

**NDA**

Nuclear  
Decommissioning  
Authority

# INSIGHT

into nuclear decommissioning



**Delivering progress across the UK**

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*Front cover: Sellafield team welcome arrival of new equipment for waste retrieval at the Magnox Swarf Storage Silo*

Welcome to the summer 2015 edition of Insight, our news magazine that aims to provide an overview of some current developments up and down the estate.

If you have any comments, please contact the editor Deborah Ward on 01925 832280 or [deborah.ward@nda.gov.uk](mailto:deborah.ward@nda.gov.uk)



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# Creating the environment for success at Sellafield

In March, Insight reported that the model for managing Sellafield was changing. The new ownership arrangements are aimed at achieving improved performance and delivering value for money.

On 1 April 2016, Sellafield Ltd will become a NDA subsidiary, replacing the model where Sellafield Ltd is owned by the private sector (currently Nuclear Management Partners (NMP)).

An NDA owner/Sellafield Ltd operator model will create simpler arrangements better suited to Sellafield. The site is the most complex of the NDA estate; its mission to retrieve nuclear waste from some of the world's oldest nuclear facilities extends beyond 2120. The timescales for some key outcomes are decades away and the sums of money involved are much greater than on other sites.

Pete Lutwyche, NDA's Sellafield Programme Director said: "A new model can help Sellafield Ltd to do things better, quicker and more efficiently. This includes engaging the supply chain at the right level and contracting out the right type of work. It's difficult at Sellafield to be certain on timescales and costs for large site-wide projects as much of it is inherently uncertain and subject to change. This work is better managed in the public sector."

The Sellafield Model Change Programme, made up of NDA and Sellafield Ltd personnel, with NMP support, is managing the change in ownership and creating the optimum model for the site. Significant progress has been made on developing the new arrangements including determining how private sector expertise can best be used at the site. Sellafield Ltd has talked to a range of organisations involved in different types of collaborative public/private sector arrangements to see what could work best at Sellafield. This piece of work will help Sellafield Ltd to develop a strategy for its procurement of a private sector partners or partners in the future.



This will then be tested with private sector organisations in the supply chain later this year.

The decision for change at Sellafield was announced in January 2015. It followed an extensive review by the NDA, which concluded that the current model would not give maximum opportunity for accelerating decommissioning and delivering value for money.

Pete Lutwyche said: "Cleaning up Sellafield takes an enormous investment of public money. We have a responsibility to ensure that Sellafield Ltd has maximum opportunity for improved performance."

*Photograph: Top, NDA's Sellafield Programme Director Pete Lutwyche*



## Businesses invited to submit entries for awards

Entries are now being invited for the prestigious NDA Estate Supply Chain Awards 2015 that recognise outstanding contributions to the nuclear clean-up mission.

Launched in 2012, the awards are jointly sponsored by the NDA and its Site Licence Companies (SLCs), with the aim of acknowledging the supply chain's vital role in delivering progress and bringing innovation to work programmes.

The entry categories have been updated for 2015 to bring an additional focus on exports and technology innovation:

### Supply Chain Collaboration

Making a difference by collaborating with other suppliers or organisations.

### Technology/Innovation Implementation with an SLC

Open to suppliers at all levels, this new category is intended to recognise technical innovations that have been developed and subsequently deployed on a site, following close engagement with an SLC.

### SME Innovation

Bringing innovation to a project through technology, processes or systems.

### NDA Estate Export Award

Successful export of products or services that were originally conceived or implemented in the NDA estate.

The award scheme attracts entries from across the UK and is part of a series of measures to improve the visibility of opportunities for suppliers in the decommissioning sector, particularly for smaller businesses.

The winners will be announced during the NDA Estate Supply Chain Event at EventCity, Manchester, on 4 November 2015, where the awards ceremony will be a key highlight of the day.

An awards stand, meanwhile, will also showcase the winning entries and those shortlisted by the judges.

The deadline for submissions is 11 September 2015.

For further information:  
[www.decommsupplyevent.co.uk](http://www.decommsupplyevent.co.uk)

*Photograph:  
Top, the winners will be announced  
in November*

## Register now

Meanwhile, registration has opened for delegates and exhibitors wishing to reserve a place at the main Supply Chain Event 2015.

Now believed to be the largest event of its kind in Europe, last year saw around 1,500 visitors enjoying a hugely successful day of informal networking and presentations by a range of high-level speakers.

Under this year's theme 'Connect and Innovate', the speakers will include:

- A senior Government Minister
- NDA Chief Executive John Clarke
- Rear Admiral Mike Wareham, Director of Submarines, Ministry of Defence

A highlight in the exhibition hall will be the central Innovation Zone, where a range of technologies will be demonstrated.

Visitors will have opportunities to meet buyers and sellers from around the NDA Estate and other Government departments.

Entry to the event is free of charge for delegates and exhibitors, however, optional lighting and electrical equipment for stands will be subject to a small cost.

Register now, enter the awards or find out more at:  
[www.decommsupplyevent.co.uk](http://www.decommsupplyevent.co.uk)



## Getting ready to scoop out waste

The arrival of a custom-built machine to scoop the radioactive contents from one of Sellafield's most hazardous buildings marks a huge step forward for site decommissioning.

The Silo Emptying Plant (SEP) will painstakingly remove waste from the Magnox Swarf Storage Silo (MSSS), an ageing storage plant and priority clean-up project.

In the coming months, 33 deliveries will bring the bespoke plant by road from Wolverhampton to Sellafield where it will be re-assembled. The SEP2 is the first of three plants that will remove the decades-old material, significantly reducing the risk and hazard on the site.

The SEP machine, which will run on rails above the waste compartments, has been developed specifically to deal with historic MSSS waste. It will lock onto the silo hatches, lower specialist grabs

into the 16-metre-deep compartments to bring up the waste, pack it into nuclear boxes and transfer it to one of the site's modern stores where it will be kept safe and secure before it is consigned to the Geological Disposal Facility for final disposal. Among the plants which will take waste from MSSS is the Box Encapsulation Plant, which is currently under construction by a joint venture comprising contractors Jacobs, Amec and Balfour Beatty.

Alan Haile, Head of MSSS Projects, said: "Think of one of those fairground machines with a metal arm that grabs soft toys, but imagine it on a huge scale within a radioactive environment,

grabbing huge volumes of potentially hazardous material, which is stored under water, with absolute precision and transferring it into safe storage, with no room for error."

The SEP machines will operate in a heavily shielded environment where radiation levels restrict workforce access. Because of this, the machines will need to work first time and continually for up to 25 years - equivalent to some 90,000 waste retrieval cycles, without any internal modifications or upgrades.

The three plants are being developed in conjunction with Ansaldo NES, who successfully tested and dismantled the first SEP inside a replica of the MSSS



store at their factory. Each weighs more than 30 double-decker buses and will be re-assembled and re-tested at Sellafield before retrievals begin.

Mr Haile added: “The SEP capability has evolved to deal with changes in our technical understanding of the material within MSSS. We really have come up with a custom-built engineering solution, basically a whole nuclear waste plant on rails, developed for the unique challenges posed by the legacy waste in MSSS, which is a very complex and ageing facility. We’ve even got additional specialist tooling capability to handle both known and anticipated waste items, so we’re prepared for all eventualities.”

The SEP machines will play a vital part in the clean-up, with an estimated 10,000 cubic metres of historic waste, including 60,000 items, to be removed from the 22 compartments. SEP1 and SEP3 are also being built and the plan is to bring them to Sellafield with the final machine SEP3 available in 2023.

*Photographs:*

*Above left, NDA’s Alyson Armett, Head of Programme (Sellafield) Delivery discusses plans with Janette Brown in the Box Encapsulation Plant.*

*Above, the custom-built machine arrives at Sellafield.*

## Fact File

- The Magnox Swarf Storage Silo (MSSS) was built to store fuel cladding, known as swarf, that was removed from Magnox fuel to prepare it for reprocessing.
- The facility became operational in 1964 for the underwater storage of swarf waste.
- The original MSSS was extended in the 1970s and 1980s providing 22 individual compartments within the silo.
- MSSS received swarf from the First Generation Magnox Storage Pond (FGMSP) and the Fuel Handling Plant (FHP) along with other metal items of intermediate level waste.
- In 1992, FHP swarf was then routed to the Magnox Encapsulation Plant (MEP) where it was encapsulated into drums. The final waste was tipped in June 2000.

**Contractor:**  
Ansaldo NES

**“Think of one of those fairground machines with a metal arm that grabs soft toys, but imagine it on a huge scale within a radioactive environment.”**

Alan Haile, Head of MSSS Projects

# First sludge removal marks historic step

The very first radioactive sludge has been removed from one of Sellafield's oldest and most hazardous fuel storage ponds, marking a historic achievement in the UK's nuclear decommissioning programme.



The First Generation Magnox Storage Pond (FGMSP), which dates back to the 1950s, needs to be emptied of 1,500 cubic metres of radioactive sludge – equivalent to around half an Olympic swimming pool.

The material was pumped via a pipe-bridge from the First Generation Magnox Storage Pond to a new store – the Sludge Packaging Plant (SPP1). Around 1,500 cubic metres of sludge need to be removed.

The 1950s pond was built to store, cool and prepare used Magnox fuel for recycling into new fuel.

Despite thick walls of reinforced concrete, it has no roof and is open to the elements, so sludge has accumulated over the years, just like any garden pond, but highly radioactive.

“We’re making history at Sellafield by transferring the first sludge using a tried and

tested pump to a new £240 million state-of-the-art sludge storage plant containing three enormous stainless steel buffer storage vessels, each of which is the same volume as seven double-decker buses,” Head of the FGMSP Martin Leafe said.

“The pond is six metres deep and we’ve spent years devising an engineering solution to literally suck up the radioactive sludge from the bottom of the pond, which in places is over one metre deep.

“What makes the job more difficult is that the pond is very congested and full of large metal boxes containing nuclear fuel, so we need to work around these and ensure they remain fully submerged at all times. Just to make matters more difficult we have to drive the platform remotely from a control cabin to minimise the radiation dose to the workforce.

“We transfer the sludge in batches to the new plant where it settles in one of the buffer storage tanks and then the top layer of water is sent back to the pond. It will take several months of work to transfer enough sludge to fully test and commission the sludge plant and in parallel we’ll install the bulk sludge removal equipment.”

Pete Lutwyche, the NDA’s Sellafield Programme Director, said: “We are now seeing the removal of decades-old material from Sellafield’s legacy ponds on a daily basis, significantly reducing the risk at these historic facilities.”

*Photograph:  
Above, sludge is removed for the first time*

## Solution

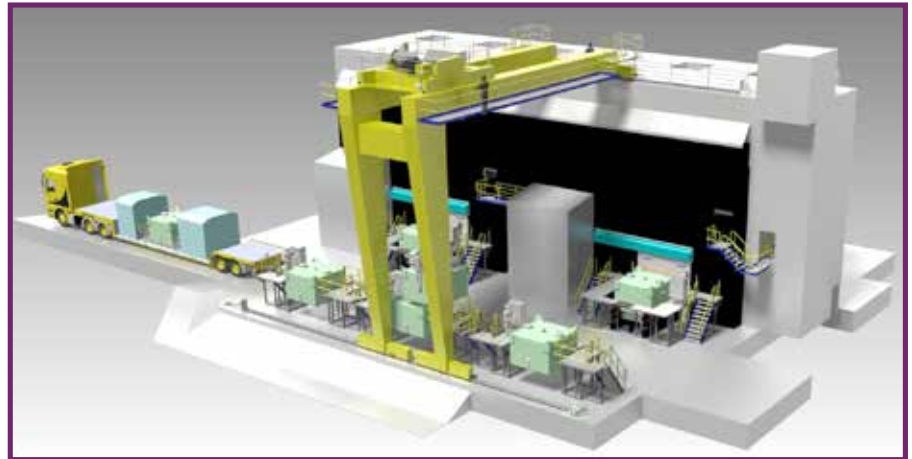
- Two solutions have been devised - a suite of bulk sludge-removal equipment to be deployed next year and a small-scale specialist centrifugal pump that has just been sent to the pond depths to lift the first sludge.
- This pump is fitted to the underside of a large floating platform which has four thrusters to propel it around.
- The platform is driven remotely from a control cabin to minimise the radiation dose to the workforce. The pump is fitted with a long 'hoover hose' and can be remotely raised or lowered to suck up the sludge and mix it with water, resulting in a slurry which can be pumped to the new sludge plant.
- The technology has already been used at European reactor stations, and had been adapted for Sellafield's needs before rigorous testing in a full-scale test facility in Cumbria.
- During the FGMSP's 26-year operating lifetime, approximately 27,000 tonnes of fuel (almost 2.5 million fuel rods) were processed. Spent nuclear fuel from the UK's nine Magnox stations, along with Magnox fuel from Italy and Japan was held in the FGMSP.
- The pond holds 14,000 cubic metres of contaminated water, in which is stored Magnox spent fuel, radioactive sludges, miscellaneous nuclear wastes and skips.

### Contractors:

Westinghouse, EnergySolutions, Forth Engineering

## £100 million boxes boost for manufacturers

The UK manufacturing sector is set to receive a £100 million boost thanks to a major contract award at Sellafield.



The site has chosen two UK-based suppliers – Darchem and Metalcraft - to manufacture thousands of stainless steel containers to store nuclear waste.

Darchem, based in Stockton-on-Tees, is an established supplier to the UK nuclear industry while Metalcraft, an SME, is a new entrant.

Under the contract, which is worth up to £100 million, the two firms will produce 2,200 boxes to store waste retrieved from the Pile Fuel Cladding Silo – a 1950s waste storage building prioritised for clean-up by the NDA.

This is the first contract let by Sellafield which includes socio-economic commitments to be written into the contract. This will see both companies create new jobs and apprenticeships linked to the work.

Geoff Suitor, NDA's Head of Contracts said: "It was clear from the outset that this contract provided opportunities for growth in the UK manufacturing sector.

"The NDA asked Sellafield Ltd to consider this during the procurement process and I'm delighted that the winners are both UK businesses, one an SME and one based in area requiring economic development.

"It's important that we seek to maximise the economic growth potential of the £3 billion a year we invest in the

decommissioning of our estate and this is a great example of that.

"Most importantly, Sellafield Ltd has secured a value-for-money supply of high-quality product that will underpin one of the most important programmes in the decommissioning of Sellafield."

Paul Foster, Sellafield Ltd Managing Director, said: "This announcement demonstrates our total commitment to ensuring value for money for the UK taxpayer, whilst underpinning a relentless drive for risk and hazard reduction at Sellafield.

"The success of this procurement is not in doubt – it has delivered a competitive solution which offers value to the taxpayer, and supports UK business, SMEs and businesses in a deprived area."

Darchem and Metacraft will manufacture in total some 2,200 three-metre cubed boxes subject to performance.

Retrieving waste from the silo in the earliest possible timeframes, is an integral part of the long-term plan to reduce the hazard on Europe's most complex nuclear site.

*Photograph:*

*Top, the boxes will store PFCS waste*

# spotlight on R&D



## Research is distinctively different

More than 30 research students working on a unique four-year nuclear programme gathered in Sheffield to discuss their work, share progress and exchange ideas.

The PhD and post-doctoral researchers from universities in the DISTINCTIVE consortium (taken from Decommissioning, Immobilisation and Storage Solutions for Nuclear Waste Inventories) are working with industrial advisors and academics on research into themes relevant to decommissioning the nuclear legacy.

The 100-plus delegates at the consortium's first annual conference included leading academics, industry representatives, regulators and international organisations. Sponsors of the one-day event and the programme were the NDA, Sellafield Ltd, National Nuclear Laboratory (NNL) and the

Engineering and Physical Sciences Research Council (EPSRC).

The DISTINCTIVE programme was launched last year to help develop the next generation of nuclear experts, while encouraging greater collaboration between multi-disciplinary university research projects and industry.

The researchers are liaising closely with industrial supervisors from Sellafield Ltd and NNL to make sure their work addresses relevant issues.

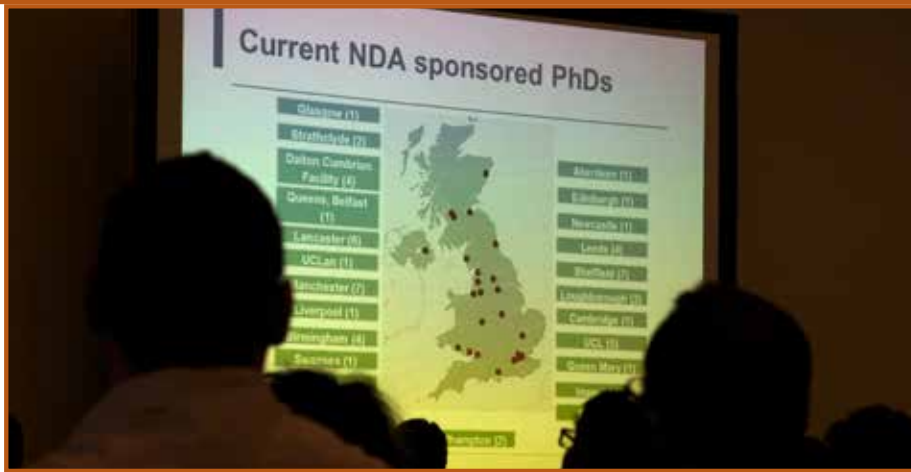
The Sheffield event provided an opportunity for all those involved to get together to share their initial research results and network with other members

of the DISTINCTIVE consortium and the wider nuclear decommissioning supply chain. The students designed posters to display at the event, outlining progress achieved over the year, and gave a series of presentations. Delegates were invited to vote for the Best Poster and Best Oral Presentation.

NDA Research Manager Dr Rick Short awarded the poster prize to Conrad Johnston, Queen's University Belfast, and the oral presentation prize to Stephanie Thornber, University of Sheffield.

Keynote speakers during the day included internationally renowned nuclear specialists Prof Eric McFarland from the University of Queensland,





Australia, and Prof Ian Pegg from the Catholic University of America.

Rick added: "The industry derives huge benefits from focussed academic research that is directed specifically at some of the challenges we face in dealing with our nuclear legacy. We very much welcome this kind of collaboration and look forward to seeing these projects progress."

"It is essential that the students understand the context for their work and how it could be applied on the ground. We look forward to seeing their expertise develop and hope their skills will contribute to decommissioning progress in the years ahead."

Prof Michael Fairweather, from Leeds University's Institute of Particle Science and Engineering, said: "It was great to see so many supporters of the DISTINCTIVE consortium and was very encouraging to see some new faces. We look forward to seeing everyone in Bristol next year for the 2nd Annual Meeting!"

*Photograph: Opposite page, Dr Claire Corkhill and NDA sponsored PhD researcher Luke Boast, both from the University of Sheffield, discuss one of the posters. Top, a presentation and, above, Dr Short, left, with winners Conrad Johnston and Stephanie Thornber*

**"The event encouraged a significant amount of engagement between industry experts and our researchers."**

Prof Michael Fairweather

## What it's all about

DISTINCTIVE is led by the University of Leeds and includes:

- Lancaster University
- University of Birmingham
- University of Bristol
- Loughborough University
- Imperial College London
- University College London
- University of Manchester
- University of Sheffield
- University of Strathclyde

Queens University, Belfast, has also now joined the consortium, supported by both internal and NDA funding.

The National Nuclear Laboratory (NNL), NDA and Sellafield Ltd collaborated with the Engineering & Physical Sciences Research Council (EPSRC) to initiate the £multi-million programme, which was launched last year. The collaboration with EPSRC enables NDA and Sellafield Ltd to leverage their funding and also support for the scheme, through the provision of in-kind assistance such as technical supervision or access to facilities.

Four technical themes were identified for research:

- AGR, Magnox and Exotic Spent Fuel
- Plutonium Oxide and Fuel Residues
- Legacy Ponds and Silos Wastes
- Structural Integrity

DISTINCTIVE follows the success of a similar four-year programme, known as DIAMOND (from decommissioning, immobilisation and management of nuclear wastes for disposal) that concluded in 2013.

[www.distinctiveconsortium.org](http://www.distinctiveconsortium.org)

More on DISTINCTIVE: page 6

# Expertise for the future



One of the primary drivers for NDA sponsorship of PhD-level research is to maintain the key skills and capability required for the decommissioning mission over the coming decades.

Programmes like DISTINCTIVE ensure that the academic experts are kept abreast of the latest challenges facing the nuclear decommissioning community, and that a new generation of experts are trained to take up technical positions in the industry or academic positions in the UK.

Examples of DISTINCTIVE work include:

**Stephanie Thorner** (University of Sheffield), an NDA-sponsored student who is investigating the use of a waste immobilisation technique that could potentially inform strategic decisions on how to deal with plutonium residues.

**Andrea Paulillo** (UCL), who is applying a Life Cycle Assessment approach to assess the environmental impact of the nuclear waste management process in the UK.

These kinds of projects promote two-way knowledge transfer between academia and industry, giving students good grounding in the existing challenges and potentially influencing future industry decisions.

Previous NDA investments in the earlier programme, DIAMOND, also focused on the development of skills and capabilities. Examples include:

**Andrew Kerridge**, a post-doctoral researcher who is now lecturing at Lancaster University, helping to train the next generation of NDA-funded PhD researchers.

**Amy Young**, who investigated radionuclide behaviour in cement superplasticiser at Loughborough and is now working for Radioactive Waste Management Limited (RWM).

*Photograph:*

*Above, DISTINCTIVE researchers in Sheffield earlier this year*

## Understanding radioactive waste

The NDA has published a document that explains how radioactive waste is produced.

*Understanding Activities that Produce Radioactive Wastes in the UK* aims to provide clear explanations for general readers and those who would like to learn more about where radioactive waste comes from.

Radioactive waste is a by-product from a wide range of activities including power generation, medicine, research, defence and industrial processes.

The NDA is responsible for managing waste generated through the clean-up of

the UK's civil nuclear legacy, including the Magnox power reactors, various research and fuel facilities and the UK's largest, most complex site, Sellafield.

Beth Ripper, NDA National Waste Inventory Manager, said: "This document provides an overview of how radioactive wastes are produced across the UK. We hope it will be helpful to people who are new to the nuclear sector, or have a general interest in the topic."

The first part of the document provides an introduction to radioactivity, an overview of activities that produce radioactive waste and how it is managed.

The second part is a series of fact sheets with greater levels of detail.

The document is available via [www.nda.gov.uk/ukinventory](http://www.nda.gov.uk/ukinventory). Feedback on the new document is welcome. Email: [enquiries@nda.gov.uk](mailto:enquiries@nda.gov.uk)

The UK Radioactive Waste Inventory website provides further information about the types and quantities of radioactive waste in the UK. The website was updated last year to improve the layout and content for a non-technical audience.



## All gone: last shipment leaves site

Dounreay has completed the transfer of 11 tonnes of irradiated nuclear material to Sellafield.

The material is a legacy of the site's fast reactor programme, consisting of natural uranium rods that were irradiated to breed new plutonium fuel for power stations.

Known as "breeder", 11 tonnes of the material were removed from the Dounreay Fast Reactor (DFR) after its closure in 1977 and stored at the site.

In 2011, after canvassing the views of the public on a range of options, the decision was taken by the UK Government to remove it from Dounreay and process at Sellafield.

The first of 32 shipments left the site by road and rail in December 2012. The final shipment arrived at Sellafield in May, where it is being reprocessed.

Alex Potts, Deputy Director of Fuels at Dounreay, said the smooth transfer was made possible by the close working

of Dounreay Site Restoration Ltd with Sellafield Ltd, Direct Rail Services Ltd, flask supplier Magnox Ltd, the Civil Nuclear Constabulary, Police Scotland, British Transport Police and regulatory bodies.

"Together, we have delivered safely and without harm to the public or the environment the first phase of the NDA's programme to consolidate its inventory of nuclear fuel and materials in the UK," he said.

"It significantly reduces the amount of nuclear material at Dounreay and takes us another step closer towards the closure of the site."

The NDA inherited approximately 100 tonnes of nuclear fuel and material which is now being returned to national stocks.

A further 33 tonnes of breeder material remains inside the DFR and is also

scheduled to be transported to Sellafield.

Purpose-built retrieval equipment has been installed above the reactor and is now undergoing a series of tests.

Work is also continuing in preparation for the transfer of other types of nuclear fuel and material that had accumulated at the site when its research and development role ended in 1994.

The UK Government's decision to remove its nuclear fuel and material from Dounreay has resulted in a rescheduling of some other decommissioning work to accommodate the additional costs associated with transport, with a new date of 2030 now projected for completion of the site clean-up and closure.

*Photograph:  
Dounreay staff mark the last shipment*

# Sludge under pressure in clean-up



A remotely operated water cannon will wash out sludge from a tunnel section of Dounreay’s shaft and silo complex, following a series of trials to test the novel approach.

Clean-up of the shaft and silo requires the removal of 1,500 tonnes of toxic waste and is the world’s deepest nuclear clean-up. The 65-metre shaft connects to a tunnel for the discharge of low-active radioactive effluent, with a shorter stub tunnel connecting the two.

One of the partners in the project, a remote handling specialist, used a set of telescopic mechanical arms attached to a platform for deployment of the high-pressure cannon during tests at its Oxfordshire facility.

The arms on the Shaft Intervention Platform (SIP) can reach several metres into the stub tunnel and remove large items of waste that may be present. The latest trials demonstrated that the water cannon can successfully wash out remaining waste.

Several different forms of replica “sludge” were created, using a variety of constituents including clay, to provide the best approximation to on-site conditions.

The process has now been adopted as the baseline approach for cleaning out the stub tunnel.

*Photograph:  
Results of the trials, before, during and after*

**Contractor:**  
Oxford Technologies Ltd

## Professional scheme endorsed

Dounreay’s development scheme for engineers and physicists has been formally accredited by three of the UK’s professional training bodies.

The endorsement is part of the site’s mission to be recognised for decommissioning excellence and follows a visit last month by representatives from the Institute of Physics (IOP), the Institution of Mechanical Engineers (IMechE) and the Institution of Engineering and Technology (IET), who completed a joint review the Professional Development Scheme.

Dounreay Site Restoration Ltd (DSRL) will start to register its trainees immediately while awaiting formal notification which will follow within a few months. It is the first time in 20 years that the site’s development scheme has received national recognition.

Dounreay is now able to develop suitably qualified engineers and physicists to Chartered or Incorporated status, in line with the UK Standard for Professional Engineering Competence.

This process of accreditation has been led for more than a year by Billy Husband

of the Technical Directorate, himself a Fellow of IMech, supported by a team from HR and in-house mentors who trained last year and have been operating for several months.

David Smillie, Technical Director, congratulated the DSRL team and said: “We are now in a position to produce a stream of professional engineers focused on the Dounreay site, on our restoration mission and on our customer. Given the highly technical nature of much of the work we have to do, this is essential for the safe and efficient decommissioning of the site.”



## Archive specialist named for new facility

The development of the NDA's nuclear archive in northern Scotland took another step forward with the selection of a contractor to manage the historic information from sites around the UK.

Document management specialist Crimson was named as the preferred bidder following a competitive procurement process over several months.

Dingwall-based Crimson, which also has offices in Lancashire, will be responsible for transporting 70 years' worth of material to the facility, as well as setting up the archiving arrangements and ongoing storage.

Records from all UK civil nuclear sites will be relocated in the new archive, with documents expected to fill many kilometres of shelf space.

Crimson will be responsible for ensuring the information is available to support both research work, future nuclear decommissioning and general public interest.

In a partnering arrangement with Highland Council, part of the building will also store the Caithness Archive, which is currently held elsewhere. The land, near Wick Airport, was provided by the Council.

Chair of the Dounreay Stakeholder Group, David Flear, said: "I'm very pleased that the Commercial Partner has been appointed and look forward to working with Crimson as they roll out their public engagement and socio-economic programme. The Dounreay Stakeholder Group has been involved with the NDA on this project for some time now and we are very pleased to see everything we hoped for appears to be coming to fruition."

Building work is due to start in July following completion of a detailed two-month design and cost review by Morrison Construction, who were appointed in March.

The archive is a priority project for the Caithness & North Sutherland Regeneration Partnership and part of the NDA's contribution to sustainable economic development in the region.

*Photograph:  
An artist's impression of the new archive*

When the NDA was established in 2005, it inherited assets from across the estate, including valuable information accrued over many decades and held in a multitude of formats at numerous locations.

The archive is part of a major programme to sift through and organise all the information in the NDA estate, then securely store and safeguard it for future generations.

As a Government body, the NDA is responsible for ensuring the material is preserved and made available in line with legislation and regulations on public information.

'Information' covers a wide range of material, ranging from archived operational records and plant designs to graphics, photographs, publications, digital records, patents, research documents, etc.

As well as being kept on sites, in buildings that mostly face demolition, the material is stored under contract at a number of off-site locations. Sellafield alone holds more than 80,000 boxes of archived records in storage.

A single facility for records from all the UK's civil nuclear sites enables consistent long-term management, best archiving practice and better value.



## Underground lab yields microscopic detail

By **Rob McLaverty**

As my first eight-month secondment on the *nucleargraduates* programme draws to a close, I have had a chance to look back on my time with RWM and begin to look to the future and my next secondment.

Since starting in October, I have been involved in some really interesting activities, including the National Geological Screening Exercise, visiting underground facilities and even playing for the Radioactive Waste Management Limited (RWM) football team, The Diggers!

One highlight was a visit to the Grimsel Test Site underground research laboratory (URL) in Switzerland, where I was observing the progress made on the Colloid Formation and Migration (CFM) experiment with a group of scientists from Birmingham University.

The CFM experiment aims to better understand how colloids (microscopic particles) form and migrate if the bentonite backfill erodes, and how these colloids may have an impact on the movement of radionuclides away from an engineered barrier system.

Getting underground to see a large-scale experiment such as this taking place in a URL was really exciting, and seeing the setup and environment in which these experiments take place is very useful to put the work done back at Harwell into context. Since then, I have been granted

some funding by the European Atomic Agency Community to visit the Äspö URL in Sweden to look at other experiments of this nature.

Another highlight of my time at RWM was the chance to work on the National Geological Screening Exercise. Working on such an important project was a great privilege and I have greatly enjoyed being part of the discussions that went into formulating the Screening Guidance. I will follow developments with interest. I have now moved to my next secondment on the *nucleargraduate*

Rob McLaverty studied geology at Southampton University and is undergoing a two-year training programme as part of the award-winning *nuclear graduates* scheme launched by the NDA in 2008. Now administered by Energus, the scheme has 20 partners in the public and private sector. Here, Rob reflects on his six-month experience with RWM.

scheme in the Department of Energy and Climate Change in London.

I will be staying with geological disposal, working with their GDF team on the policy side of delivering the GDF - I find the social and political aspects of delivering a GDF just as engaging as the geological aspects. From the short time I have spent here, I am confident that RWM will continue to evolve and meet the challenges ahead to successfully implement geological disposal. I have greatly enjoyed my time and hope I will remain involved in the GDF delivery beyond my two-year graduate scheme.

*Photograph:*

*Above, Rob, left on back row, in the underground Swiss lab*

## RWM needs your help!

By **Natalyn Ala**,  
GDF Siting Director, Radioactive Waste Management

The launch of a public consultation by Radioactive Waste Management (RWM) later this year is part of our getting ready to engage with communities about geological disposal.

Last year's White Paper, *Implementing Geological Disposal*, set out several Initial Actions to be completed prior to talking with local communities in 2017. Those discussions will begin the process of identifying a suitable site for a geological disposal facility (GDF) with communities who may be interested in hosting it in their areas.

In the past, public consultation has shown a desire for early consideration of geology as a crucial step in building public understanding of geological disposal. So the Government has asked RWM to carry out a National Geological Screening exercise covering England, Wales and Northern Ireland. This will bring together existing geological information that is relevant to the environmental safety case for a GDF. There are two stages:

- Identifying those geological attributes which contribute to the safety case, presenting them as screening guidance.
- Applying the guidance by preparing outputs which will consist of short narratives and maps.

The draft guidance has been developed by RWM with the help of geological experts and has then been assessed by an Independent Review Panel, established by the Geological Society of London at the request of DECC. The public will be consulted on the resulting draft guidance.

Once consultation feedback has been reviewed, RWM will issue final guidance. This will then be implemented with the help of the British Geological Survey, who hold much of the available geological data, providing high-level and authoritative information for 13 regions of England,



Wales and Northern Ireland. Screening is not designed to rule areas 'in' or 'out', nor to identify particular sites for a GDF. Rather, it will assist those communities who may be interested in hosting a GDF in their area when the formal engagement and siting process begins in 2017.

We hope that the NDA Estate and the many other organisations involved in the nuclear industry will contribute insights and comments during the consultation. We will tell you more about how to take part later in the year.

*Photograph:*

*Above, Natalyn Ala is RWM's Siting Director*

# Finished: Europe's largest-known asbestos strip

The asbestos strip at Chapelcross, believed to be the largest in Europe, has been completed one year ahead of schedule and £5 million under budget.



Since the project began eight years ago, 3,300 tonnes of asbestos have been removed from the turbine hall, four reactor buildings and 16 heat exchangers. More than one million bags of asbestos waste (equivalent to filling four Olympic-sized swimming pools) were despatched to licensed landfill sites.

The original estimate for the project, completed in March, was £43 million against an actual cost of £38 million.

Site Director John Grierson said: "This is a tremendous achievement for Chapelcross and contractor OCS Environmental Services; the safe, early and cost-efficient delivery is testament to the quality of the personnel working on the project."

Before any material could be removed, a containment structure was erected around each of the 16 heat exchangers over a two-year period, supporting asbestos enclosures and providing weather protection.

The containment, required 506,246 feet of steel scaffolding, 194,576 fittings, 276 ladders, 48.84 tonnes of steel strengthening and 24,000 square metres of Powerclad sheeting. The scaffolding boards, if placed end to end, would have stretched from Manchester to Bristol.

Polythene enclosures ensured that staff were protected from any exposure during asbestos removal operations and that fibres were safely contained.

Once the bulk asbestos was removed, the steelwork was fine-cleaned and taken back to bare metal before being washed down. The fibre levels inside and adjacent to the enclosure were monitored by a team of independent asbestos analysts from Environmental Evaluation.

Brian Burnett, Head of Programmes at the NDA, said: "This completes an important hazard reduction activity for the site and a key step on the path to care and maintenance. I commend Chapelcross and Magnox on completing this project."

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*Photograph:*

*Above, cladding was installed round the 16 heat exchangers, and, right, staff endured physically demanding conditions*

**Contractor:**  
OCS Environmental Services





## Challenges

- Largest-known asbestos removal project in Europe, second largest in the world.
- Ensuring a safe working environment for the workforce.
- Protecting the surrounding environment by ensuring all the asbestos was contained.
- Physically demanding work for long periods of time where radiation dose rates were present.
- Working in temperatures varying from minus 13 degrees centigrade to 28 degrees centigrade.
- Characterisation of bulk asbestos waste carried out for the first time, resulting in no waste sent to Low Level Waste Repository (LLWR) at Drigg – licensed landfill sites used instead.





# Turbine hall bites the dust

The final section of the Dungeness A turbine hall has come crashing down as a three-year programme to clear the south side of the former power station draws to a close.



Members of the team gathered to see the last pieces of framework fall to the ground in a dramatic ending to the project which has seen more than 30,000 tonnes of waste generated.

All the material, other than a small amount of hazardous material including asbestos, has been recycled and some rubble was re-used to backfill other areas on the site. This helped keep disruption on local roads to a minimum.

Site Director Paul Wilkinson said: “The skyline now looks very different at Dungeness A with this representing the biggest visible change since construction was completed in the 1960s. Following

40 years of safe electricity generation, this latest success demonstrates that Magnox is now leading the way in UK nuclear decommissioning.”

Thousands of viewers visited the Magnox website in recent months to see progress broadcast live on a webcam.

NDA Chief Financial Officer David Batters said: “More than £12 million was invested to deliver this work in three years rather than the original 15 years that was planned. It is an excellent example of accelerated decommissioning delivering value for the taxpayer while taking the site closer to its closure point.”

The focus now turns to other areas of the site, which is operated by Magnox Ltd. One of the next activities will be to begin draining the cooling pond which stored used fuel until it was removed from the site. The last fuel shipment left for reprocessing at Sellafield in 2012.

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*Photographs:*

*Left, the land is cleared. Above, the team gather to see the last frames fall*

## New structure

Magnox has announced plans for a new organisational structure that will reduce workforce numbers at its 12 sites by 1,400-1,600 over the next 17 months.

The re-organisation will ensure the appropriate level of resources to deliver the decommissioning programme on behalf of the NDA, and follows the re-licensing of Research Sites Restoration Ltd (RSRL), the former Site Licence Company (SLC) for Harwell and Winfrith sites, into Magnox Ltd on 1 April 2015.

Staff numbers at the sites have been declining for a number of years as progress is made on the decommissioning programmes.

The NDA has been assured that efforts will be undertaken to mitigate the impact of job losses through voluntary redundancy, re-skilling and potential alternative employment in Magnox Ltd's parent companies, Cavendish Nuclear and Fluor Corporation.

The restructure follows the NDA's appointment last September of the Cavendish Fluor Partnership as the new Parent Body Organisation (PBO) for Magnox Ltd and RSRL.

The appointment followed a two-year competitive procurement process launched in 2012, with the primary aim of delivering a more efficient, effective programme within agreed funding levels.

Two of the sites are scheduled to enter the passive Care and Maintenance phase within the next few years, followed by the others. This will leave only sealed reactor buildings and waste stores for a number of decades before final clean-up.

## Admin reduced to zero

Bradwell's administration building has been reduced to rubble in another major step towards the closure of the former power station.



From the 1950s onwards, the building served as a base for thousands of staff developing their careers, through the latter stages of construction, 40 years of generation and a decade of decommissioning.

More than 1,200 tonnes of waste were created during demolition, with 80 per cent of the spoil used to backfill a hole in the ground created when the site's cooling water pumphouse was removed earlier in the decommissioning programme.

Site Director Scott Raish said: "By re-using the material at Bradwell, we kept more than 50 lorries away from local roads and ensured we delivered the best value for the taxpayer."

Demolition of the building, whose canteen saw more than two million hot meals served during its lifetime, was made more complicated by more than

46 tonnes of asbestos which had to be carefully removed and sent to an appropriate facility for disposal.

Scott added: "While it is just one building, the majority of our team hold personal memories of their time working there, so it is one of those projects that has been particularly special to watch for many."

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*Photograph:*

*The walls come down*



## Vaults emptied of waste

The Bradwell workforce has completed the retrieval of all bulk fuel element debris (FED) from its vaults in a significant step towards dealing with the site's legacy waste.

More than 200 tonnes of FED were retrieved over a three-year programme that saw the waste packaged into 2,900 drums ready for processing.

Scott Raish, Site Director, said: "Our goal at Bradwell is to reduce the risk and associated hazard. Completing the retrieval of FED significantly lowers the risk as; we now have clarity about the volume of waste that needs to be processed, it is safely packaged in modern fit-for-purpose drums and we can properly monitor and inspect it ahead of processing."

The work was undertaken by an in-house team which was originally established to retrieve a limited number of drums for characterisation purposes. The scope evolved, learning lessons from experience at Dungeness, to the point where the simplicity and flexibility of the process generated significant time

and cost savings. This included simple additions such as drum spacers allowing filtered drums to be double stacked and saving £300 per drum stored.

Shaun Birkett, FED and Intermediate Level Waste Programme Manager, added: "This is a huge achievement for the site and for the wider decommissioning programme. This exceptional team has moved us closer to our ultimate goal and I must thank everyone involved for safely and successfully completing the work. They owned the process and came up with safety initiatives, dose-saving ideas and cost and programme-saving measures throughout the programme."

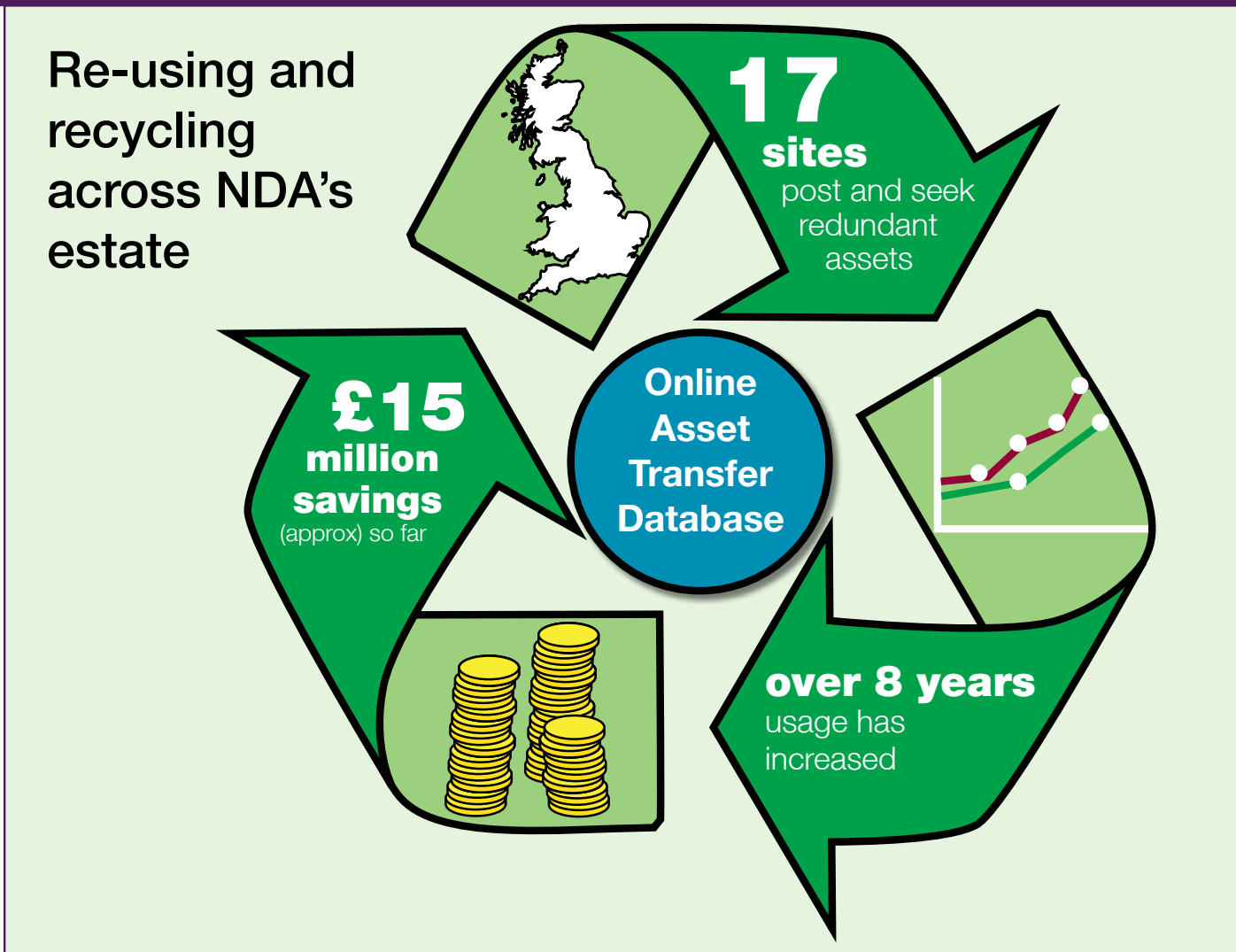
All 12 FED vaults have now been handed over to the Ponds Programme team for decontamination and clean-up, with eight already decontaminated.

### Fact file:

- 204 tonnes of waste retrieved
- 2,900 drums packaged for processing
- The team worked 12-hour shifts, seven days a week
- Zero lost-time accidents
- FED consists largely of metallic components such as splitter blades, coupling wire, springs and lugs which were removed from casing of the fuel elements before the spent fuel was sent for reprocessing

*Photograph:*

*Above, a FED drum is moved ready for reprocessing*



## Equipment swap saves £millions

NDA sites have saved around £15 million by using an online database to recycle and re-use redundant equipment.

Among the items transferred from one site to another are pumps, cranes, forklift trucks, tractors, blocks of lead, boilers, radiation detectors, breathing apparatus, office equipment, robotic equipment, a snow plough – and more.

The NDA Asset Transfer Scheme (NATS) was launched by the NDA eight years ago for sites to advertise unwanted items, or seek redundant equipment from other sites.

Many items are in good condition but no longer needed as a site makes progress in decommissioning. Other sites can use the equipment, however, if they are at a different stage in their programmes or undertaking similar projects.

NATS is available to all Site Licence Companies with the aim of reducing costs and waste.

Martin Grey, the NDA's Engineering Manager (Assurance), said: "One site has accumulated £1.9 million of benefits in the first few months of 2015 by avoiding the costs of buying new equipment, and by transferring surplus kit to other sites.

"Another site acquired 50 tonnes of lead that will be used for shielding. These kinds of transactions are taking place across the estate regularly. They deliver huge all-round benefits not just in cost terms but also in encouraging a more sustainable approach to asset use."

The principle of recycling assets across the estate has now been enshrined in SLC contract specifications. Before buying new, procurement teams seek to acquire goods from other sites first. On-the-ground teams, meanwhile, advertise redundant equipment for a specified period, before following their

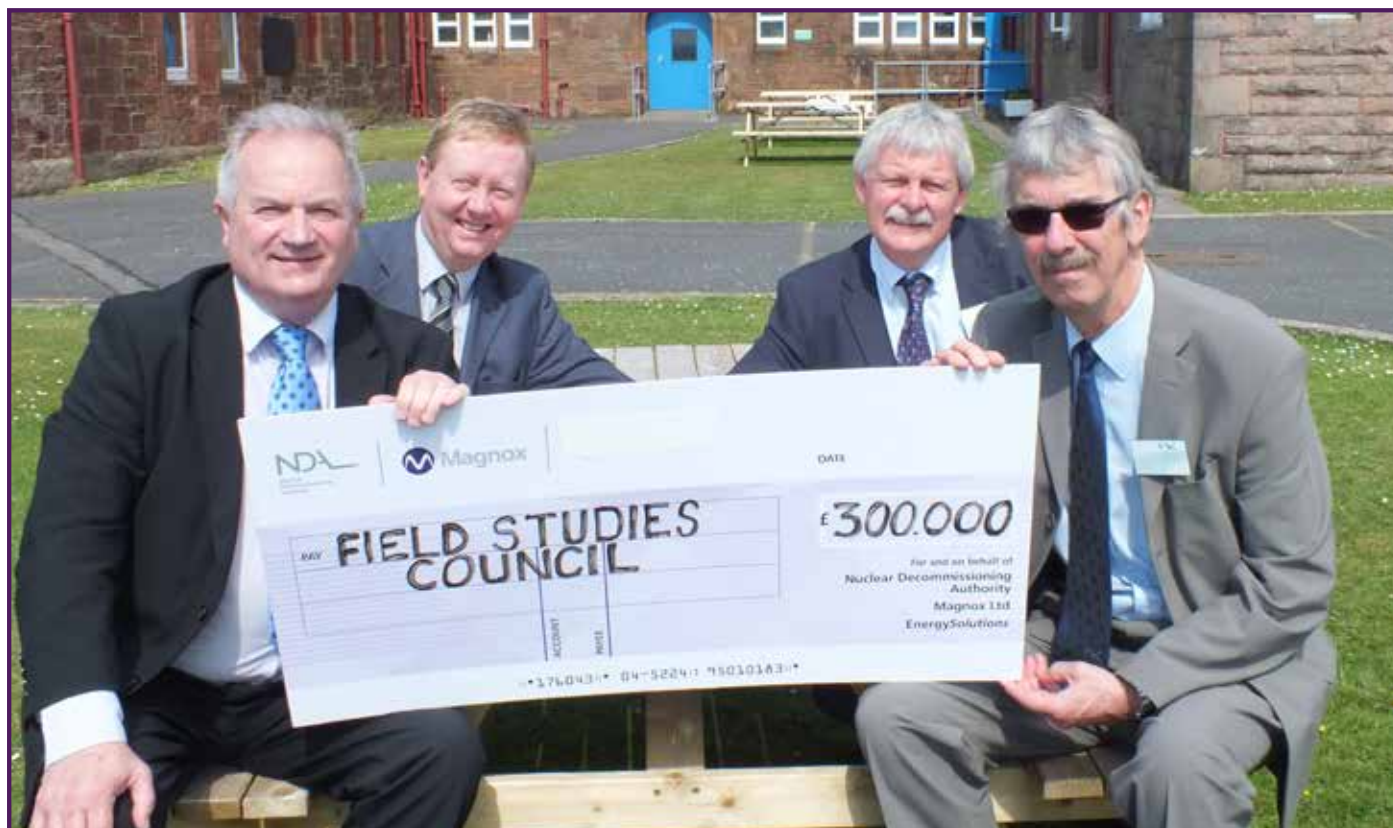
usual disposal processes, which prioritise the most cost-effective options.

One of the larger exchanges was Dounreay's super-compact, which was acquired brand new from AWE where it was surplus to requirements and is now in use to crush drums of Low Level Waste (LLW). The drums will be disposed of in the site's new LLW vaults. The site's own machine suffered a major mechanical failure in 2011 and a backlog of 11,000 drums built up before the replacement was found.

The latest version of the Asset Transfer Scheme is being extended to include transport assets for NDA subsidiary INS.

# New life for historic research centre

The UK's oldest marine research centre has re-opened after the NDA joined new funding partners to ensure its long-term future.



The NDA's £300,000 award, via the Magnox Socio-Economic Scheme, is part of a £4 million package for Millport Field Centre, on the small island of Cumbrae, North Ayrshire, which lies just across the water from the NDA's decommissioning site Hunterston A.

The earlier loss of grant funding had led to closure, in 2013, of the historic facility which was established in the 19th century after a floating laboratory moored at the island and attracted a stream of distinguished scientists. Its museum and aquarium attracted many visitors.

An independent charity, the Field Study Council, stepped in to acquire the site and a range of partners, including the NDA, is now helping to transform and expand the Centre, formerly owned by the University of London.

Earlier this month, a ceremony marked completion of Phase One, which includes a new accommodation building with 32 twin en-suite rooms, a 150-seat lecture theatre and teaching laboratory/teaching room.

The £3 million Phase One cost was funded by North Ayrshire Council, the

Scottish Government and Highlands and Islands Enterprise.

To complete the project, work has started on Phase Two, costing £1 million and involving a new aquarium together with further improvements to teaching facilities.

Rob Lucas, FSC Chief Executive, said: "The generous support of £300,000 from the Magnox Socio-Economic Scheme has been instrumental in securing the long-term future of the former Marine Biological Station at Millport. The island's fragile economy was badly impacted by the closure of the station and the support from NDA to Phase Two will secure long-term future employment, bring in new visitors and allow future generations of scientists and the public to expand their understanding of the environment"

FSC's long-term business plan is marine science field study, while the new aquarium should also attract more visitors to Cumbrae, providing a welcome economic boost to the island.

Bill Hamilton, NDA Head of Stakeholder Relations, said: "Supporting transformational projects such as this will

mitigate against the impact on the North Ayrshire economy when our nearby Hunterston 'A' site is decommissioned. The NDA is delighted to help fund this project which will provide long-term sustainability for Millport Field Centre."

The centre offers fieldwork experiences for all ages and research facilities for universities and environmental professionals. FSC Millport opened for field teaching in February 2014.

Field Studies Council, FSC, is an environmental education charity providing opportunities for people of all ages and abilities to discover, explore, and understand the environment. FSC relies on fees paid by visitors and on the generosity of donors, trust funds and grant bodies.

*Photograph:*

*Above, from the left, the NDA's Head of Stakeholder Relations Bill Hamilton with Hunterston A Site Director Martin Grafton, FSC Chief Executive Rob Lucas and FSC President Prof Tim Burt*



## Demolition paves way for magazines to go

A major skyline change is under way at the LLW Repository in Cumbria.

Magazine 4's Retrieval Facility (MRF), a fixture at the site since the 1990s, has been safely demolished, setting the template for the future demolition of such facilities on site.

MRFs are purpose-built engineered facilities, constructed to allow the retrieval of Plutonium Contaminated Materials (PCM) from magazines before decommissioning and demolition could begin.

Carl Smith, PCM Senior Project Manager, said: "This is the first of five remaining Magazine Retrieval Facilities to be demolished and we have proven the demolition method for the MRF. This will be reviewed as part of the post-project review to identify any improvements and efficiencies for the future demolition phases."

All remaining magazines on the site near Drigg will be demolished, in time, to make way for future vaults.

The soft strip, de-planting and removal of the cladding and portal frame is now complete for Magazine 4.

The first phase of demolition has now been completed, with soil removed from the top of the magazine structure, erection of an environmental barrier at the magazine entrance and the removal off site of all remaining waste.

All the demolition work has been recorded by four time-lapse cameras located around the demolition site.

The magazines, or concrete bunkers, were constructed to store munitions such as TNT during World War II, when the site hosted a Royal Ordnance Factory.

PCM from Sellafield operations was later stored in some magazines and in the 1990s, retrieval facilities were built to enable the removal, packaging and transport of the waste for safe storage in modern, purpose-built facilities at Sellafield.

In 2008, LLWR started a programme of work to decommission the magazines.

### Contractor:

KDC, under the decommissioning and demolition framework with NSG

### Photograph:

Above, Magazine 4's retrieval facilities are taken apart