and decommissioning former nuclear facilities. The DIDO, PLUTO and GLEEP reactors closed in 1990 and large buildings, such as B351, demolished. UKAEA's HQ moved to Harwell in 1992 and a £20m infrastructure renewal programme completely replaced original RAF electricity, drainage and heating systems. In the mid-1990s UKAEA underwent a significant change with the privatisation of AEA Technology in 1996.

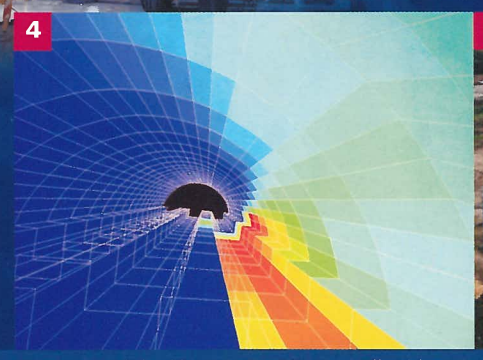
Decommissioning and radioactive waste management, and remediation work progressed rapidly from the early 1990s. Following closure the fuel, coolant and much of the equiupment was removed from DiDO and PLUTO reactors. Many buildings around the site which had been used for handling radioactive materials were decommissioned. In order to provide safe storage for radioactive waste new stores were built together with plant for recovering and processing radioactive waste.

The decommissioning programme has removed the GLEEP reactor and three of the four former RAF hangars on the site. Much of the work in the Eastern Area of the site is complete and a case has been submitted for delicensing part of the site.

The whole of the site has been thoroughly checked for contamination and areas such as the Southern Storage Area have been completely remediated.

Major progress has been made to restore the former AERE site for new uses so that the whole campus can continue to develop and thrive in the future.

1 *Checking for cracks in a jumbo jet.*
2 *German bomb casing found when decommissioning land.*
3 *B351 being demolished.*
4 *Supercomputer modelling of the Kings Cross fire.*
5 *The RAF Catapult Pit fully excavated in 2002.*
6 *Demolition spoil being crushed for use as 'back-fill'.*



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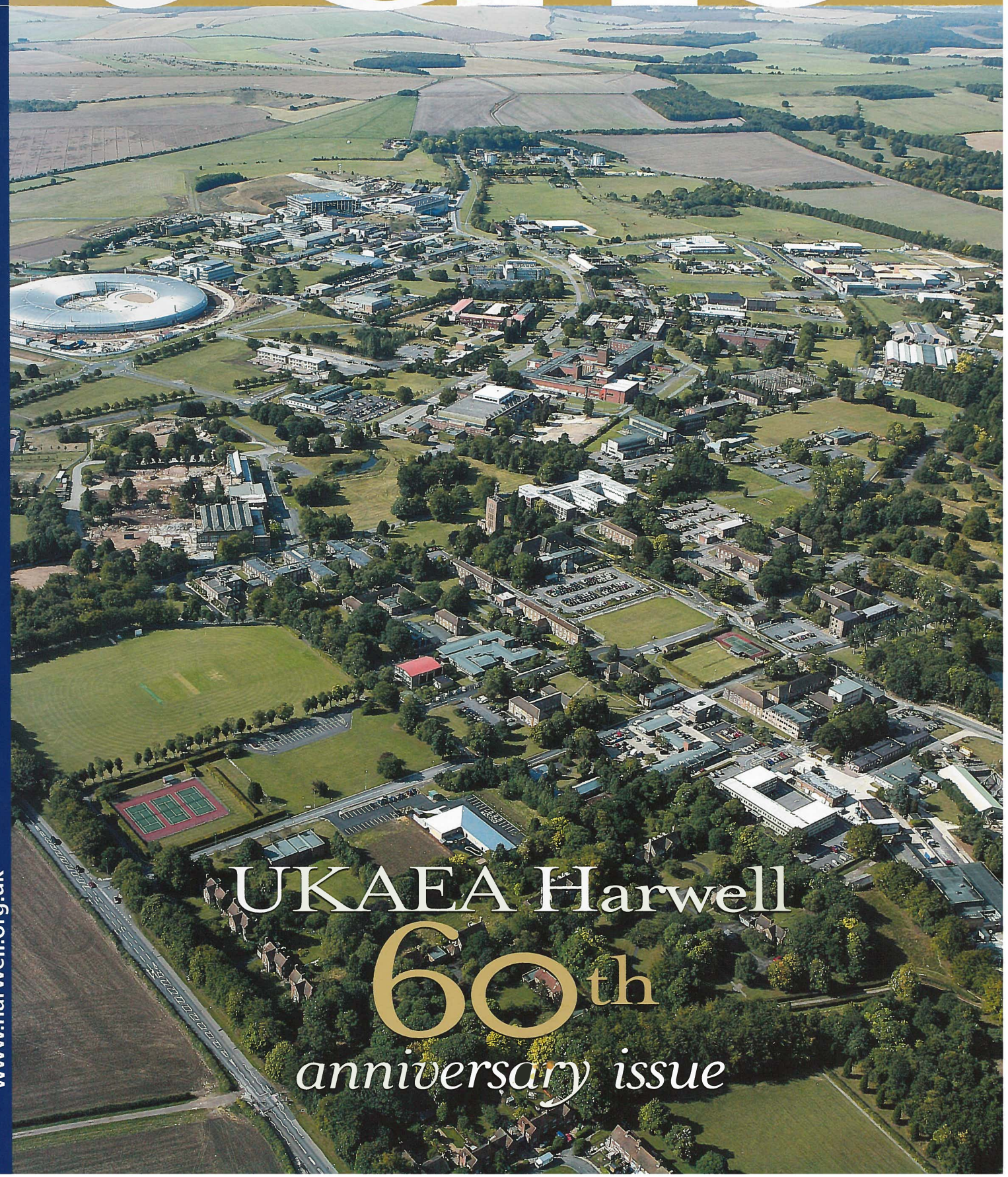


UKAEA Harwell 60th anniversary issue

Campus vision

Six decades have passed since the former WWII bomber training station of RAF Harwell was taken over by the Ministry of Supply to become the Atomic Energy Research Establishment (AERE) Harwell in 1946. The intervening years have seen the site go through an immense period of transformation which has seen Harwell establish itself as a world-renowned name in scientific research.

The Harwell campus provides work for over 4000 people and is home to some of the world's most prestigious research and technology organisations including CCLRC (Council for the Central Laboratory of the Research Councils) Rutherford Appleton Laboratory, Diamond, the Medical Research Council and the Centre for Radiation, Chemical and Environmental Hazards (CRCE, formerly NRPB).

The vision for the future of the Harwell Science and Innovation Campus is as a world-class centre for science and innovation and home to an ever stronger community where new collaborative approaches to learning, research and innovation are developed. The campus will be a natural location for new science, engineering and technology initiatives in the UK and a focus for science-linked projects and innovation activities.

In practice this will see organisations like CCLRC, Diamond, MRC and CRCE forging ahead with world-class public sector research that will underpin the success of the campus and attract new contributors. UKAEA will establish a joint venture (JV) with a private sector partner to develop the campus and to strengthen interactions with business. The Nuclear Decommissioning Authority (NDA) will complete the clean up and release from special regulatory control of land at the campus to support the development plans. Public sector organisations will work alongside businesses, using research to develop and profit from innovative products and services.

The campus will provide a high quality, sustainable environment for people working at the site and for visitors.

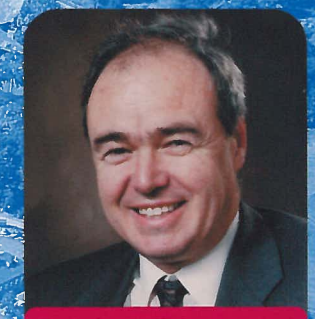
Dipesh Shah, Chief Executive Officer, UKAEA

In 2006, as we mark sixty years since AERE Harwell came into being, there is much to celebrate. The Harwell Science and Innovation Campus is, once again, looking forward to a vibrant future as well as reflecting on the events that have shaped its past.

There is no doubt that Harwell has established a world-class reputation for science and innovation. This is due entirely to the ground-breaking work carried out over the past six decades from the birth of the nuclear age in the 1940s to the latest research into the building blocks of life and the origin of our planet.

The changes taking place on the campus represent exciting opportunities for new alliances and ambitious new projects that will re-establish our name in the global science and innovation arena.

On behalf of UKAEA, I would like to thank every organisation and individual that has contributed to the past and present success of the Harwell campus, providing a solid foundation for the next stage of its evolution.



Dr John Wilkins, Head of Site, Harwell

Since the establishment of AERE Harwell in 1946 there have been many changes on the site. The rapid growth of the late 1940s and 1950s has been followed by a period of consolidation and diversification. By 1974, when I joined Harwell, all the organisations on the campus had established world-class reputations.

In the intervening years the purpose of the site has undergone many changes, not least the closure of most of the nuclear facilities which are now being decommissioned. The recent investment in major new research facilities represents an exciting new era for the Harwell campus.

I am pleased to have been able to contribute to the evolution of the campus as a research scientist and, recently, as manager of the decommissioning project. The next 60 years have the potential to be as significant as the 60 we are celebrating now.

UKAEA's changing role

As the rapid transformation of the Harwell campus continues, one of the central players in its history is also going through an exciting period of change.

The United Kingdom Atomic Energy Authority (UKAEA) commenced stewardship of Harwell in 1954, when it took charge of the UK's atomic energy programme. The organisation oversaw many of the scientific achievements that made Harwell famous around the world. Since the end of publicly-funded nuclear fusion research and the privatisation of AEA Technology, UKAEA has concentrated on decommissioning and restoring Harwell along with its other sites around the UK. Much of the task has been completed, with over one million square feet of facilities already safely removed. The task is expected to be completed by 2025.

In April 2005, UKAEA entered a new phase in its evolution when it became a contractor to the Nuclear Decommissioning Authority (NDA). The NDA has been established by government to take overall responsibility for the clean-up of Britain's 20 civil nuclear sites. It plans to introduce competition for the management of the sites, including the nuclear licensed site at Harwell which occupies one third of the campus. UKAEA is responding to this change by creating a new business arm to bid both for NDA contracts and for other environmental restoration work in the UK and overseas. With a strong international reputation in decommissioning, the organisation is confident of establishing itself as a competitive British player in the market.

UKAEA continues to manage most of the campus working with its neighbours to maintain Harwell as a world-class centre for science and innovation.

By using land released through decommissioning to create a thriving business centre, it has helped to lay the foundations for the future vision. UKAEA will shortly form a joint venture with a private sector partner to accelerate this development.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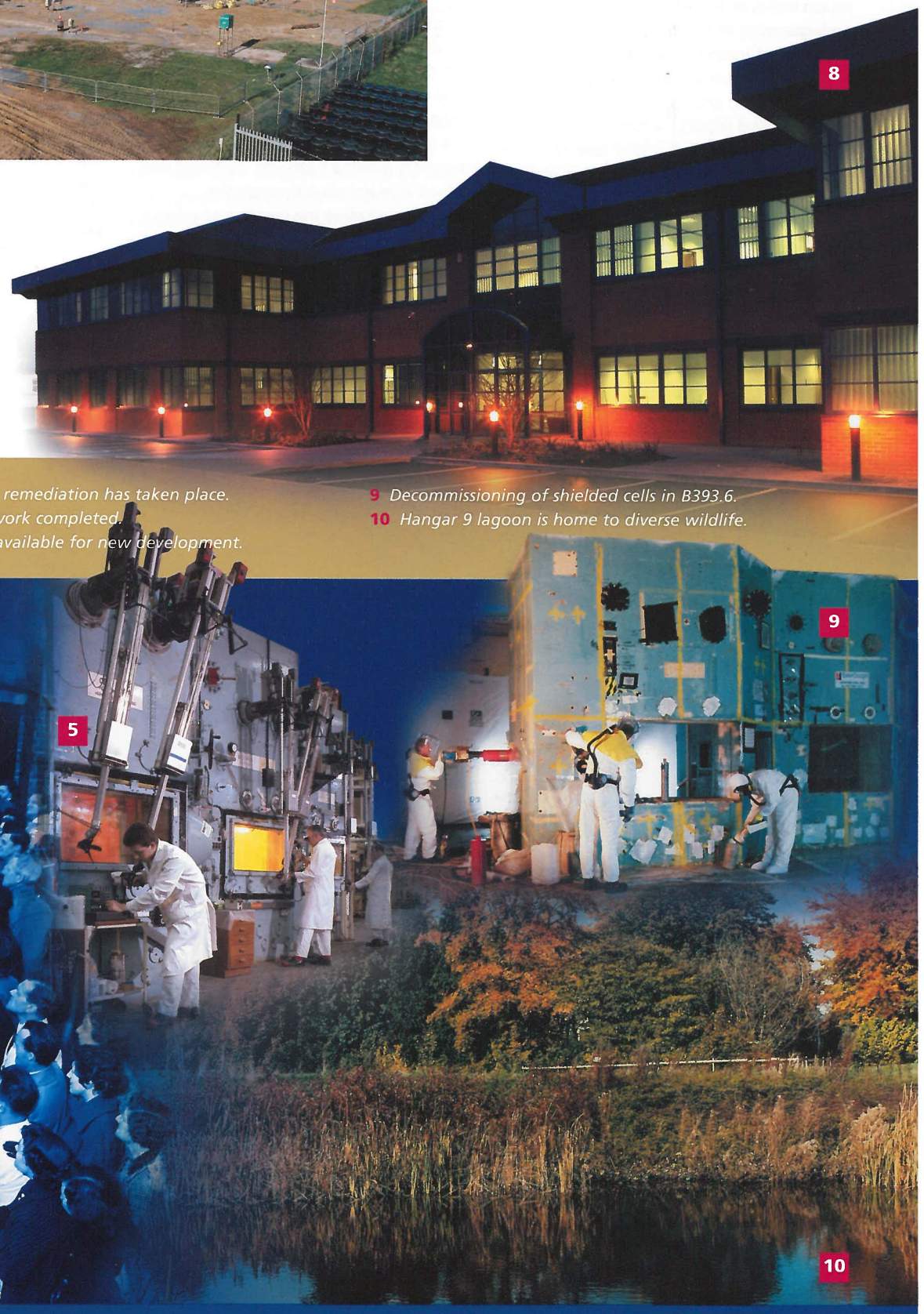
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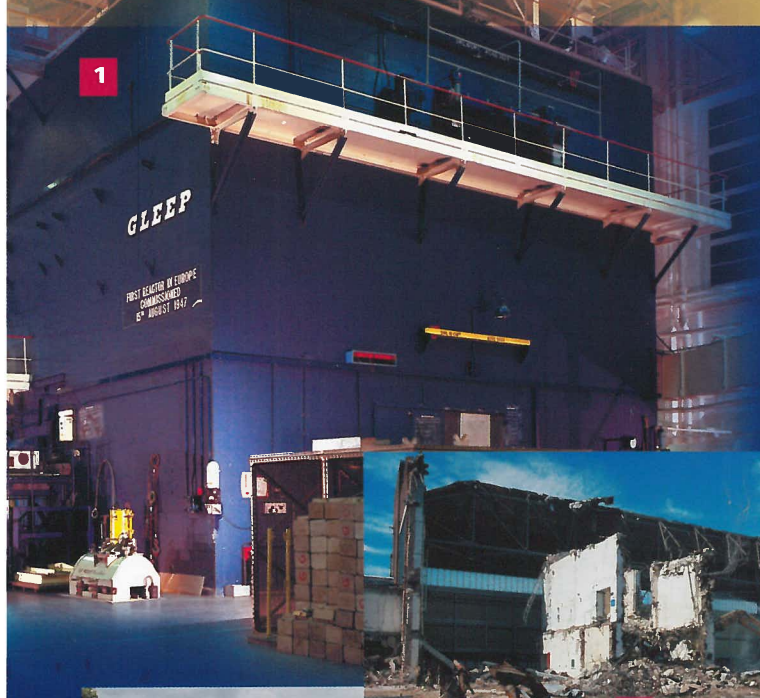
1 *The GLEEP research reactor.*
2 *Hangers 7 and 8 have been successfully demolished.*
3 *Investment has been made in the B462 waste facilities.*
4 *The Queen visited H7 in 1957.*
5 *Shielded cells.*
6 *Extensive land remediation has taken place.*
7 *Remediation work completed.*
8 *Land is made available for new development.*
9 *Decommissioning of shielded cells in B393.6.*
10 *Hangar 9 lagoon is home to diverse wildlife.*



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CCLRC RAL today and tomorrow

Recent grants to upgrade the laboratory's main research facilities and funding to bring the site infrastructure up-to-date have left the CCLRC Rutherford Appleton Laboratory (RAL) looking more like a building site than the world-leading science research centre that it is. But beyond the diggers, the barrier fencing and the earthworks, the research continues unabated.

A £130 million grant to build a second target station for the Isis pulsed neutron source will enable scientists to extend their understanding of the molecular and atomic structures of materials like proteins and viruses. There will also be new dedicated programmes on energy, materials and environmental impact. A further grant to upgrade the Astra high power laser to make it the most intense laser in the world ensures that RAL's facilities continue to lead the world in scientific research.

These upgrades will result in more visiting scientists and engineers from the UK and across the world. New overnight accommodation for users is being built - using pre-fabricated modules that are delivered, fitted together and completed in a matter of weeks. The restaurant complex is being expanded and plans for a new reception building to welcome the visitors are well developed.

A separate company, Clik Knowledge Transfer, ensures that knowledge resulting from CCLRC research is exploited in as many ways as possible. Professor John Wood, chief executive of CCLRC, explains: "The innovation that emanates from the laboratory is being captured, nurtured and realised in many ways through this company, including the creation of spinout companies. One recently created company is developing robust sensors that will work in the heart of car and aeroplane engines, ensuring that future use of the world's precious and finite supply of fossil fuels is used economically."

Scientists will benefit from the synergy the new Diamond Light Source will bring to the site. Engineers have the opportunity to exchange ideas about the technological advances that underpin all the leading-edge facilities and scientists will benefit from the extensive pool of scientific experience that the campus provides. The benefit to staff working in an exciting environment such as this is enormous, evident in the number of technical awards and achievements RAL staff win each year.

Almost 50 years ago the Nimrod proton synchrotron experiment for research into high energy physics was the first facility built at the then Rutherford High Energy Laboratory following its emergence from the AERE Harwell Laboratory in 1957. One of the proposed instruments on the Isis second target station is to be called Nimrod and the re-use of this name brings almost 50 years of RAL full circle, as it looks towards a bright, innovative and exciting future.

Professor Wood finishes by looking even further ahead. "There are a number of potential large scale European facilities that might be built on the site and we are actively working for a grand vision for science and innovation with our neighbours and with government"

A user from Imperial College, London, setting up an experiment on the Astra High Power laser.

Diamond heads for sparkling launch

As Harwell marks the milestones and achievements of the past 60 years - successes that have made it a world renowned research centre - Diamond Light Source, the UK's new electron synchrotron, is looking ahead and counting down the days to the start of operations.

The striking doughnut-shaped building, which is now a feature of the south Oxfordshire landscape, houses a machine that will give a major boost to 21st century science via a series of 'super-microscopes'. Diamond will be one of the most technologically advanced machines of its kind in the world, with an electron beam energy of 3 Giga electron Volts.

The campus has a long history of developing pioneering particle accelerators. Harwell's variable energy cyclotron, launched in 1965, was one of the earliest types of particle accelerators and it was followed by the Proton Linear Accelerator (PLA) and the high energy NIMROD proton synchrotron. The scientists and engineers who worked on these machines had world leading electronics and particle physics expertise and today machines such as Diamond owe a huge debt to the particle accelerators that went before.

From January 2007, Diamond will be up and running, doing experiments here on the campus. Once operational, Diamond will be able to establish its credentials as a world class scientific research facility.

Prof Gerd Materlik, Diamond's chief executive, comments: "To ensure that we are ready to welcome researchers early next year, tight deadlines have to be met throughout 2006 on both machine installation and beamline commissioning. The work is on-schedule and we have exciting plans to involve the local community in our launch celebrations, which will take place throughout 2007".

Diamond is going to be capable of doing experiments in a wide range of areas, bringing about exciting developments in fields such as medicine, engineering, nanoscience and environmental research to name just a few. Susan Judge, who joined Diamond at the beginning of the year, is setting up the User Office, which will support the academic and industrial researchers from their earliest contact with Diamond through to post experiment feedback.

Gerd Materlik, Diamond Chief Executive, in the atrium of Diamond House.

Prof Materlik adds, "We want to create a vibrant culture where researchers interact with each other as much as possible. Next generation synchrotron facilities such as Diamond can be fully focused on exploiting, together with our users, the advanced technology that have been developed over the past decades . We will encourage Diamond users to share ideas with each other and we hope some very new and exciting research projects will be born here as a result of fostering this kind of culture."

Principal beamline scientist Sarnjeet Dhesi inspecting the new monochromator and the hexapod for the nanoscience beamline.

The Mary Lyon Centre

MRC Harwell celebrates 50th milestone

The major challenge for genetics in the twenty-first century is the determination of the function of all the genes in the human genome and their role in disease. The mouse occupies a unique and pivotal position in this endeavour because as a mammal it demonstrates a remarkably similar development, organogenesis, physiology and biochemistry to that of a human.

In 1955 the Medical Research Council (MRC) introduced mouse genetics as part of the research effort of the MRC Radiobiology Unit at Harwell. At that time the focus was on using mouse as a tool for the study of mutagenesis mechanisms. But with an outstanding scientific team who recognised the wide variety of biological insights that could be gleaned from studies of this mammal, research flourished and expanded, sometimes in unexpected directions.

From the 1960s to the 1990s, Harwell was a hotbed of some of the most profound and exciting discoveries in genetics, most notably X inactivation and imprinting by scientists like Dr Mary Lyon and Dr Bruce Cattanach.

Mouse geneticists have developed an extensive toolkit that enables them to undertake systematic mutagenesis of every gene in the mouse genome and to examine the phenotypic consequences and identify disease models from amongst the mutants created. They can then translate that knowledge into a better understanding of the genetics of human disease. With this goal in mind MRC established the MRC Mammalian Genetics Unit at Harwell in 1996 under the leadership of Professor Steve Brown.

In 2004, a new state-of-the-art animal facility - the Mary Lyon Centre - was built at Harwell. As part of the MRC's remit to develop a dialogue with the public, open days are organised annually where local schools visit.

In December 2005, to mark the fiftieth anniversary of mouse genetics at Harwell, a one-day meeting was organised, where eminent scientists such as Professors Azim Surani, Phil Avner, Nick Hastie and Jeff Friedman gave a series of interesting lectures.

CRCE new face of NRPB

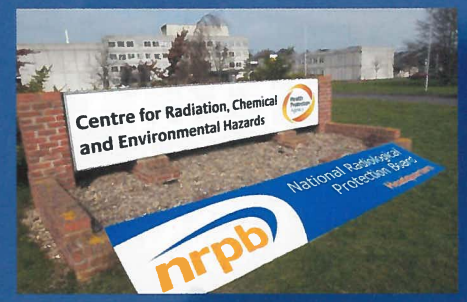
Set up in 1970 by Act of Parliament, the National Radiological Protection Board (NRPB) had its headquarters on the site for 35 years. During its formative years, many staff were recruited from the UKAEA, MRC and the former Radiation Protection Services.

NRPB offered advice to government, the media, the general public and others, such as local authorities and industry, on all aspects of both ionising and non-ionising radiation. NRPB was, for example, at the forefront of providing UK advice following the Chernobyl incident in 1986.

On 1 April 2005 NRPB merged with the Health Protection Agency (HPA), forming its new Radiation Protection Division (RPD). This division, together with the Chemical Hazards and Poisons Division (CHaPD), now forms the organisation's Centre for Radiation, Chemical and Environmental Hazards (CRCE), with its headquarters based at the former NRPB headquarters.

The RPD remit is very similar to that undertaken previously by NRPB, except that provision of advice on ultrasound has been added, together with the day-to-day management of the Department of Health's Radiological Protection Research Programme. It also provides secretariat support for the Administration of Radioactive Substances Advisory Committee (ARSAC) and for the Committee on Medical Aspects of Radiation in the Environment (COMARE).

The Chemical Hazards and Poisons Division provides comprehensive expert advice and support for chemical incidents across England and Wales. For example, the staff - together with some from RPD - were heavily involved in the aftermath of the recent Buncefield oil depot explosions. It also provides advice to UK government departments and agencies on human health effects from chemicals in water, soil and waste as well as information and support to the NHS and health professionals on toxicology.



CRCE (formerly NRPB) 1 April 2005.

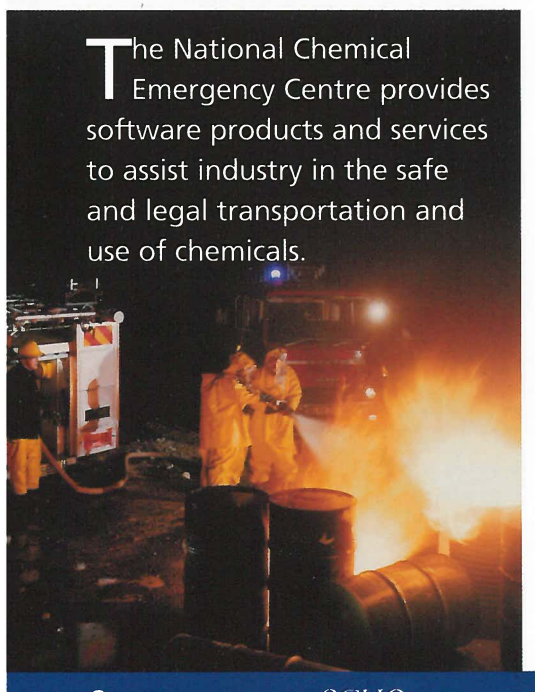
RPD and CHaPD were brought together to allow effective sharing of methodology in epidemiology, toxicology and modelling. Staff can pool knowledge in the event of incidents and accidents involving chemical and radiological hazards.

In common with the former NRPB the new organisation is a non-departmental public body, whose role is to provide an integrated approach to protect UK public health. This is achieved through support and advice to the NHS, local authorities, emergency services, the Department of Health and the devolved administrations.

AEA Technology is one of Europe's leading environmental consultancy and technology companies following its privatisation from UKAEA in 1996. The company provides consultancy, technical services and products to in two core areas, namely environment and rail. Two Harwell-based businesses are profiled in this 60th issue.

National Chemical Emergency Centre (NCEC)

The National Chemical Emergency Centre provides software products and services to assist industry in the safe and legal transportation and use of chemicals.



A major road accident in the 1970s highlighted the need for the emergency services to have immediate access to information on chemical hazards. The NCEC was set up over 30 years ago, within the Environmental Safety Centre in Hangar 7 at Harwell. Along with other parts of AEA Technology, the NCEC relocated to Culham in 1994 but returned to Harwell in February last year.

Supporting the emergency services remains at the heart of the NCEC, however its principal clients are now found within the chemical industry. As part of NCEC's commitment to the Responsible Care initiative, chemical companies seek to provide information on their products wherever they are made or used.

Working for a global industry has posed exciting challenges for NCEC. It now operates through 24-hour shift working and the return to Harwell provided an ideal opportunity to set up a dedicated control centre. A network of international call centres has been established and on-line translators provide advice in over 100 languages. The relocation of chemical manufacturing to Asia Pacific continues to drive NCEC's evolution into an international business.

Innovation is key in all the company's products and its software is available on a multiplicity of platforms, including web-based delivery. NCEC's chemical hazards database CHEMDATA was recently launched for pocket PC use.

Future Energy Solutions

Future Energy Solutions (FES), part of AEA Technology, is Europe's leading sustainable energy consultancy. From its offices in the Gemini Building (off Fermi Avenue) and Glengarnock in Scotland, FES helps public and private sector organisations find solutions to the growing implications of climate change.

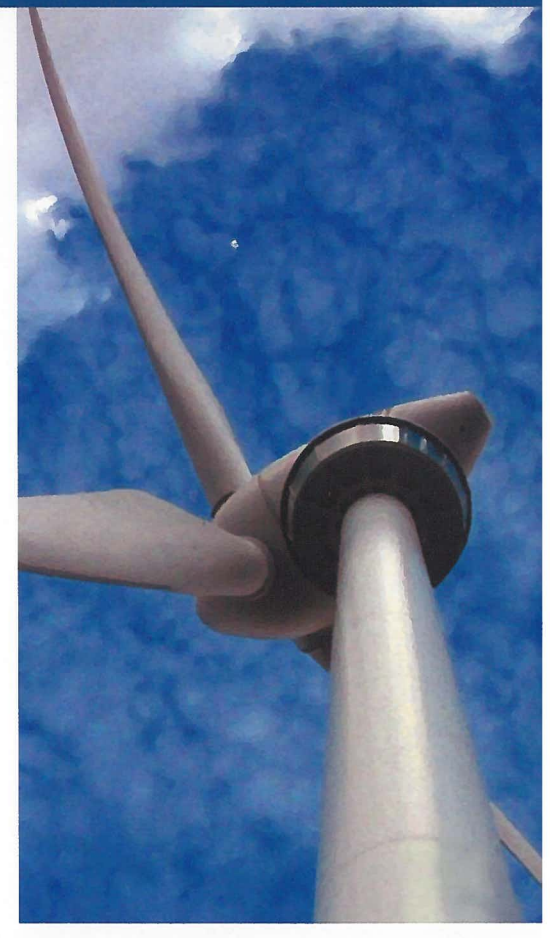
FES evolved from the Energy Technology Support Unit (ETSU), which was set up within UKAEA in 1974 by government in response to rising fuel prices, increasing energy costs and insecure oil supplies. During this time FES staff have managed many influential and high-profile, energy-related programmes for UK and overseas clients.

These programmes include the Market Transformation Programme. This Defra initiative works with policy makers and manufacturers in the UK, EU and worldwide to encourage the design of better products and minimise waste generation. The New and Renewable Energy Programme is a DTI programme that has run for 30 years and been a key element of UK government policy to develop new and renewable energy technologies.

With over 170 staff, and drawing on its unique experience and pedigree, FES is well positioned to offer professional and practical solutions to the opportunities and challenges of climate change in the twenty-first century.

FES director, Cathy Durston, says: "FES goes from strength to strength. We have recently won several multi-million pound contracts. This is a major achievement given the competitive market in which we operate and a significant vote of confidence from new and existing clients in our capabilities to deliver projects to time, budget and quality.

"Looking to the future, we have exciting plans to broaden our skills base and establish a presence in the USA and central and eastern Europe."



FES, Europe's leading sustainable energy consultancy.