

The logo for the Nuclear Decommissioning Authority (NDA), featuring the letters 'NDA' in a stylized, white, sans-serif font on a dark purple background.

Nuclear  
Decommissioning  
Authority

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# INSIGHT

into nuclear decommissioning

A photograph of an industrial setting. A large yellow robotic arm is positioned on the left, welding a large, rectangular metal structure. Bright orange sparks are being emitted from the welding point, creating a dramatic light effect. The metal structure has some handwritten markings and a small sign attached to it. The background is dark, making the sparks and the yellow arm stand out.

## INSIDE:

Five-page focus on

Annual Report and Accounts 2013/2014

**Delivering progress across the UK**

## Contents

2	Agreement on new nuclear
3	Pete Lutwyche's Sellafield approach
4	Supply chain latest
5	Mentoring scheme success
6	Berkeley's new waste system
7	Site safety accolade
8	Four stores in action
<b>10-14</b>	<b>HIGHLIGHTS 2013-14</b>
15	100 buildings razed
16-17	Sellafield leads on 3D
18	Swedish heat for Dean
19	Waste director appointment
20-21	R&D innovations
22	Dounreay's low profile
23	50-ton plug removed
24	Japanese agreement

*Front cover: Laser-cutting trials taking place at The Welding Institute, see page 21*

Welcome to the summer 2014 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)

# NDA agrees land deal on Cumbrian site

The NDA has reached an agreement with Toshiba and its partner GDF Suez on the key commercial terms of an updated option agreement for NDA-owned land at Moorside near Sellafield in Cumbria.

The deal is part of a programme to dispose of surplus NDA assets, bringing value to offset the costs of decommissioning.

Toshiba and GDF Suez intend to build three reactors at Moorside, to come online from 2024. They will deliver around 3.4GW of new nuclear capacity, enough to power up to six million homes.

It is estimated that the project will result in 21,000 jobs over the construction period, including on-site employment of more than 6,000 people during the peak phase.

In the operational phase of the reactors' lifetimes, the three reactors will sustain around 1,000 permanent jobs.

Energy and Climate Change Secretary Ed Davey said: "This is an important step forward in the plans for a new nuclear power station at Moorside – a plant that will generate enough clean electricity to power around six million homes.

"Moorside means outstanding opportunities for Britain – thousands of jobs during construction and billions

of pounds of investment in Britain's booming energy sector.

"The new nuclear programme is a core part of our drive to build a new, clean energy sector in Britain to tackle climate change as the same time as we deal with a legacy of underinvestment in Britain's energy sector, ensure we remain among the most energy secure countries in the world."

NDA Chief Executive John Clarke said: "This is a significant step forward for the plan to establish new nuclear in West Cumbria. Together with our nuclear partners we are seeing the emergence of West Cumbria as a centre of nuclear excellence across the whole span of the industry from new build to decommissioning and waste management."

- On the same day, a co-operation agreement was signed between Sellafield Ltd and the key Japanese organisation involved in the post-Fukushima clean-up. The agreement further strengthens the dialogue between the UK and Japan. For further details, see back page.

## Views invited on website

The NDA is inviting views on its new website which aims to make finding information simpler and faster.

Tablets, smart phones and PCs have all been taken into consideration and the website's new display will change to give the best layout.

A simplified list of links at the top of the site is designed to meet the most common information needs quickly, while other pages provide quick access to the NDA's priorities, progress, estate structure and work areas.

The website aims for a clear and consistent format with an emphasis on the use of plain English. Changes mirror those made by other government departments and arm's length bodies that have moved their websites to the single government website: [www.gov.uk](http://www.gov.uk).

Take a look at the website and let us know what you think, email: [enquiries@nda.gov.uk](mailto:enquiries@nda.gov.uk)

# Increased focus on Sellafield

Pete Lutwyche became the NDA's first-ever Sellafield Programme Director in March.

His appointment will bring even greater focus on the priority site and help drive forward performance improvements, particularly in the vital hazard reduction programmes in the legacy ponds and silos area of the site.

The new role was created as part of a series of changes to the NDA executive made by Chief Executive John Clarke designed to ensure the authority is in the best possible shape for the challenges ahead.

It's a return to Sellafield for Pete, who worked for BNFL for 22 years, rising from a graduate trainee to an executive board member before leaving for a highly successful five-year spell at US engineering firm Jacobs.

"I'm delighted to be coming back to the nuclear industry at what is a crucial time for Sellafield and the NDA," he said.

"For me, the role is about relationships, whether that's internally with the NDA board and employees, Sellafield Ltd, Nuclear Management Partners (NMP), Government and the stakeholder community around the site.

"The key to being successful in the role will be setting challenging, but realistic, expectations and helping people understand how they can achieve them.

"It's also about taking stakeholders on the journey with us; being honest about what's achievable and what isn't, managing expectations and not overpromising. The language we use is very important, we must be open about the uncertainty that still exists in many of the Sellafield programmes.

"I'll consider my time here as a success if, in a few years' time,



stakeholders at all levels can say they understand the challenge at Sellafield, that they can see real progress and momentum on site and that they understand the costs and timescales involved in delivering these complex programmes.

"We can only achieve that if the people engaged in delivery - chiefly ourselves, Sellafield Ltd and NMP - are collectively focused on the right things and are open and honest with each other about what improvements are required and how they can be achieved.

"Legacy ponds and silos remain our number one priority at Sellafield; quite rightly our success will be judged on our progress on these nationally important programmes.

"The learning acquired by NDA, NMP and Sellafield Ltd over the last five years has given us an invaluable insight into the challenge and is being applied to our approaches over the next five years and beyond.

"The decommissioning programme at Sellafield reaches well into the 22nd century; it's an inter-generational task that will test our scientific and engineering capability for the next 100 years.

"When you consider the seismic social and technological changes that have taken place since Sellafield was born nearly 70 years ago in 1948, it's incredible to think this programme of work will cover a period almost twice as long as that.

"I think that underlines how difficult it is to talk with any certainty about the programme in the medium to long term."

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*Photograph:  
Pete believes the key to success  
is setting challenging but realistic  
expectations*

# spotlight on supply chain



## Diary date

A date has been agreed for the 2014 NDA Estate Supply Chain Event. The annual event, now in its fourth year, will take place at EventCity on Thursday, 6 November.

Further details will be published in the near future, but remember to put the date in your diary. Last year's event, opened by Baroness Verma (pictured left), attracted more than 1,000 delegates, with 200 exhibitors and excellent opportunities for networking.

## Business partnering scheme success

A trial mentoring scheme is helping small businesses navigate their way through the maze of decommissioning opportunities, and has exceeded expectations in just a few months.

When the NDA launched the scheme in November, the goal was to sign up around 20 people who were experienced working in the industry, the mentors, who would provide guidance and support to an equivalent number of smaller businesses, the mentees. The objective is to help the mentees become more effective in entering or working in the NDA supply chain.

More than 40 pairs of businesses from all across the UK have been undergoing introductory training and familiarisation and will link up for several hours each month, both electronically and face-to-face, with the aim of improving understanding within the Small and Medium-sized Enterprise (SME) community about how best to access opportunities in the decommissioning market.

The NDA Estate Mentor Scheme, which will run for a trial 12-month period, is the

result of discussions that began three years ago with a series of workshops focused on SMEs, involving all Site Licence Companies as well as the NDA. Additional development of the concept followed the more recent establishment of SME steering groups around the UK. The groups have also led to other measures to support the supply chain and SMEs in particular, including a mandatory prompt payment scheme and greater flexibility around the requirements of Intellectual Property.

Mentors must be experienced professionals (but not necessarily with nuclear experience) from any size of company, while all UK-based SMEs are eligible to apply for the scheme as a mentee, regardless of industrial background, but must aspire to work in nuclear decommissioning or have an existing involvement.

NDA Supply Chain Manager Sam Dancy said: "We have been delighted by the interest and support for the mentoring scheme and hope it will become an established feature of our supply chain. The scheme should assist smaller businesses with improved understanding of the decommissioning sector and how it operates, but mentoring is a partnership and I also hope that it will help the mentors gain a greater understanding of the capability and capacity of the SME community which may help break down some of the perception issues surrounding this area of our market."

Training and support will be provided under the guidance of Cumbrian-based Centre for Leadership Development. The scheme is also being supported by a new micro SME, Davies Nuclear Associates Ltd.

# Skills showcase for Cumbrian firms

Small and medium-sized businesses (SMEs) in Cumbria's energy sector enjoyed a chance to showcase their skills at an NDA-supported event.

Cumbria Excellence Day, conceived by the NDA's Cumbrian SME Steering Group, allowed smaller firms to demonstrate their services while also hearing from a range of industry experts on the opportunities available across the sector.

The event, held at the Enerigus training centre near Workington, was sponsored by Britain's Energy Coast (BEC) and delivered by CN Group.

Ron Gorham, NDA's Head of Supply Chain Optimisation and SME Champion, spoke at the event along with a host of other top industry names including George Beveridge, Deputy Managing Director of Sellafield Ltd, Jonathan Evans, of the Low Level Waste Repository (LLWR), and Robert Powell, of National Grid.

Kurt Canfield, chairman of the Cumbria Excellence Day committee and the NDA's SME Steering Group in Cumbria, said: "The event was designed as an opportunity to celebrate excellence in local SMEs and allow them to identify tangible business opportunities.

"I believe the day delivered on that promise and more, offering a vast

peer-to-peer business networking opportunity and a huge number of diverse companies showing off their capability to the energy sector.

"Contracts were awarded, new relationships were formed and new businesses came to the fore. The speakers were excellent and I'd particularly like to thank Sellafield Ltd, LLWR, Innovus and Pactec UK."

Mr Canfield, Managing Director of Cumbrian SME Safety Critical, added: "The support of BEC as sponsors and CN Group as delivery partners made this event possible and ensured it was free for businesses, which meant there were no barriers to prevent start-ups and smaller firms attending."

The NDA's SME Steering Group in Cumbria was formed in 2013 as one of a network of five regional groups established by the NDA to provide a voice for SMEs working on, or wanting to work on, the authority's estate.

The steering groups are part of the NDA's SME Action Plan which commits the authority to engaging with the SME community through

its Site Licence Companies to boost SME participation in its mission and sets a challenging target of having 20 per cent of procurement spend with SMEs by the end of the current Parliament in May 2015.

Half of the NDA's current £3 billion annual budget is spent with the supply chain, via the SLCs, a figure that has grown steadily since the NDA was established in 2005.

The NDA's SME Action Plan forms part of a wider plan drawn up by the Department of Energy and Climate Change (DECC), covering DECC-related spending.

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*Photographs:*

*Left, Simon Blackburn, a BEC Fab Lab volunteer, demonstrating Fab Lab's services at Cumbria Excellence Day*

*Right, Kurt Canfield, Chairman of the the Cumbria Excellence Day committee*



# All dried out and ready to store

A new technique for drying out radioactive waste is being pioneered by the ILW Programme at Berkeley site, after being developed in partnership with a small local specialist firm, who were unearthed through an internet search.

MechaTech Systems Advanced Vacuum Drying System (AVDS) has the potential to be deployed at other NDA sites, producing significant savings in terms of time and cost over traditional concrete encapsulation methods. Early estimates suggest more than £15 million could be saved across the estate.

Clearance of Berkeley's four vaults is one of the highest hazard activities on the Magnox sites, and the current focus is on retrieving and treating the waste so it can be safely stored until the geological disposal facility becomes available.

The material has accumulated partly through normal nuclear generation and partly as a result of experimental research carried out at the neighbouring historic research labs, which produced quantities of non-standard waste.

The vaults contain sludges, resins and a variety of solid wastes, characterised as Intermediate Level Waste (ILW), with varying amounts of moisture that need to be reduced through the conditioning process before being packaged. Once sufficiently dried the waste is more stable and less likely to present future corrosion and gas generation issues for the container.

The bespoke technology, developed by Thornbury-based MechaTech Systems, uses a heating, vacuuming and refrigeration process to dry out sludge and resin, reducing moisture content by as much as 99% and the volume by approximately half. The process is



capable of safely managing the hydrogen generated by some of the wastes until dried. It can be used 'in box' and will be applied at Berkeley to material packaged in Ductile Cast Iron Containers (DCICs).

Engineering Design Manager Nathan Mills said: "MechaTech Systems is a bespoke vacuum drying specialist. Having a local company that had relevant expertise in what we were trying to achieve was quite a fortunate find."

MechaTech Systems Managing Director John Hutchinson added: "This is a flexible, 'dry-in-the-box' solution that could potentially be used across the whole NDA estate."

Magnox Ltd's Intermediate Level Waste (ILW) Programme Director Phil Sprague added: "This innovative new solution is an example of how we are working with local suppliers to make huge steps forward in decommissioning. The AVDS will make a real difference to the way we process our wastes. It not only provides a comprehensive solution to dealing with our most challenging wastes at Berkeley but also across the whole NDA estate, a testament to good British engineering."

The full-scale AVDS is now being installed at Berkeley site after undergoing several years of small-scale trials using simulant sludges. The four heating stations should be ready for testing and inactive commissioning by the end of June, with plans to have the first box of resin conditioned in the autumn. The conditioning facility is expected to treat approximately 700 DCICs comprising both cuboidal and cylindrical containers.

MechaTech Systems, who have a team of 10 full-time staff plus contractors and sub-contractors, specialise in the design and manufacture of bespoke vacuum drying equipment and draw upon a combined experience of over 50 years in high vacuum engineering.

*Photograph:  
Above, dried sludge simulant*

## Contractors:

MechaTech Systems Ltd



## Magnox collect top trophy

A passion for safety has earned Magnox the highest competitive accolade from the UK's leading accident prevention organisation.

### Site safety standards are pure gold

Magnox sites figured prominently in the internationally recognised and highly sought-after safety awards presented by the Royal Society for the Prevention of Accidents, (RoSPA) for outstanding performance, collecting a clutch of trophies at the annual awards ceremony, held in Birmingham earlier this year.

The RoSPA awards programme, sponsored by NEBOSH (the National Examination Board in Occupational Safety and Health), is the largest and longest-running occupational health and safety awards programme in the UK.

The prestigious Sir George Earle trophy was presented to Magnox Ltd by Lord McKenzie of Luton, RoSPA president, and by the organisation's Chief Executive Tom Mullarkey, who said:

"Magnox Ltd has demonstrated outstanding performance and we were particularly impressed by the seamless co-operation between employees and contractors. Good working processes and practices were abundant, with Magnox acting on numerous ideas from the workforce, and this is why it is a worthy winner of the prestigious Sir George Earle Trophy.

"The firm's passion to leave a legacy that is safe for individuals and the environment alike is truly inspiring."

The trophy was received by Neil Baldwin, Magnox Managing Director and Keith Spooner, director of EHSSQ, at the 2014 Occupational Health and Safety Awards ceremony.

Magnox, which also won the Construction Engineering Industry Sector award, a MORR (Managing Occupational Road Risk) Gold achievement award and nine site awards, was because of its commitment to intensive training, especially around the core areas of behavioural safety and board-level responsibility.

Directors and senior managers spend quality time at all sites to reinforce the message about health, safety and welfare, giving the workforce a real opportunity to air views, whether positive or negative.

*Photograph: Neil Baldwin (centre), Managing Director of Magnox Ltd receives the Sir George Earle Trophy from Tom Mullarkey (left), RoSPA chief executive and Lord McKenzie of Luton (right), RoSPA president.*

**"We were particularly impressed by the seamless co-operation between employees and contractors."**

RoSPA Chief Executive



## Four boxes in four stores

Berkeley site achieved a major milestone when the first package of Intermediate Level Waste (ILW) was placed inside its newly constructed interim storage facility (ISF).

The waste, generated while the site was operational, is safely stored inside a self-shielded cast iron container and marks the fourth Magnox site with waste packaged and placed inside an ILW store.

The ISF at Berkeley is the largest of its kind in the UK, with a footprint the size of a football pitch. Once decommissioning is complete it will hold around 850 waste packages from the site until a national disposal facility becomes available.

Dr Brian Burnett, Head of Programmes at the NDA said: "In 2010, Berkeley was



the first Magnox site to place its two reactors into safestore. The focus now is on retrieving, packaging and storing the waste on site to enable Berkeley to enter care and maintenance. This is an important step on that path and I commend Magnox on its achievements."

Phil Sprague, Magnox ILW Programme Director added: "Getting to grips with legacy ILW has been a key part of the Magnox Optimised Decommissioning Programme and this year I can say we are now making exceptional progress and meeting the challenges presented by ILW.

"We are now retrieving, packaging, conditioning and storing waste across five sites, with Chapelcross and Dungeness about to start. Having ILW packed and stored in its final resting place at four sites - Hunterston, Trawsfynydd, Bradwell and now Berkeley - was a great way to finish off the last financial year."

*Photographs:*

*Top, the ISF at Berkeley and, above, a DCIC being lifted into position.*

# Whirlwind site tours for new team

Representatives from the Cavendish Fluor Partnership (CFP) have now completed a whirlwind introductory tour of the 12 Magnox and RSRL sites, meeting the management and employees who will be implementing their proposals once the new contract is signed in September.

The site tours followed a two-day event in Manchester, where the CFP team met community stakeholders, regulators, trade union officials and senior representatives from Magnox and RSRL management.

CFP was named two months ago as the Preferred Bidder in the £multi-billion competition to take ownership of Magnox Ltd and Research Sites Restoration Ltd (RSRL), the two Site Licence Companies that operate the historic nuclear sites on the NDA's behalf.

The announcement marked a major milestone in the two-year procurement process, which involved four bidding consortia from the UK and overseas, who each submitted detailed proposals for taking the sites into the final stages of decommissioning.

It is anticipated that CFP's proposals will secure savings of at least £1 billion on current estimates, significantly reducing demands on the public purse.

The NDA's Competition Programme Manager Andrea Livesey said: "The five-month transition phase is progressing smoothly, and we're delighted that feedback on the site visits so far has been extremely positive, both from the CFP team and from the site workforces."

For the moment, however, on-site activities and work programmes are continuing as usual, and the existing Parent Body Organisations remain in charge. Full details of CFP's plans will only be disclosed once the contract is signed.

The transition includes a series of legal checks, exchanges of information and training for the incoming management team. Subject to a successful transition, a ceremony marking the transfer of shares from EnergySolutions and



UKAEA to CFP will take place on 1 September.

Following share transfer, CFP will bring in a team of more than 30 senior executives from their parent companies, Cavendish Nuclear and Fluor Corporation, who will begin to introduce the new programme of work over an initial 12-month period.

Meanwhile, the claim for damages submitted by EnergySolutions, part of the unsuccessful Reactor Site Solutions consortia, will be examined in the High Court. The claim does not seek to overturn the NDA's decision to select CFP as the Preferred Bidder and will have no impact on either the transition or the share transfer.

The NDA is confident that the competition process was carried out in strict compliance with EU and UK guidelines, with regular internal and external assessments throughout the two years of the procurement. This included a comprehensive and positive review earlier this year by the Major Projects Authority, an arm of the Cabinet Office.

*Photographs:*

*Top, visiting Harwell are, from the left: the CFP team Kelly Duane, Peter Knollmeyer, Beverley Grey, Paul Brown, Tony Handley, Rob Gentry, RSRL's Tony Wratten and Kenny Douglas from CFP*

*Above, Harwell staff listen to the CFP presentation*

# 2013/2014 HIGHLIGHTS



Welcome to this special five-page Insight focus which gives a brief overview of the progress outlined in our Annual report and Accounts 2013/2014.

## Key Achievements

The 12 months from April 2013 to the end of March 2014 saw important decisions on two major contracts.

The Cavendish Fluor Partnership was named in March as the Preferred Bidder for Magnox Ltd and RSRL, bringing the two-year procurement closer to its conclusion.

Award of this contract in September is anticipated to deliver more than £1.5 billion in savings at the 12 historic sites over the contract term and will signal completion of the NDA's process to introduce private-sector contractors, via competitive procurement, to manage its sites.

The NDA has also extended the Sellafield Ltd contract, awarded to Nuclear Management Partners in 2008, for a further five-year term following a rigorous assessment of the options. This uniquely challenging site continues to be the subject of scrutiny by the National Audit Office and Public Accounts Committee, and remains our No 1 priority.

Other achievements from the year include:

- Excellent progress on the Magnox Optimised Decommissioning Programme, set to deliver significant savings against the original estimated cost of sites reaching the passive Care and Maintenance phase, and secure a 34-year reduction in timeframes spread across all sites.
- The UK's top safety award, the Sir George Earle Trophy, presented to Magnox for outstanding performance in this key area.
- Delivery of all milestones and commitments at NDA's northernmost site, where the Dounreay Cavendish Partnership is now into the second year of its contract. The new Parent Body Organisation has also taken on additional work required by the NDA.
- Commercial income of almost £1 billion, achieved by exceeding generation targets at Wylfa, the UK's last operational Magnox power station, as well as concluding of commercial deals on nuclear material together with reprocessing and management of spent fuels.
- More than 100 tonnes of metal waste retrieved from the world's largest open-air nuclear fuel pond, Sellafield's Pile Fuel Storage Pond.
- Major progress at the First Generation Magnox Storage Pond at Sellafield, focusing on preparations for starting fuel retrievals in 2015/2016. The pond is one of the most complex challenges in the site's decommissioning programme.
- Even more challenging are the Sellafield Magnox Swarf Storage Silos, where a number of activities have moved ahead, including construction of Silo Emptying Plant machines, installation of a seismic restraint tower and completion of a passive ventilation system. A new approach to estimating uncertainty indicates that this programme will take longer to complete and costs will increase.
- A 13% increase in the diversion of waste away from the Low Level Waste Repository (LLWR) to alternative means of disposal, including combustion, taking the total to 86%. The development of new waste routes forms part of the National Low Level Waste Programme, which is led by the NDA and supported by waste organisations both inside and outside the NDA estate. Preserving capacity at LLWR is a key goal for the programme.
- A wide range of initiatives to support the supply chain, optimise skills across the whole nuclear industry, encourage collaborative R&D into innovative decommissioning solutions and contributions to the regeneration of communities affected by the gradual closure of NDA sites.

## View from the top

This financial year has seen genuine progress across the NDA estate and also a number of challenges on many fronts.



Dominating the year were our decisions on the Magnox/RSRL competition and NMP's Sellafield contract, along with the continued commitment to make progress on the high-hazard facilities at Sellafield.

The decision to continue NMP's contract into a second five-year term was made after extensive consideration and we believe that this offers the greatest likelihood of achieving real progress.

We have welcomed the scrutiny of the National Audit Office (NAO) and the Public Accounts Committee (PAC), whose reports were insightful and instructive. These investigations have provided us with a useful external check on our progress and we are well on the way to implementing, in full, the recommendations made.

We have noted the PAC's concern about the importance of providing transparency to the taxpayer over the full range of possible costs of the NDA's mission and have been working to provide a better estimate of the range which we are publishing in our Accounts.

While performance in the operational plants at Sellafield has generally improved over the last year, it continues to be below that we would wish to

see. Some unplanned disruptions are an important reminder of the inherent fragility of the operating plants and infrastructure that we rely on.

We are currently reviewing Sellafield Ltd's updated site plan, Performance Plan 2014 (PP14), which was recently submitted and sets out the future programme of work with a particular emphasis on the next five years.

This plan takes a more informed approach to estimating uncertainty and contingency within the necessary programmes of work, many of which are highly complex, of long duration and pose technical challenges which are unlikely to be fully resolved for a considerable time.

We have accepted some changes and reflected these in our latest estimate of the lifetime cost of dealing with Sellafield challenges, but also acknowledge that this figure will increase significantly as we complete our scrutiny and develop a better understanding of the ranges of uncertainties contained in the Plan.

As the site begins to retrieve waste which has been stored for many decades, understanding will strengthen and assumptions made on the basis of incomplete historic data will be clarified.

We are confident in the accuracy of short-term cost estimates, however, significant uncertainty will remain over the longer term and continue until such time as the last waste is removed.

An important milestone in the management of plutonium was reached during the year with the publication of our technical advice to Government. This paper advises that alongside the preferred option of re-use as Mixed Oxide Fuel (MOX), there are two other credible options, the PRISM reactor proposed by GE Hitachi and a Candu MOX reactor proposed by SNC Lavalin. We will now carry out further work to underpin the cases for these options.

We concluded the transfer of our Radioactive Waste Management Directorate (RWMD) into an NDA subsidiary company, which will continue to be based at Harwell, with responsibility for delivering Government policy on geological disposal of higher activity radioactive waste. The NDA continues to support Government in revising the process to search for a suitable site for a Geological Disposal Facility (GDF).

# Estimates based on a certain uncertainty

Over the year, the NDA has spent £2.6 billion in directly addressing the often complex decommissioning tasks, and secured more than £0.9 billion income to offset this cost.

However, in the context of the sheer scale of the work scheduled over the next 100-plus years, this expenditure represents less than 3% of the total expenditure that will be required over time.

In line with all public bodies, the NDA is required to use Treasury guidance in the HMT Green Book when preparing

business cases for expenditure that will continue for many decades into the future, and fluctuate as new technologies emerge.

The guidance recommends preparing estimates according to different levels of confidence about plans. These ranges could, potentially, add as much as 300% to estimates or subtract up to 50%,

depending on levels of certainty. Longer-term spending is subject to a greater range of unknown factors than shorter-term spending which can be costed more realistically.

At Sellafield in particular, an additional factor is the complexity of many critical projects which are at an early design and delivery stage, and therefore subject to future adjustment on cost and technology. Elsewhere in the estate, where there is relative certainty over future work scope, the NDA has been able to run competitions under target cost contract arrangements, introducing more clarity and reducing the expected cost.

The estimated overall lifetime cost of completing decommissioning across the whole estate currently stands at £110 billion, an increase of £6.6 billion over last year's figure. In its accounts, the NDA is required by UK Accounting Standards to provide a single figure, and to apply a discount rate specified by HM Treasury, which gives the figure of £64.9 billion – the 'nuclear provision'.

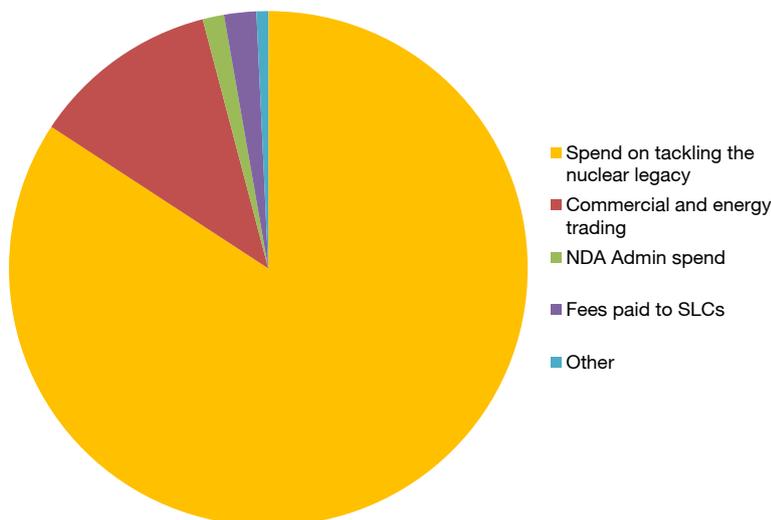
The discounted figure represents the amount of money needed now to pay for decommissioning when it takes place in the future, based on likely returns from an invested figure using rates specified by HM Treasury.

So while the nuclear provision is based on a single point estimate, the reality is that the figure will look very different when work is completed over the next century.

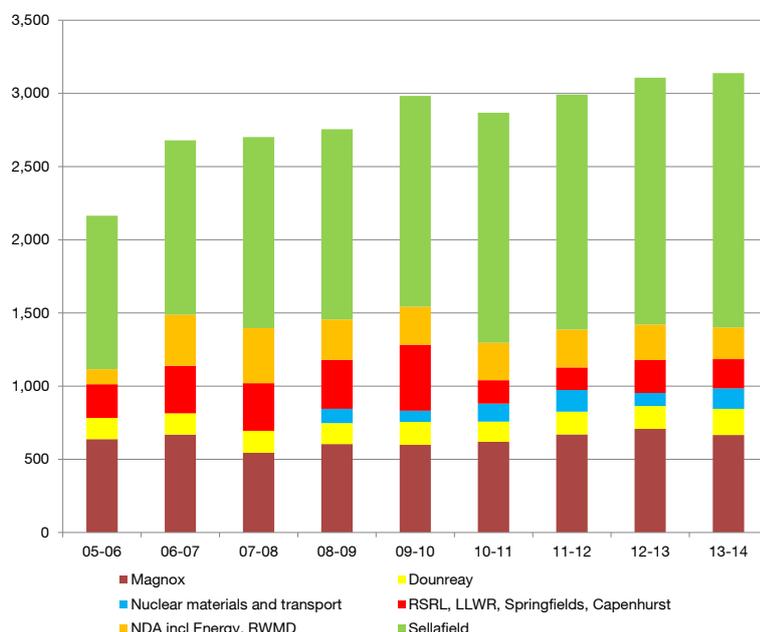
Even a small adjustment for changing confidence levels can add up to a significant number over a 100-plus year programme. When added together, the consequence of using ranges of estimates to reflect uncertainty is that potential costs could, for the whole mission, be somewhere between £88 billion and £218 billion.

For more details, see the full Annual Report and Accounts 2013/2014 at [www.nda.gov.uk](http://www.nda.gov.uk)

**Proportion of NDA spend on tackling the nuclear legacy 2013-14**



**NDA Spend, £m**



# Estimating lifetimes costs is a journey into uncharted territory



The NDA's estimated nuclear provision figure, whether discounted or undiscounted, reflects the best analysis of probable costs over a period spanning more than 100 years into the future.

Much of the work required across the estate is well understood, particularly in the near term at the Magnox and RSRL sites, so costs can be predicted with some confidence. Despite this, scientific advances and better analysis of problems are sure to lead to future revisions in known costs.

Take asbestos. This cheap, fire-resistant insulating material was widely used in construction and other industries up until the 1980s, and had been used for many centuries all over the world.

When the dangers were eventually proved, asbestos use was halted. Asbestos removal has added many

£millions to the costs of taking apart numerous nuclear (and other) facilities.

Equally, the growing use of robotic machinery is bringing costs down and cutting timeframes by allowing work to take place in spaces that were previously inaccessible to the workforce because of high contamination.

Full understanding of many historic Sellafield challenges will only be achieved once the last quantities of waste have been retrieved and analysed.

In particular, the four legacy ponds and silos date back to the very earliest days of the nuclear industry and the

Cold War military programme. Waste has accumulated over the intervening decades and each facility now requires an individual set of complex engineered solutions to gain access, before the material is retrieved, treated and packaged for long-term storage.

Many projects are unique and unprecedented in scale, complexity and hazard. Inevitably, refinements will be required as the projects develop and discoveries are made that shed new light on the challenge. Such refinements lead to movements in cost and time estimates, and demonstrate progress in dealing with the legacy.

# 100 down and still counting

A century of buildings have now been demolished at Sellafield as decommissioning of the site gathers pace.

A former store on the site has become the 100th structure to be razed since 2007, a list which includes legacy chemical plants, R&D facilities, waste stores, reactor cooling towers and even the old Sellafield Fire Station.

Steve Slater, Head of Decommissioning for Sellafield Ltd, said: "There are more than 1,300 facilities at Sellafield to be decommissioned and reaching our first century is a significant achievement. Demolition of the 100 buildings has released more than 35,000 square metres of real estate which is equivalent in size to five football fields.

"This valuable space at Sellafield is necessary to fuel our continued decommissioning programme. We're using the extra room to help retrieve, process and re-package historic nuclear waste to make it safe for long-term storage and disposal."

Sellafield's decommissioning programme stretches out to 2120 and work is

currently concentrating on high priority projects where hazardous waste is being stored in buildings which do not meet modern standards.

One of the major challenges in retrieving waste from these facilities is the lack of available space for construction projects in the highly congested historic areas of the site.

Geoff Carver, Demolition Delivery Manager for Sellafield Ltd, said: "The demolition of redundant buildings provides valuable space.

"Often the hazards we encounter demolishing buildings are conventional rather than nuclear. We've had to demolish a large number of redundant facilities which contain hazardous asbestos materials. Skilled operators are employed to ensure that the buildings are demolished safely and the waste managed in a responsible manner."

Demolition of the original Sellafield Fire Station was completed last year.

Built in 1949, the emergency centre was home to the firefighters who extinguished the 1957 Windscale fire. The demolition was carried out in two phases over a six-week period resulting in more than 400 tonnes of crushed concrete.

Sellafield's demolition team is now concentrating on developing plans to safely pull down the tallest standing chimney on the Sellafield site. The 61-metre-tall chimney sits on top of the 11-storey First Generation Reprocessing Plant and in total stands 122 metre high, just beating off competition for the tallest structure on the site.

# News of success filters out early

One of the UK's top 10 nuclear safety risks has been significantly reduced after a project to repackage historic plutonium-contaminated filters at Sellafield was completed four years early.

The work involved removing the filters from a building deemed no longer fit-for-purpose, repackaging them and placing them in a more modern store.

The filters had been removed from facilities around the site during the 1970s and 1980s and placed into storage.

The project, which is a part of a wider programme to remove plutonium contaminated material from across the Sellafield site, was completed in February this year - four years ahead of schedule - saving around £7 million on the original cost estimate.

Mark Bailey, the NDA's Programme Manager for the area, said: "When Sellafield Ltd approached the NDA for approval of the acceleration, it was clear

that it was something we had to support as it accelerated delivery of our Strategy with minimal cost impact in-year and significant potential savings.

"The way in which Sellafield Ltd have delivered this project has been innovative and the team have had to overcome some significant barriers in order to complete this work - they rose to the challenge impressively.

"To have significantly reduced one of the top 10 nuclear risks in the UK while delivering the project ahead of schedule and saving the UK taxpayer more than £7m is a tremendous achievement."

The NDA is now challenging Sellafield Ltd to take the learning from this work and apply it to the remainder of the

legacy plutonium-contaminated material programme and achieve further acceleration and cost savings.

The Sellafield Ltd team that delivered the work were rewarded with the 'Working Together as a Single Team' award at Sellafield Ltd's Business Excellence Day.

Paul Foster, Sellafield Ltd's Chief Operating Officer, said: "It's fantastic to see the Sellafield Strategy in action out in the field. It is too easy to overlook successes when they are quietly, efficiently and safely delivered. This team has removed one of the top 10 nuclear issues in the country through their own initiative and deserve great recognition."

# Sellafield leads the way on 3D technology

Sellafield is taking a global lead in the nuclear industry with its pioneering work on innovative uses for 3D printing and scanning.

The site hopes to save hundreds of thousands of pounds by combining metal and plastic 3D scanning and printing.

Donna Connor, Head of Technical Capabilities at Sellafield Ltd, said: “Personally, as a material scientist, 3D scanning and printing is the Holy Grail. The technology offers a huge amount of opportunity that we can exploit to continue the safe and accelerated clean-up of the site.

“The plants at Sellafield are unique and many of them have been used for far in excess of their original design specification.

“With these older plants, lots of parts are one-off designs, which makes it both expensive and time-consuming to replace parts. If something has to be

custom-manufactured, it could mean a plant is closed down until a part is replaced, and even if we can avoid closing the plant temporarily, we know for certain that the part will be expensive. Using this technology can revolutionise the way we do things, saving time and money for the taxpayer.”

A recent conference also considered additional ways of using the newest 3D technology, metal printing, a process which fuses together very fine layers of metal powder with a focused laser beam to create parts and components in high-performance metals.

Managing Director of Sellafield Ltd, Tony Price, said: “These emerging technologies are hugely exciting for the future legacy of our nation and the

nuclear sector, and I’m proud to be able to say we were the first nuclear company to adopt them.

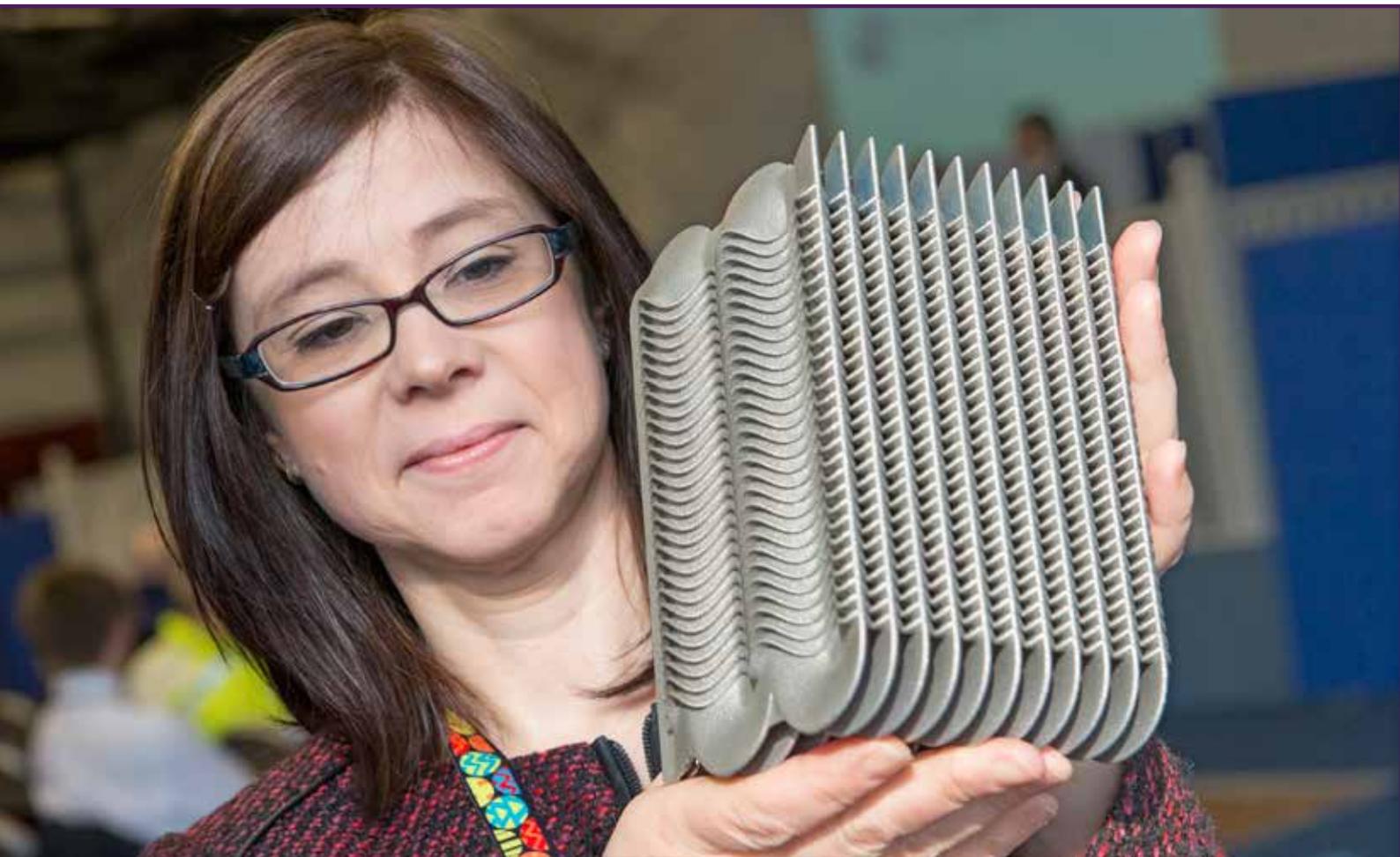
“The quality of definition of these printers means that the products they produce are actually more accurate, stronger, and more reliable than parts made using traditional techniques. This is a really exciting development for us.”

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*Photograph:  
Donna shows a sample part printed by a 3D metal printer and on display at the Cumbrian conference*

## “3D scanning and printing is the Holy Grail.”

Donna Connor





## Simpler, cheaper and more accurate

The 3D technology has been successfully deployed in support of preparations under way to export historic nuclear waste out of the site's oldest pond, the 60-year-old Pile Fuel Storage Pond (PFSP).

A massive 40-tonne stainless steel flask is being modified to transfer radioactive sludge from the PFSP to a waste encapsulation plant for treatment.

A 3D scanning company was brought onto site to measure the lid to build a 3D vector model to underpin the new lid design. The modified lid will be manufactured next year, to fit on an existing type of flask currently used in Thorp, and will feature a new filling port to allow sludge to be measured into a drum located inside the flask.

Lead Mechanical Engineer Eduard Bordas said: "I was tasked with the job to re-use an existing container and to get a new lid designed with a filling port to allow the sludge to be metered into drums. We recognised early on that

it was paramount that the new lid will fit the old body first time. None of the traditional metrology methods available gave us the same confidence that 3D scanning did. 3D scanning was simpler, cheaper and more accurate."

Alistair Norwood, Head of Metrology, said: "The scan cost about £3,000 versus the estimated £25,000 cost of using a metrology rig. It was also carried out in a fraction of the normal six months taken to manufacture such a component using traditional tooling."

*Photograph:*

*Lead Mechanical Engineer Eduard Bordas with the Solid Waste Export Flask and the lid that is being redesigned*

- Sellafield Ltd will be using 3D specialist companies, 3T RPD and Central Scanning, to create metal and plastic components, parts and one-offs.
- Using metal printing, parts can be printed in a wide range of metals, including titanium, stainless steel and brass, to a high resolution.
- The advantages of using 3D technology include: quicker speed of production, ease of modification and cheaper cost.
- To find out more, visit [www.3trpd.co.uk](http://www.3trpd.co.uk) and [www.central-scanning.co.uk](http://www.central-scanning.co.uk)



## Swedish welcome too warm for Dean

Think of Sweden. Imagine the snow. Perhaps even skiing to work as well as for fun. Seeing the Northern lights in the night sky – think again!

Dean Gentles had snowy landscapes in mind when he went on a four-month secondment from NDA's Radioactive Waste Management Ltd (RWM) to the Swedish Nuclear Fuel and Waste Management Company (SKB), but they didn't materialise because of the exceptionally mild winter.

So it's not surprising that the 25-year-old Engineering Manager has vowed to return to Sweden in the future when he hopes things will be as expected.

Dean did however fulfil all his work aims for what turned out to be a very productive few months.

"I wanted to go to Sweden to have an opportunity to work underground, and to learn more about the experimental work going on at SKB's Äspö Hard Rock Laboratory. Before I went to Oskarshamn, the deepest I had been was in a cellar. Over there I was working at a depth of 450 metres," he said.

Dean's focus was on the development of bentonite in SKB's KBS-3V disposal concept for spent nuclear fuel. Bentonite – also used in cat litter – expands when wet and provides a tight hold and stability for the waste container.

He also participated in an experiment to test a full-scale alternative disposal concept in repository-like conditions, where experts from SKB placed a "supercontainer" for spent nuclear fuel in a horizontal tunnel and surrounded it with bentonite.

The experiment started in November 2013 and will be monitored over the next year or so with sensors to find out how the system components behave. Although back in the UK now, Dean will be keeping in touch with his Swedish colleagues on the project.

Dean is working on a report for RWM on the development of bentonite and it will be published in due course.

It was Dean's first time living in a foreign country on his own, but he found everyone in Sweden very welcoming, friendly and helpful.

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*Photograph:  
Dean Gentles, Engineering Manager*

## RWM leads European project

Radioactive Waste Management Limited is co-ordinating a €14.7million European project called CAST (Carbon-14 Source Term).

CAST is part-funded by the European Commission.

The CAST project aims to develop understanding of how carbon-14 is released from radioactive waste materials (steels, Zircaloy, ion-exchange resins and graphite) under conditions relevant to waste packaging and disposal to underground geological disposal facilities.

RWM Limited's Research Manager, Steve Williams, said: "The CAST project brings together 33 international partners with a range of skills and competencies in the management of radioactive wastes containing carbon-14.

This includes waste management organisations, research institutes, universities and commercial organisations."

The project began in October 2013 and is due to run until March 2018.

Two workshops will be held as part of the project. The first in January 2016 aims to outline the initial findings from the research.

The second workshop, planned for January 2018, will present the overall results and findings of CAST and discuss these with target groups.

More information on Carbon-14 and the CAST project is available at [www.projectcast.eu](http://www.projectcast.eu)

Carbon-14 has a half-life of 5,700 years and, with large amounts of graphite and irradiated steels on the NDA's estate, understanding of its behaviour is important for the assessment of the long-term safety of geological disposal.

# Radioactive Waste Management appoints Ann McCall as Waste Management Director



Radioactive Waste Management Limited (RWM), the NDA's new wholly owned subsidiary, has announced the appointment of Ann McCall to the new post of Waste Management Director.

The role is key in the organisation's work with waste producers in developing new and innovative ways to reduce the volume of radioactive waste and ensuring it is suitably packaged for eventual geological disposal.

Ann said: "I'm delighted to be joining Radioactive Waste Management Limited at such an important time. I'm looking forward to working with waste producers to find solutions to deal with the country's legacy waste in the short term; whilst also ensuring that there are plans in place for its final disposal.

"It is vital that RWM, the regulators and waste producers have the very best plans in place to package the country's radioactive waste safely and securely."

Bruce McKirdy, Managing Director of Radioactive Waste Management, said: "The creation of our new organisation and Ann's appointment underlines our commitment to geological disposal and developing waste packaging solutions – it ensures we are appropriately set up to achieve these goals. Ann has more than 30 years of nuclear waste management and disposal experience and is a welcome addition to our Executive Team."

Ann is a Chartered Engineer and a Chartered Scientist, a Fellow of the Institution of Mechanical Engineers and a Fellow of the Institution of Mining, Minerals and Metallurgy.

She has spent the past six years with SKB, the organisation responsible for radioactive waste disposal in Sweden, where she saw the conclusion of site selection for Sweden's Spent Fuel Repository and the application process for both an Encapsulation Plant and a final repository.

Radioactive Waste Management Limited was created at the beginning of April 2014 as a wholly owned subsidiary of NDA. The organisation employs around 100 nuclear scientists, geologists, engineers and other professionals and is based in Harwell, Oxfordshire.

*Photograph:*

*Ann McCall, Waste Management Director for RWM*

## Ceramic technologies could polish up sites

A unique technology has been developed that could help to treat radioactive waste at lower cost and more effectively in the future.

Current methods rely on immobilising both liquids and solids by blending them with a cement-based grout before packaging the mixture for storage and eventual disposal.

The approach being pioneered by Lucideon (formerly CERAM), a materials consultancy company whose expertise emerged from the ceramics industry of Stoke-on-Trent, involves pouring a slurry of mineral-like materials, or a geo-polymer, onto the waste which hardens the material into a resilient solid.

One key advantage of the geo-polymer over conventional cement-like encapsulating material is the potential to seep effectively into gaps or awkward spaces, while working equally well with solids, liquids or a mixture of both – avoiding the need to drain off liquid.

The slurry can be poured into waste containers, or pumped into the bottom, to solidify any liquids and also encapsulate solid Intermediate Level Waste (ILW). Control can also be exercised over the viscosity (or “flow”) of the encapsulant, offering more versatility than standard treatments and with potential for a wider range of applications.

Ian Buckley, Lucideon’s project lead, said: “The study exceeded our expectations and the experimentation results provided advantages we had not foreseen. The nature of the geo-polymer means the encapsulant product can be pumped into the skips either from the top or the bottom, whilst still permeating the entire waste volume and successfully immobilising it.”

Sellafield has numerous skips containing varying types of ILW, contained in both wet and dry conditions. Identifying the need for such an innovative solution, Sellafield Ltd (SL) partnered with Lucideon to deliver the Feasibility Study and provided vital guidance on the site-specific requirements.

Paul Hughes, Sellafield Technical Manager with responsibility for the interim storage of legacy waste, said: “The TSB collaboration has been absolutely brilliant. There are huge benefits in considering technologies and novel ideas outside the traditional nuclear industry, as has been the case with Lucideon. The TSB competition has allowed us to identify these innovative ideas, work with SMEs to guide the development of the technology and consequently, accelerate a possible solution.”

## Laser cutting in action

Tests have recently taken place on a laser size-reduction system that can quickly and cleanly cut up sections of redundant skips from Hinkley Point A.

The laser-cutting equipment was initially developed by engineering specialist TWI Ltd, based in Cambridge, who were awarded a £1 million contract from NDA’s strategic R&D portfolio in 2009 to demonstrate the technology’s effectiveness in removing contaminated concrete surfaces and cutting up pipework. Further development has taken place with Fanuc Robotics.

The equipment is now being installed at Hinkley ready for deployment in July, when it will form part of trials into treating fuel skips from Sellafield and Magnox sites by shaving off the contaminated surfaces using a computer-guided precision milling machine, leaving the skips clean enough for recycling. If successful, potential savings could reach £30 million across the estate.

## Innovation investment bears fruit

NDA, Technology Strategy Board (TSB), Department of Energy and Climate Change (DECC), and Engineering and Physical Sciences Research Council (EPSRC) has invested a total of £18 million to fund innovative technology projects across all nuclear sectors. This has leveraged a further £15 million from private-sector organisations.

This enabled support for 35 projects and promising results led to a further joint investment by the NDA and TSB this year, this time providing £13 million, allowing some of those earlier projects to move from feasibility stage to further development, testing and eventual market deployment.

The focus of both calls was on collaborative work involving small to medium-sized enterprises (SMEs). Funding was allocated on the basis of submissions from all levels of business, both small and large, as well as academic institutions and operators of nuclear facilities.

The Viridian Partnership and Lucideon have been able to move their technologies forward with funds from the collaborative investment in nuclear innovation projects by NDA and other public bodies

Both the Viridian and Lucideon examples reflect the NDA’s drive to encourage Site Licence Companies to link up with R&D ventures. Viridian received a £45,000 grant and Lucideon received £65,000 to pursue these feasibility studies.

The NDA’s Head of Technology, Prof Melanie Brownridge, said: “It is critically important to support promising concepts at the early stage, and encourage progress through all stages of maturity. The joint approach with TSB also helps to leverage extra funding, while the collaborative approach, in these cases with Sellafield Ltd, ensures future markets are aware of the potential for these new technologies.”



# Research & Development

## Paving the way for concrete clean-up

As nuclear facilities are taken apart and demolished in the years ahead, millions of tonnes of radioactively contaminated concrete will need to be carefully analysed before decisions are made about how to deal with it.

A key question will be whether the material is classified as Intermediate Level Waste (ILW), or Low Level Waste (LLW) which is simpler and cheaper to dispose of.

A novel approach, ViridiScan, being developed jointly by NDA-funded PhD students, a UK micro-company and Sellafield Ltd, is now beginning to show promise. The potential is to reduce timescales and, based on estimates of future Sellafield concrete arisings, potentially save more than £10 million in decommissioning costs.

Geochemist Prof Kym Jarvis, one of the three partners in Surrey-based SME Viridian Partnership, described how the innovative tool will use a remotely deployed laser to remove material from a contaminated concrete surface, which is then collected in a filter trap, transferred to a safe area many metres away where it is processed and analysed.

The technique represents a huge advantage over current processes where samples are removed by drilling deep into the concrete and sent off site to a lab for analysis. The potential savings in analysis time, costs and dose uptake for workers are huge.

Prof Jarvis said: “Analysis of concrete samples by both mass spectrometry and alpha-induced UV fluorescence has not yet been achieved without the need to transport samples off site to a lab, which drastically alters the condition of the sample. By combining laser ablation with our new interface, a test-ready concrete sample can be extracted and analysed on site.”

The Viridiscan project takes forward earlier research carried out through a PhD supported by Viridian and funded by NDA, demonstrating how an initial investment via the NDA Bursary Scheme developed into a larger-scale trial that attracted collaborative funding and moved further along the road to successful market deployment.

NDA’s Research Manager Jack Hardy said: “This technology illustrates how our strategic investment has accelerated the development of an innovative decommissioning solution and enabled the transfer of knowledge between academics, SMEs and our Site Licence Companies. ViridiScan promises significant savings in future decommissioning. We look forward to seeing it on our sites.”

Mark Dowson, Sellafield Business and Technology Manager, Sellafield Technical Directorate, added: “On site, there are approximately two million cubic metres of concrete to be analysed and eventually decommissioned. By adopting this novel technique, the operational costs and exposure to radiation doses for workers are minimised. Increasing the efficiency of the concrete analysis means larger volumes of concrete can be more accurately characterised and potentially classed as LLW rather than ILW, presenting another significant cost saving.”

**“We are delighted to see that our targeted R&D investments are delivering benefits to the whole estate.”**

Melanie Brownridge



## Waste vaults almost ready for action

Dounreay's first two underground waste vaults have now been officially handed over, marking the completion of a major milestone on the journey to site closure.

The new Low Level Waste Facility will take around 150,000 tonnes of demolition material and other waste, including paper, rags, tools, glass concrete and clothing, that will be produced as the site is taken apart.

The vaults were handed over to Dounreay Site Restoration Ltd and the Cavendish Dounreay Partnership in a ceremony that also marked the beginning of the consortium's third year in charge. The ceremony was attended by more than 200 guests and members of staff, including NDA Chief Executive John Clarke, Chief Financial Officer David Batters and Head of Programme at Dounreay Nigel Lowe.

Contractor Graham Construction excavated a total of 243,000 cubic metres of rock during the construction phase. Each vault is equivalent to 370-450 double-decker buses in volume, with the floor 11 metres underground.

The vaults are scheduled to begin accepting waste material later this year, and once filled, will be capped, covered with earth and landscaped.

Planning permission was granted in 2009 for up to six underground vaults east of the main site.

John Clarke, NDA chief executive, said: "The NDA is committed to managing radioactive waste in a way that protects the public and the environment. Our major investment in these facilities underlines how seriously we take that responsibility and our responsibility to help the community adjust to the effects of closing down Dounreay."

The first two vaults and ancillary plant were developed at a cost of approximately £20 million. The total cost of managing LLW through the closure programme is expected to be in the region of £110 million.

Decisions about the development of further vaults will be made as part of a review of the site closure programme now being carried.

The NDA also created a £4 million community benefit fund as part of the development and the hand-over sees a further payment into the fund of £300,000, following an initial £1 million in 2011 when construction started.

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*Photographs:*

*Above, staff and guests inside one of the newly completed vaults*

**Contractor:**  
Graham Construction

## Two years and all on track

Hand-over of the vaults also marked the first two years of Cavendish Dounreay Partnership's (CDP) contract to clean up and demolish the Dounreay site.

Completion of the two vaults is one of the major milestones as the site heads towards closure in just over 10 years' time.

NDA awarded the contract to CDP in 2012, with anticipated savings of more than £1 billion and an acceleration of the date for reaching closure, when all the redundant buildings, including the reactors, have been cleaned out and demolished, with the radioactive waste made safe for long-term storage or disposal.

Nigel Lowe, the NDA's Programme Director for Dounreay, said: "All annual milestones have been met to date and significant progress has been made in hazard reduction projects. We are delighted with this performance and are confident that, together with the Dounreay workforce, CDP will continue to deliver on the commitments outlined in the contract."

A comprehensive assessment is now under way, expected to be complete by autumn, into how the fuel transfer activities will be accommodated alongside existing decommissioning plans which may need to be re-scheduled. Additional spend of several hundred million pounds is likely over the next few years, however, this will lead to reduced spending over the longer term as modernisation of the fuel stores will no longer be needed, and associated long-term security costs will disappear.

Transfer of the plutonium and uranium fuel to Sellafield was finalised and agreed in 2013, a year after the Dounreay contract award.

## Unplugged after 50 years

Preparations to finally decommission Winfrith's iconic Steam Generating Heavy Water Reactor (SGHWR) took a major step forward when a giant-sized concrete plug was removed, allowing access into the key area around the reactor.



The 50-ton plug had been in place since the 1960s, when it was positioned to seal a large access point that had been used during the construction phase to bring large items of plant into the shell of the reactor containment.

Some essential equipment was repositioned and several walkways were removed before the reinforced concrete and steel plug was successfully lifted clear of the containment, then placed into storage. A roller shutter door now replaces the plug to seal the access and to act as a fire barrier.

Its removal enables access to the Primary Containment area immediately surrounding the reactor, and the start of de-planting activities.

RSRL Primary Containment Project Manager Andy Haas said: "This lift, although seemingly straightforward, had the potential to impact on the programme if the plug refused to move after so many years in situ.

"The securing bolts were removed and the team carried out trial lifts employing a weight sensor to ensure plant and equipment would not become overloaded. After the successful plug removal, work has begun to remove those large items of plant from the Primary Containment 50 years after they were originally installed."

Winfrith, which was officially opened in 1961, was a test bed for a range of pioneering research during the 1970s and at one time housed nine reactors. Seven have been fully dismantled and, following a period of care and maintenance, decommissioning is now under way on the two remaining reactors, DRAGON and SGHWR, which once generated enough electricity for a small town.

*Photograph:*

*The plug is manoeuvred into the unloading bay*

## Agreement builds on Japan dialogue

The recent co-operation agreement signed by Sellafield Ltd and TEPCO's new Fukushima Daiichi Decontamination & Decommissioning Engineering Company (FDEC) represents an important milestone in the relationship between the UK's and Japan's nuclear industries.

That relationship began nearly 50 years ago, when the UK provided Japan's first commercial reactor at Tokaimura, and continues to this day, with spent fuel transported to the UK for reprocessing, on-going management of the reprocessing products and return shipments of Vitrified Residue (HLW) following reprocessing.

It also includes long-established agreements between the NDA and several Japanese organisations: the Nuclear Waste Management Organisation (NUMO), the Radioactive Waste Research and Funding Centre (RWMC), Japan Nuclear Fuel Limited (JNFL) and Japan Atomic Energy Authority (JAEA).

While the NDA continues to its reprocessing obligations and return HLW to Japan, a strong, new focus is support to the response to Fukushima Daiichi, with the NDA playing a pivotal role in co-ordinating the response across its Site Licence Companies and the supply chain. A formal Framework on Civil Nuclear Co-operation was signed by Prime Minister David Cameron when he visited Japan in 2012.



Specifically, the NDA has advised the Japanese Government and TEPCO on waste management and the NDA's decommissioning strategy and structure, facilitated UK companies and academics in engaging with Japan and, with assistance from SLCs, supplied technical expertise on water management and fuel retrieval.

Work is also under way to enable UK companies to assist the clean-up, with a key brokering role played by International Nuclear Services staff in Japan and UKTI supported by the British Embassy in Tokyo.

Adrian Simper, NDA Strategy and Technology Director, now sits on both the International Expert Group and the International Advisory Team of the International Research Institute for Nuclear Decommissioning (IRID), established by Japan to facilitate R&D and promote co-operation nationally and globally.

"The nuclear industry really is a close family and following the accident there has been a real willingness, both by the UK Government and all of the UK's nuclear industry to respond to calls for assistance from the Japanese on dealing with the situation at Fukushima.

"So far there has been a healthy exchange of information and ideas which are beginning to make real differences to the work being undertaken. I am sure that before long knowledge and experience will flow and back and forth and I hope that we can both continue to build on this," said Adrian.

A joint statement has also been signed by the UK and Japanese governments on climate change and energy issues. This recognised the UK's support post-Fukushima Daiichi and the need for this co-operation to continue.

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### Photograph:

*Sellafield Managing Director Tony Price and Naohiro Masuda, President of TEPCO's new Fukushima Daiichi Decontamination & Decommissioning Engineering Company (FDEC) signing the co-operation agreement with Ed Davey and Prime Minister Abe present*