

ISSUE 19 2015

INSIGHT

into nuclear decommissioning

NDA
Nuclear
Decommissioning
Authority

Tackling the UK's nuclear legacy



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Let us have your views

The NDA will launch two formal consultations early in the New Year, seeking feedback on its future approach to decommissioning:

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Front cover: The last canned fuel has been removed from Sellafield's oldest spent fuel pond, see page 13

If you have any comments, please contact the editor Deborah Ward on 01925 832280 or deborah.ward@nda.gov.uk

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- **The draft Strategy, which will be effective from April 2016.**
The Energy Act 2004 requires the NDA to update and consult on its overall strategy every five years, outlining long-term objectives through to completion of the decommissioning mission. The last edition was published in 2011.
- **The draft Business Plan 2016/19.**
This aligns with the overall strategy and contains a breakdown of proposed expenditure over the next year for each SLC, subsidiaries and other NDA-owned sites. The planned key activities at each site are also summarised briefly.

The public consultation period for both documents will run from 5 January until 15 February, when all comments will be considered before submission to the government for approval. The anticipated publication date, subject to government approval, is April 2016.

Timings for the six-week consultation phase were postponed from late 2015 to ensure the final drafts could be adjusted to take the government's spending review into account.

Under the settlement announced by Chancellor George Osborne last month, covering the period until 2020, the government will provide more than £11 billion for the NDA to continue its vital work cleaning up historic nuclear sites.

This includes making significant progress on the legacy ponds and silos at Sellafield, some of the most hazardous facilities in the UK. The NDA will also continue to secure approximately £1 billion of income each year from other sources, including reprocessing and storage of nuclear materials, bringing its overall budget to around £16 billion over the next five years.

NDA Chief Executive John Clarke welcomed the government's recognition of the vital importance of safe, secure nuclear operations and

decommissioning, as well as the need for continued investment to tackle the legacy.

He said: "Through a combination of re-phasing non-safety-critical work, opportunities to change scope through breakthroughs in innovation, driving value from our contracts and forward projections on efficiency improvements, we have been able to offer significant savings to the Treasury of around £1 billion over the next four years.

"In return, we have secured funding for that period which will enable us to continue to make broad progress across our estate. But it is nonetheless clear that we and our SLCs will need to place even greater focus on value for money in order to deliver the outcomes we require."

Major activities during 2016 will include the transfer of Sellafield Ltd into a wholly owned NDA subsidiary, completion of work on the updated Magnox Lifetime Plan (incorporating what was RSRL) following the 2014 competition, the start of defueling at Wylfa and further transports of nuclear materials from Dounreay to Sellafield.



Supply Chain Awards, pages 4-7

Event goes from strength to strength

The 2015 NDA Estate Supply Chain Event was a huge success, attracting 1,500 visitors for informal networking and presentations on decommissioning opportunities.

Businesses from across the UK and overseas were represented at Manchester's EventCity venue, with delegates from as far afield as Canada, Japan, China, Russia and the European Union.

Organised jointly by the NDA and its Site Licence Companies, a key goal is to create greater visibility of opportunities for suppliers and in particular for Small and Medium-sized Enterprises (SMEs).

Since launching five years ago, the event has become established as one of the largest nuclear decommissioning supplier days in the world. This year's event was the busiest so far.

The day was formally opened by NDA Chief Executive John Clarke, who highlighted the importance of suppliers in providing skills and innovation to support decommissioning progress, together with the estate's commitment to encourage participation from businesses at every level.

The main hall featured more than 270 exhibition stands, staffed by a wide range of technical and service suppliers, alongside information stands representing the NDA, all the SLCs, government bodies and regeneration organisations.

A central Innovation Zone, supported by the government's Innovate UK, hosted more than 40 exhibitor companies, who held demonstrations of leading-edge technologies throughout the afternoon.

Other government departments attending included:

- The Ministry of Defence, Defence Equipment and Support and Submarines Operating Centre
- UKTI, the government body working with UK businesses to promote exports
- Innovate UK, the government innovation agency
- Crown Commercial Service
- Welsh Government

Ron Gorham, the NDA's Head of Supply Chain Optimisation and SME Champion, said: "The success of our mission depends on vibrant, dynamic businesses providing solutions to the many challenges. We remain committed to working with the supply chain, from the largest to the smallest players, to improve opportunities for involvement in decommissioning."

The event is part of a series of initiatives developed over recent years to encourage and support the supply chain. These include a simplification of contract flow-down requirements, a requirement for prompt payment of sub-contractors, establishment of national and regional steering groups for Small and Medium-Sized Enterprises (SMEs), and a mentoring scheme for smaller businesses.

Photograph: NDA Chief Executive John Clarke, above, formally opened the event



Survey feedback: 97% voted the day a success



What they said:

“A ‘must attend’ day for small companies and those new to the market”

“Biggest and best of its kind in the nuclear industry”

“Proud to be involved and looking forward to 2016”

“As always, the best event of the year”



The NDA launched its 2015 R&D brochure at the event, focusing on the innovative work being carried out at decommissioning sites across the UK.

Around £85 million is invested across the estate every year to address site-specific issues, with the largest amounts directed to Sellafield. The latest publication follows last year's brochure which looked at R&D that is sponsored directly by the NDA.



Awards recognise suppliers' success

The winners of this year's prestigious NDA Estate Supply Chain Awards were announced to a packed audience.

The annual awards recognise the vital contribution of suppliers to the UK's nuclear clean-up mission and were among the highlights of the NDA Estate Supply Chain Event.

Open to suppliers of all sizes, entries were submitted in five categories including collaboration, innovation and export success.

Chair of the judging panel Ron Gorham, the NDA's Head of Supply Chain Optimisation and SME Champion, said: "Our suppliers play a critical role in delivering timely, cost-effective decommissioning

across our sites, and we are delighted to acknowledge their success. The standard of entries this year was again extremely high, particularly from SMEs who demonstrated an impressive level of innovation in their approach to challenging situations.

"These awards celebrate the commitment of our supply chain and the value they bring on a daily basis."

*Photographs:
Opposite, this year's award winners.
Below, businesses enjoy the day of networking opportunities*





1. TECHNOLOGY/INNOVATION IMPLEMENTATION with a Site Licence Company

This new award recognises both the innovation and collaboration required to take a technology/innovation through to successful deployment on a site. The award was open to all suppliers, whatever size, working collaboratively with the SLCs.

WINNER

TWI and Magnox with Fanuc Robotics: First-of-a-kind automated laser cutting of contaminated skips, developed at Hinkley Point A.

HIGHLY COMMENDED

Forth Engineering and Sellafield: adapting off-the-shelf equipment to drive hydraulic power pack in legacy pond.

INNOVATION by Small and Medium-sized Enterprise (SME)

An award specifically for smaller businesses, the innovation can be a new product/process or adaptation of technology from other non-nuclear markets, bringing benefits and savings.

WINNER (plus Highly Commended)

NSG Environmental: Novel development of a combined cement and organic matrix to recover and solidify contaminated water from Harwell's ILW storage tubes. Supported by other SMEs.

with HIGHLY COMMENDED for the project partners **Rutpen and Nochar**, and for **Stuart Watson** of Magnox.

2. BEST SUPPLY CHAIN COLLABORATION

This year, collaboration was interpreted in its widest form, open to suppliers and organisations working collaboratively in the supply chain or providing wider community benefits, or increased skills.

WINNER

PPS Electrical, Lakes College, Hilti, Arco, Edmundson Cabletech Carlisle, JTL and Sellafield Ltd: Improving the experience for students at the start of their apprenticeship journey by providing training, PPE/equipment and materials

HIGHLY COMMENDED

Four awards were made this category.

Supply Chain Quality Event Review Team (SC QERT):

Led by Interserve to develop the mechanics for sharing and communicating Learning from Experience (LFE) between Sellafield Ltd and the supply chain. Members include Amec Foster Wheeler, Ansaldo NES, Arup, Atkins, Balfour Beatty, Carillion, Cavendish Nuclear, Costain, AMA, Sir Robert McAlpine, Urenco, Morgan Sindall, M+W Group, Nuvia, GE Group, Magnox Ltd and Sellafield Ltd.

Britain's Energy Coast Business Cluster: Encouraging collaboration, partnership and co-operation between its 250-plus members.

Innovus: The University of Manchester and National Nuclear Laboratory working with SMEs to develop their innovations for commercial applications.

Gen2: Long-term collaboration with Sellafield Ltd providing cost-effective training solutions



“Our suppliers play a critical role in delivering timely, cost-effective decommissioning across our sites, and we are delighted to acknowledge their success. The standard of entries this year was again extremely high, particularly from SMEs who demonstrated an impressive level of innovation in their approach to challenging situations.”

Ron Gorham, NDA's Head of Supply Chain Optimisation and SME Champion



EXPORT AWARD

A new award for 2015, created in conjunction with UKTI, for companies who have successfully exported overseas from concepts, products and services originally conceived or implemented in the NDA estate.

WINNER

React Engineering and Createc: Their unique N-Visage™ Gamma Imaging System provided analysis and consultancy support to inform future clean-up activities at Fukushima.

MINISTER'S SME AWARD

Sponsored this year by Lord Bourne, Parliamentary Under Secretary of State for Energy and Climate Change, the Minister's Award recognises the great value, flexibility and innovation that SMEs bring to the mission.

WINNER

Oxford Technologies: Design and manufacture of the Shaft Intervention Platform for the Dounreay shaft.



Photographs:

1. The NDA's Head of Technology Melanie Brownridge with Andrew New from Magnox (left) and TWI's Ali Khan, winners of the innovation implementation award
2. SME innovation award winners, from the left, Jonathan Cox from NSG, RWM's Marc Rigby, Helen Perthen from Magnox, the NDA's Chief Financial Officer David Batters, Dave Wheeler from Rutpen and Stuart Watson from Magnox
3. Admiral Mike Wareham with Lee Savage of PPS, representing collaboration winners PPS Electrical, Lakes College, Hilti, Arco, Edmundson Cabletech Carlisle, JTL and Sellafield
4. INS Managing Director Mark Jervis with React and Createc's Pete Woolaghan
5. NDA Chief Executive John Clarke with Stephen Sanders from Oxford Technologies

View from a small business

In business, small can be beautiful

FIRMA was launched in 2013 by three engineers experienced in aerospace, defence and the renewables industries, plus R&D projects.



Gaining a foothold in the nuclear market can seem like a formidable hurdle for suppliers, particularly smaller businesses. One new entrant explores the challenges.

By Lee Chapman, of
FIRMA Engineering Ltd,
Doncaster

For us, there seemed to be obvious synergies with nuclear decommissioning, a highly regulated industry that requires innovation, accountability and robust approach to quality. The nuclear sector has a reputation for being difficult to break into and we were prepared for an uphill struggle.

What we learnt is that while some barriers are valid to ensure the necessary technical output, some are perceived rather than real, often revolving around guarded attitudes from the industry towards new entrants. This, while initially slightly frustrating, is not restricted to nuclear – most large sectors have their own barriers, but what's interesting is how they are dealt with.

We attended our first NDA Supply Chain Event in 2013: daunting for a start-up micro-SME like us and while the reception was friendly, we did recognise elements of a slightly closed culture.

Recognising the potential difficulties, we focused on our strengths: capability to understand and deliver; skills, qualifications and track record. Fortunately, we soon learnt that the NDA was open-minded and supportive of new entrants.

Our break came when we were asked to represent new entrants on the 'NDA SME Steering Group Committee'. This enabled us to give feedback on our challenge and explore a more productive approach, while gaining insight into commercial mechanisms and culture.

Our initial commercial engagement began in March 2015, prompted by our marketing campaign. We were invited to contribute to designing a machine to sort, segregate, consolidate and condition waste material at Sellafield's First Generation Magnox Storage Pond (FGMSP).

This is a priority project, raising the stakes for us to exceed expectations, and providing a great platform to showcase our professionalism.

We drew on a wide range of skills to deliver a solid CAD model, detailing fabricated parts and assemblies. All this was complemented by auditable documentation to support certification of the machine in line with Sellafield requirements.

We found the path sometimes less than straightforward. Participating in a multi-tier supply chain created challenges to align the potential solutions for all parties, ensuring they were practical and realistic. We were also keen to keep an eye on costs which meant keeping things simple wherever possible.

We found that SMEs, particularly smaller ones, can offer benefits that, to be fair to supply chain managers in the industry, are not always obvious. Reductions in project cost and delivery time are often achieved by removing wasteful overheads, eg, duplicated project management which is usually well catered for by senior (usually Tier 2) supply chain partners. This frees up smaller SMEs to concentrate on their technical solution.

We estimate the annual cost per engineer in a large organisation may actually be twice the advertised salary when equipment, software, administration, benefits, etc. are taken into account. This provides food for thought compared to the costs of a micro-SME used for specialist tasks on an ad-hoc basis, and should encourage us to acknowledge our strengths.

Another point is that the micro-SME is playing a high-stake game - we don't have the luxury of not meeting expectations.

Finally, a message the NDA has been keen to support is that of the requirement for innovation in nuclear. It is accepted that SMEs can bring genuine innovation and hopefully this will be acknowledged as micro-SME contributions are celebrated at events such as the NDA Supply Chain Awards.



Reactors emptied of fuel

Oldbury power station has removed the last fuel from its reactors, marking the end of an era for the site.

More than 52,000 fuel elements were removed from the reactors during defuelling, and the final element was removed from reactor two in October.

Keri James, Oldbury's Defuelling Manager, said: "I am proud to be part of the team that removed the final fuel from these reactors. The work doesn't end here though; we still need to ship the fuel to Sellafield. Once the fuel has all been sent off site, we will have removed about 99 per cent of the site's radioactivity."

The final fuel is due to leave the site in the New Year. Once all the fuel is shipped, Oldbury will move into its decommissioning phase, which will bring a new set of challenges.

Oldbury's reactor one began generating electricity in 1968, and shut down in 2012. At the start of defuelling each reactor held a total of 25,826 43-inch long fuel elements, which, if placed end to end, would stretch 17.5 miles.

All eyes now turn to Wylfa on Anglesey as it becomes the final operating Magnox reactor. It is due to cease generation later this year and will begin its own programme of defuelling in 2016.

*Photograph:
Fuel flasks at Oldbury*



Reactors ready to brave the elements

The project to weatherproof Bradwell's reactor buildings reached a new milestone with the installation of top-sheet cladding on both reactor roofs. This marks a major step towards completion of the biggest physical overhaul at the site since its construction.

Work began in 2012 to remove the old glass and metal panels that had protected the reactors for more than half a century. The new aluminium cladding is designed to provide protection for the reactor buildings during its closure state.

The focus continues, meanwhile on installing liner sheet at the west face of reactor one, while cladding on the remaining circulator halls progresses.

The project, which has required a team of 140-180 people per day, is on schedule to be complete

by March 2016. Over the next few months, work will begin on removing the last of the scaffolding and the two giant tower cranes

Ken Murphy, Plant and Structures Programme Delivery Manager, said: "Completion will see working-at-height activities significantly lowered at the site, and as such will dramatically reduce one of the biggest risks we face."

*Photographs:
Top and right, the roof
cladding is almost complete.*



Contractors:
Kalzip and Vinci

Silence falls on the main controls

The central control room at Magnox's Dungeness A Site is now silent for the first time in more than half a century.

Home to an array of switches, buttons and dials that controlled the former power station, the facility has been at the centre of site operations 24 hours a day since generation began in 1965.

Chas Parr, who worked there, said: "There has been lots of change since we ceased generation in 2006, but this is a very practical sign that the site has moved on. A number of us have spent many years working in the control room, so it's going to be strange knowing it is empty, unoccupied and no longer a workplace or home."

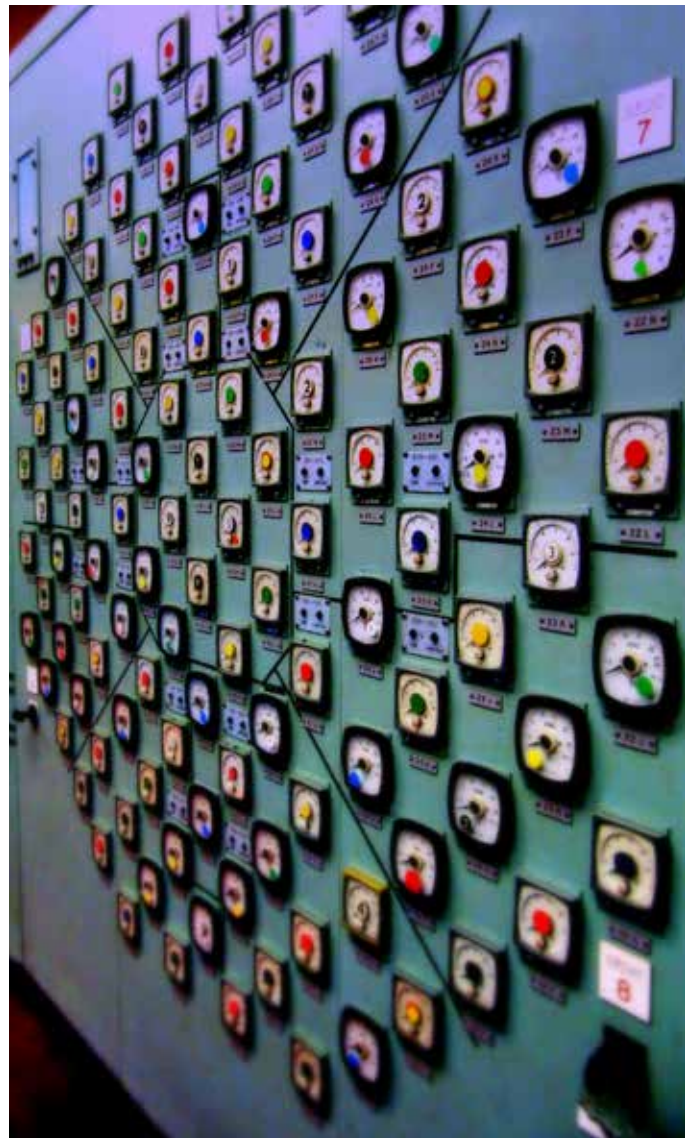
The move follows confirmation three years ago that all nuclear fuel had been removed – representing 99 per cent of the site's radioactive hazard – as well as further work to demolish and remove redundant buildings.

Closure Director, Paul Wilkinson, added: "It has been a big year for visible changes at Dungeness. As we move towards closure. Earlier in 2015 we completed removal of the turbine hall and, while demanning a control room might not appear on the same scale, it's

another huge cultural shift from a site that produced electricity."

With the control room retired from service, alternative arrangements more appropriate for a project-driven site have been put in place. This will see shift staff work from other areas of the site with the flexibility to move around and respond to the changing demands of decommissioning.

*Photographs:
The central hub for site operations, right and below, has now been closed.*



spotlight on Sellafield



Photograph: Sellafield's PFPS team

Fuel removal firmly in the can

One of the biggest tasks in the Sellafield clean-up is now half-way to completion after workers removed the last ‘canned fuel’ from the site’s oldest nuclear fuel pond.

The milestone brings a 50 per cent reduction in radioactivity levels at the Pile Fuel Storage Pond (PFSP).

The PFSP is a relic from the Cold War when Sellafield produced material for the UK’s nuclear deterrent and one of four high hazard site facilities prioritised for clean-up.

The ‘canned fuel’ - 191 stainless steel cans containing fuel pins, pellets and cladding waste from the Windscale Advanced Gas-cooled Reactor – was transferred to a modern handling plant operated by the National Nuclear Laboratory (NNL).

Many years of improvements were needed to the pond building before it was able to withstand retrieval operations. All the contents must be removed before it can be drained and demolished.

Sellafield Managing Director Paul Foster said: “This is a fantastic example of how closer collaboration with our colleagues in Government, the NDA, our regulators and NNL is delivering fit-for-purpose solutions to the accelerated clean-up of the site.”

Pete Lutwyche, the NDA’s Sellafield Programme Director added: “I feel fortunate to be able to see first-hand the excellent progress being made and



the tremendous teamwork and expertise required to deliver it.”

Meanwhile, among other items recently retrieved from the pond are the largest pieces of redundant equipment, two Magnox fuel decanning machines each weighing 6.5 tonnes. The machines were used to shave off the outer cladding from fuel elements.

Removal required months of planning and deployment, by a specialist contractor, of an underwater diamond wire saw to cut the decanners in two before they were carefully lifted out. The decanners were then washed, scraped and bagged before being lowered into a container, with the intention that decontamination

techniques will enable them to be disposed of as Low Level Waste. Work is now being carried out to remove the remaining pond contents, including ‘metal fuel’, which is expected to be cleared by next April.

Once achieved, more than 70 per cent of the pond’s radioactivity will have been removed. Attention will then switch to the other wastes, including the sludge on the pond floor.

The date for pond draining has been brought forward by 21 years since the first estimate was made in 2011, and £700 million saved from the original cost forecast.

Photograph: The last of the canned fuel has been removed

FACTFILE

- PFSP was built in the 1940s
- World’s largest open-air spent fuel pond
- Initially received irradiated fuel from the Windscale Piles, supporting plutonium production
- Subsequently took spent fuel from the Magnox reactors at Calder Hall
- Contains 1,000 different wastes, including fuel, skips, redundant equipment and radioactive sludge.

See next page for how a new collaborative forum, G6, is helping with risk and hazard reduction.

Contractor:
NNL

G6 Strategic Forum

Partners find a shared approach delivers the results



Closer working between key organisations responsible for activities at Sellafield is enabling risks and hazards to be tackled more effectively.

A collaborative group, informally known as G6, comprises Sellafield Ltd, the NDA, the Office for Nuclear Regulation (ONR), Environment Agency, Department for Energy and Climate Change and Shareholder Executive.

Historically, the six organisations have worked with the site separately, each responsible for scrutinising and reporting on different activities. All agreed that a new approach was needed to help deliver better results, and G6 was set up with the common purpose of accelerating hazard and risk reduction.

The six organisations hold a senior-level Strategic Forum to address issues

that may impact risk and hazard reduction, while a separate monthly forum called the Engine Room manages issues at a more detailed level.

Early wins for the group include its contribution to removing radioactive sludge from one of Europe's most hazardous nuclear plants, the First Generation Magnox Storage Pond (FGMSP), in March 2015.

Andy Lindley, Director of ONR's Sellafield Programme, said: "G6 works collaboratively to remove blockers. We have frank and open conversations to find fit-for-purpose solutions to obstacles.

"It's about identifying how we can do things safely and securely but maybe differently: challenging the way things are and then doing things better."

Another major waste retrievals project now under way is at the historic Magnox Swarf Storage Silo (MSSS) - one of the site's largest hazards.

Mr Lindley said: "The installation of the Silo Emptying Plant (SEP) machine has commenced and after commissioning, waste retrievals will begin.

"We fully understand that the installation and commissioning of the SEP is a complex operation in itself that will carry a level of risk. This is unavoidable to ensure that the longer-term risk is reduced as low as reasonably practicable and ultimately the waste recovered.

"Extensive work has been undertaken by ONR and other stakeholders to identify and evaluate the risks associated with the installation of the SEP machines.

"We are satisfied that arrangements for undertaking the work and the preparations in place to mitigate the risks are adequate."

Among other projects where the G6 approach has produced tangible benefits is the current Pile Fuel Storage pond work.

Photograph: Speakers at a summer G6 conference held at Sellafield were (from the left) Richard Westlake of DECC, Sellafield Ltd Managing Director Paul Foster, Andy Lindley of ONR, the NDA's Alyson Armett, Nathan Phillips from the Shareholder Executive, and the EA's Steve Hardy.

Robots set the pace on lab work

Robots are being used to empty and demolish an old Sellafield lab that helped power cardiac pacemakers in the 1970s.

In the early days of pacemaker technology, when short battery life was a problem, early nuclear scientists found plutonium-238 could power a device for 20 years.

Lab 188c, one of the legacy buildings being decommissioned, produced the radioactive isotope for the Department of Health from 1974-78. At the time, it was one of Sellafield's most significant contributions to modern science.

Plutonium-238, which does not occur in nature, emits a constant level of heat for decades and is still used by NASA as a primary fuel source for deep space missions that cannot rely on solar energy.

At the contaminated Lab 188c, a new robotic 'raptor' arm is helping to remove nuclear waste without any direct human intervention.

Mark Pennington, Project Manager, said: "We sometimes forget how much of the pioneering work at Sellafield during its early years supported peaceful uses and created health benefits. Some are aware that the site provided isotopes for cancer treatment

but it may come as a surprise to many that early pacemakers were powered by our plutonium."

"There are literally hundreds of different nuclear fuels and waste types in the historic storage ponds at Sellafield, including cobalt isotope cartridges produced for a wide range of medical purposes, such as lifesaving radiotherapy treatment and the sterilization of medical supplies."

Some pacemakers went on to last more than 25 years, a feat that traditionally powered devices could not match. There are still people in the US who have nuclear-powered pacemakers which must eventually be removed so the plutonium can be safely recovered and disposed of, like any other nuclear material.

The most well-known medical uses of radiation are x-rays, scans, radiotherapy for the treatment of serious diseases, sterilisation of medical supplies and medical waste.



Photograph:
Robots are emptying the lab

Magnox Swarf Storage Silo



*Photograph:
New research has the potential to change waste treatment not just at the Magnox Swarf Storage Silo (right) but elsewhere in the nuclear industry as well.*

Research breakthrough set to transform waste treatment

A breakthrough in the management of nuclear waste is set to accelerate progress at Sellafield and save hundreds of millions of pounds.

Scientists studying Intermediate Level Waste (ILW) in the historic Magnox Swarf Storage Silo have unearthed previously unknown information about the material's long-term behaviour.

The discovery points the way to a radically simplified approach to ILW packaging and disposal that will see significant reductions in the timescales and costs – not just at Sellafield but at other redundant nuclear facilities in the UK and around the world.

The research focused on the chemical behaviours of ILW stored in the MSSS. Previously, a 22-step mechanical treatment and encapsulation process was thought necessary to manage and ultimately dispose of ILW stored in the silos.

But the findings suggests that theory could be swept away and replaced with a three-step solution which stores the waste 'raw' with concrete grout inside a shielded container. Switching to this new method could speed up MSSS decommissioning by several years and provide huge savings to the taxpayer. The technique could also be applied to other redundant nuclear facilities in the UK and around the world.

Dr Adrian Simper, the NDA's Strategy and Technology Director, said: "This research has delivered the underpinning to what could be a paradigm shift in the management of nuclear waste. Having a greater understanding of the long-term behaviour of this material allows us

to design a truly fit-for-purpose approach to its management and disposal.

"To be able to deliver a technical solution to historic ILW at Sellafield, which not only offers a safe, secure route but also opens up the possibility of a quicker and cheaper alternative to current technology, is a genuinely exciting development."

The four-year study was led by the NDA, Sellafield Ltd and the National Nuclear Laboratory, with academics from the universities of Bristol, Leeds and London South Bank. It focused on the corrosion behaviours of magnesium and uranium and shed new light on the hazards posed by the materials to people and the environment in the long term.

As a result, scientists now believe a safe and secure waste package can be produced using a far more straightforward approach. The waste package would be suitable for interim storage at Sellafield and then, once grouted, for final disposal in a UK geological disposal facility.

An added benefit of the alternative approach is the reduction in 'secondary wastes' created during the treatment phase, producing an estimated 10 per cent fewer waste packages during the decommissioning of MSSS.

Massive tunnel squeezes in

Meanwhile, a massive 50-tonne ‘transfer tunnel’ has arrived and been hoisted into place in the MSSS building.



Contractor:
Ansaldo NES

The tunnel is the main component of the first Silo Emptying Plant (SEP), one of three 360-tonne machines which will scoop out the highly radioactive contents.

The 1960s silo contains waste from the early days of the nuclear industry and is one of the NDA’s four highest priority decommissioning jobs, all at Sellafield.

The silo is now well beyond its operational life and its hazardous contents must be removed for storage in more modern facilities. Installing such a large piece of kit into a 50-year-old building is a logistical challenge.

The metal structure, manufactured in the West Midlands, first had to be transferred to a warehouse about two miles from Sellafield, then transported at walking pace on a flat-bed truck.

It was then hoisted up into the silo building through a gap with only 40mm clearance at either side, and secured in place.

Attention will now turn to delivering the remaining components of the SEP machine so it can be assembled in situ before retrieving waste. Retrievals are currently scheduled to start in 2018. Production of the two remaining SEP machines is still ongoing.

The start of waste retrievals will mark the beginning of approximately two decades of work.

Chris Halliwell, Head of the site’s MSSS programme, said: “It is fantastic to see the installation of the first part of the first machine that is going to get the waste out so that we can make this building far safer.

“This is one of the nuclear industry’s most complicated engineering challenges being addressed before our very eyes.”

Photograph:
The tunnel was transported at walking pace

MSSS FACTS

- Swarf is the metallic debris produced by removing the outer cladding from spent Magnox fuel, which is then sent for reprocessing.
- The MSSS became operational in 1964, storing the swarf waste under water, along with other items of intermediate level waste.
- Six wet silos were initially built and the facility was extended on three further occasions to cater for the increased storage demands; by 1983, 22 silos had been established.

spotlight on Dounreay



NDA Asset Transfer Scheme

The NDA's database contains assets such as vehicles, trailers, cranes, boilers, radiation detectors and much more, all available to SLCs free of charge. The only cost to the SLC is transport.

Fire engine swaps sites

Dounreay has acquired a third fire engine thanks to the NDA's online Asset Register that enables redundant equipment to be re-used and recycled.

Since Sizewell completed defueling, its fire team has been disbanded and was looking to re-home the site's firefighting equipment.

They put the equipment onto the NDA's Asset Register, effectively advertising its availability to other SLCs. Dounreay was looking for a third fire engine to ensure that at least two are available at all times, to comply with a requirement from the ONR Inspector for Fire Safety.

The fire engine arrived from Suffolk on the back of a Stevens lorry, and was formally handed over to DSRL by Sizewell's former fire team leader Mark Thurston.

NDA Contract Manager John Lawes said: "This is another example of the savings in cost and schedule that can be made from using the Asset Register and we encourage DSRL's project teams to check it regularly."

DSRL's Fire Chief Colin Mackay plans to use the fire engine for at least the next decade.

DSRL is in discussion with Sizewell about other items on the register.



Calder's expertise at the core of design work

Senior design engineer Calder Bain has more than 50 years knowledge of the Dounreay site and is now using his expertise to help build a range of unique devices that can probe the depths of the redundant Prototype Fast Reactor (PFR).

Calder, who started his apprenticeship in the 1960s and worked on the site before the PFR was built, is part of the site's in-house design team responsible for safely dismantling the reactor.

Together they have donned their thinking caps and pondered the unique challenges they face.

Calder Bain said: "A considerable amount of innovation was required to build the Prototype Fast Reactor and there will be a continual requirement for pioneering methods to take a reactor of this complexity apart. This type of work

gives both our young and experienced engineers the opportunity to put their innovative skills and knowledge into practice."

The team has developed a series of robotic tools which will allow the removal of hundreds of components from the reactor vessel. A total of eight multi-purpose grabbing, cutting, slicing and lifting tools are being designed and tested to pull out the core of the redundant fast reactor.

All the tools have in-built cameras fitted and are designed to operate within an extremely hazardous

environment to allow safe remote operation, including plunging over 10 metres into the centre of the core to cut and remove components.

Calder is sharing his knowledge with a team of DSRL engineers to pass on his expertise to a new generation of design professionals who will be taking the reactor apart when the time comes.

He added: "These engineers are demonstrating huge potential and will be at the forefront of the final stages of the PFR reactor dismantling programme."

Ken Heider, Project Director for reactors, said: "The reactor dismantling project is critical to the decommissioning of PFR. We need to use lateral thinking and unique ideas to design and build the necessary equipment to safely take apart the plant and remove the reactor vessel. The design of purpose-built equipment like this is a credit to all DSRL staff and contractors involved."

*Photograph:
Senior Design Engineer
Calder Bain*

Scheme to help young workers of the future

Young people in the north Highlands will be helped to get their careers off to a flying start, thanks to a Scottish Government and NDA-funded scheme that brings employers and schools closer together.

The initiative, Developing the Young Workforce (DtYF), will take a new approach to resolving the region's ongoing problems of youth employment and shortage of skilled workers. The aim is to involve companies with schools

and the local college to ensure young people develop the skills and attitudes required for work - long before they start to seek employment.

DtYF will be managed by Caithness Chamber of Commerce who will establish a regional industry-led group as the single point of contact in facilitating engagement between employers, schools and colleges. Launching the scheme, Annabelle Ewing,

Scottish Government Minister for Youth and Women's Employment, said the North Highlands programme would help support young women and men into sustainable, rewarding jobs while helping to resolve youth unemployment.

Funding for three years has been granted by Scottish Government and the NDA, after which the scheme will continue to be funded through other sources.

David Vineall, NDA Human Resources Director, said: "There will be good opportunities at Dounreay and in its supply chain companies for a number of years as the decommissioning programme continues. I hope this new approach will focus attention on decommissioning as a good career choice, as well as highlighting opportunities in other industries in the Highlands."

Low Level Waste Repository



Contractor:
Forth Engineering, Hardall International and Portasilo

Revamp cements new lease of life for plant

Refurbishment work has been completed on the most recognisable building at LLW Repository Ltd following an £1.8 million upgrade.

The Direct Grouting Facility, first commissioned in 1995, will re-open for grouting before Christmas, after operations ceased last December.

Unreliable, obsolete and redundant equipment, including electrical systems, control system panels, valves, pipework and tanks are being refurbished, replaced or removed entirely. A chute is also being installed down the height of the DGF, which will reduce manual handling of waste grout down stairways.

“All of this work should lead to improved reliability and safer operations,” said Operations Manager Neil Taylor.

The Grout Plant plays a vital role in the life of the site. A cement-based grout is introduced to containers in

the DGF, ensuring minimal voids in the waste, before disposal in a vault.

But gone are the days of processing more than 700 containers per year. Huge benefits are arising through educating customers to use more sustainable waste management options rather than dispose of LLW at the repository.

Three years ago, over 300 containers annually were still being disposed of at LLWR. By 2014/15, it had fallen to 193. The downward trend is set to continue this year, preserving valuable capacity at the repository.

*Photograph:
The Direct Grouting Facility was set to re-open by Christmas*

Green light for future disposals

A vital environmental permit has been granted that enables many more decades of disposing material to the Low Level Waste Repository (LLWR).

The Environment Agency's decision follows seven years of work to demonstrate that every aspect of the UK facility, near Drigg, Cumbria, can continue to be operated safely.

Dennis Thompson, LLWR Managing Director, welcomed the EA's endorsement: "So much hard work has gone into this great news, and I would like to thank all who played a part in achieving this outcome. Obtaining a permit for disposal is a major milestone for the company."

Some of the many issues comprehensively examined in LLWR's Environmental Safety Case (ESC) included geology, hydrogeology, waste characterisation, waste processing, engineering of the waste vaults, potential radiological impacts, coastal erosion and engagement with stakeholders.

An earlier permit granted in 2006 allowed for disposal at Vault 8, but left Vault 9, completed in 2010, with permission only for storage, together with any future vaults.

With approval of the ESC secured, a planning application has now been submitted to Cumbria County Council, seeking to enable the phased construction of two new vaults (10 and 11) plus an extension, 9a. LLW would be disposed of in specially grouted containers.

Both permits are required for disposal to continue in the long term. LLWR hopes eventually to construct up to 14 vaults, to accommodate all the decommissioning waste forecast to arise over the decades ahead.

If the application to Cumbria County Council is successful, site preparation could start in 2016. The application would also allow higher stacking of containers in vault 8 and disposal of containers in vault 9, currently only approved for storage.

In addition, it would permit the construction of a final cap over existing and new vaults, plus seven landfill-style trenches where



waste was disposed of before the first vault became operational.

LLWR opened in 1957 on the site of a former Royal Ordnance factory site and provides an essential UK service for disposing of solid LLW from all NDA sites as well as other industries that produce radioactive waste.

Back then, disposal of LLW was based on landfill practices, with waste tipped into clay-based trenches and covered with stone and soil layers.

Today the trenches are covered by a water-resistant cap and a soil layer, then planted with grass and shrubs in keeping with the surrounding environment.

Disposal practices have also changed dramatically, with far more emphasis on sustainable waste management, such as prevention, metal recycling, super-compaction, incineration and using specially licensed landfill sites to take material with very low levels of radioactivity.

Photograph:

Above, higher stacking of containers could be permitted

FACTFILE

- A vast amount of work went into the Environmental Safety Case (ESC) that supported LLWR's application to vary its permit.
- The ESC, submitted in 2011, comprised 2,000 pages, made up of 17 reports and a non-technical summary.
- A further 10,000 pages went into 100 underpinning reports and over 80 technical experts were involved in the process.
- LLWR then went on to work with the EA during its review of the ESC and responded to a range of formal questions from the Agency.
- The Environmental Permit was submitted in 2013 and involved the production of a further two reports.

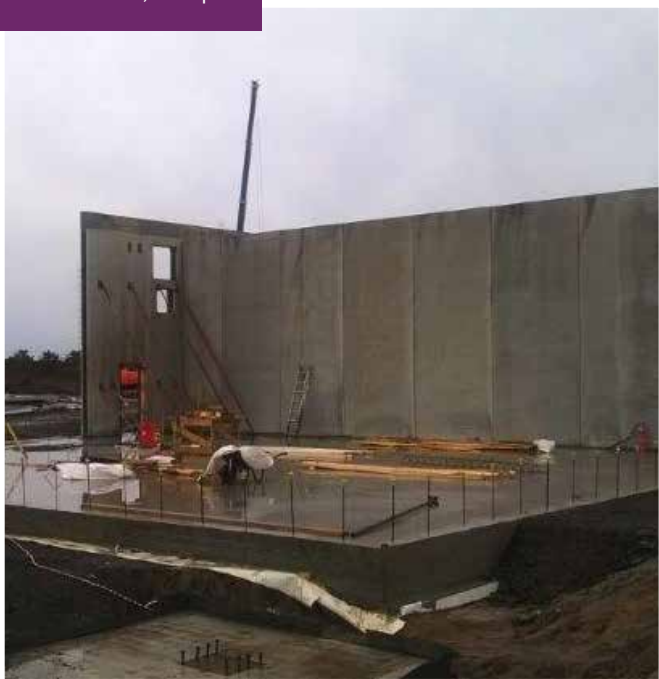
New NDA Archive

FROM CAITHNESS TO THE WORLD E CATHENESIA AD MVNDVM

This NDA Archives strapline was originally inscribed in Latin on a stone sculpture commissioned in 1966 to commemorate the opening of Dounreay's Prototype Fast Reactor (PFR). The stone will be relocated to the NDA Archive.



Contractors:
Morrison Construction,
Reiach and Hall, Arup



Archive building takes shape

The floors and walls of the new NDA Archive building in Wick have taken shape as construction work continues at the site near Wick airport in northern Scotland.

The former World War II airfield site has already thrown up interesting construction challenges, including the surprise discovery of a large sub-surface concrete slab, which hadn't shown up in old plans or preparatory ground investigations.

The first piece of turf for the Archive was cut in summer, marked by an event for local stakeholders. Ground works and drainage works are now complete, while the erection of steelwork and construction of the entranceway started in November.

A huge volume of records from across the nuclear industry, some dating back 70 years, will eventually be held at the facility. They will be available for study, research and supporting the decommissioning mission, for example by storing waste records. Much of the archive material will be in digital format as well as paper and other documents.

The Archive will include material from hundreds of thousands of boxes that have accumulated over the decades at Sellafield, Dounreay, Magnox sites, Harwell, Winfrith and other nuclear facilities

that are scheduled for eventual demolition. Large quantities of additional material, meanwhile, are also held at off-site commercial storage locations.

A 'sift and lift' process is currently under way across the estate to retrieve and examine stored records in detail before transfer, where appropriate, to the archive.

The Archive will also provide a new home for a local collection, the Caithness Archive, which contains local records dating back to the 15th century and has outgrown its current location.

Wick was selected for the £20 million national facility as part of the NDA's commitment to help support local economies in areas affected by the closure of NDA sites.

As the owner of decommissioning sites, the NDA is responsible for all relevant nuclear records, which must be preserved and made available in line with legislation on public information.

*Images:
Left, the construction phase will deliver a striking Archive building, top.*

Keeping information safe

The Archive is one part of a wider NDA programme, the Information Governance Programme (IGP), which aims to ensure consistent, effective management of all kinds of information, knowledge and the professional expertise within the estate.

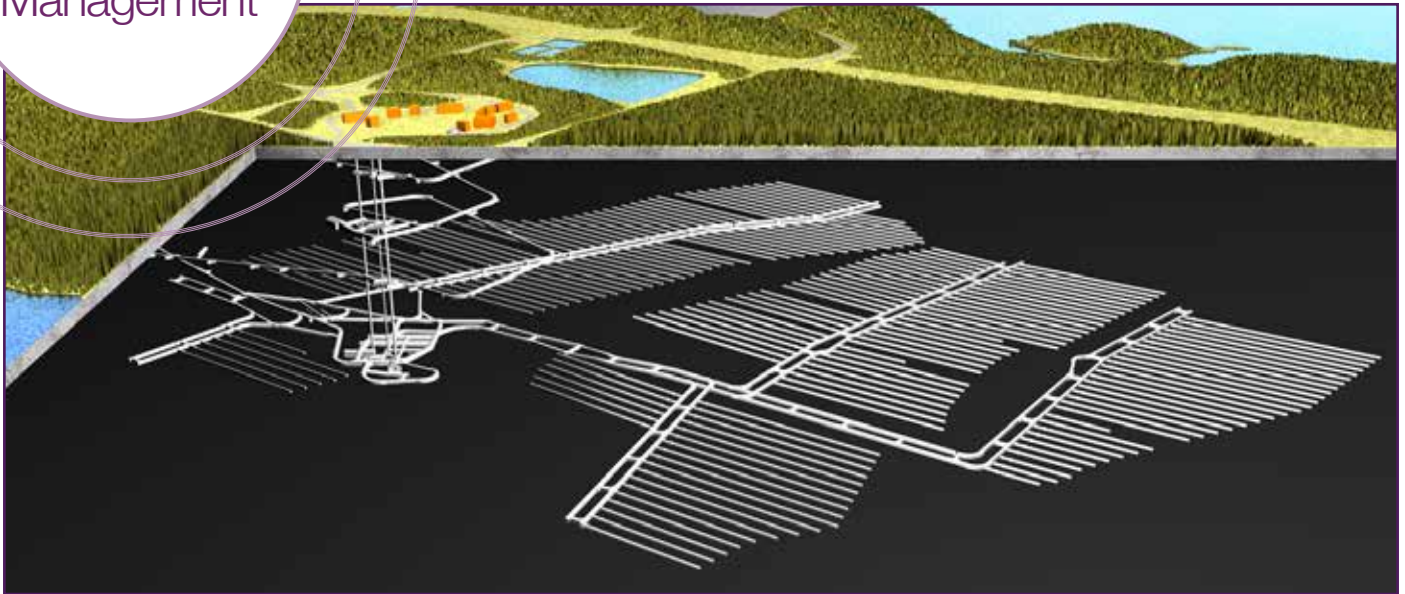
The principle aims of the IGP are:

- Safeguarding of sensitive material.
- Effective management (and/or destruction) of records.
- Sharing knowledge to support decommissioning.
- Ensuring access to knowledge and information.
- Agreement on systems for managing information in both hard-copy and digital format.

All SLCs, subsidiaries, relevant government departments and the nuclear regulators are involved in the programme.

Simon Tucker, the NDA's Head of Information Governance and Managing Director of NDA Archives Ltd, said: "It is vitally important to preserve the records and information that we hold, as well as to capture the expertise that our staff have collectively built up over the years. The Archive is part of this wider programme.

"Interestingly, when the construction team came across the concrete slab, they initially wondered if it might have been the footings of an old air raid shelter but eventually concluded it was probably associated with the electrical infrastructure. Full investigations had to be carried out before it was filled in before work could continue, but this demonstrates the value of historic records - which were incomplete in this case."



Geological disposal in Europe takes a major step forward

The Finnish government's announcement that construction work can start on a repository for spent nuclear fuel marks a major step towards geological disposal of higher activity radioactive waste.

Natalyn Ala, Geological Disposal Facility Siting Director at Radioactive Waste Management, sets recent international announcements in the context of UK developments.

Radioactive Waste Management's counterpart in Finland, Posiva Oy, expects that the facility at Olkiluoto, in the west of the country, will begin operations in 2023. The Finnish facility is due to be the first repository for high level waste in the world

Just days after this announcement, the Swedish Radiation Safety Authority (SSM) formally accepted the recommendation by SKB, the country's radioactive waste management company, that the best site for a geological disposal facility (GDF) would be Forsmark on the east coast of the country.

Like other countries, including the UK, the approach in both Finland and Sweden is based on working in partnership with local communities in order to find a location. Forsmark in Sweden was put forward by local leaders as a candidate for the underground disposal facility in 2002, with 77% local support. The selection process included several other candidate sites.

These two developments illustrate the progress being made on geological disposal in Europe.

It is sometimes assumed that the issue of radioactive waste disposal is something unique to this country, and that geological disposal is specifically a UK choice. Yet many countries with nuclear facilities have chosen geological disposal as the preferred method for addressing this challenge. And most – including Finland, Sweden and Switzerland – are working with local communities who have volunteered to host the facilities.

In the UK, RWM's public consultation on the National Geological Screening Guidance came to a close on 4 December. Once feedback has been analysed, final Guidance will be issued early next year. The outputs produced from the application of the Guidance are due to be published by the end of 2016, ready for the start of discussions with communities from 2017.

Geological disposal programmes are very long-term activities. The announcements in Finland and Sweden mark significant steps forward. The UK, too, is moving forward in its programme to deliver a permanent disposal solution for the country's higher activity radioactive waste.

*Image:
The planned GDF at Olkiluoto
in Finland.
Image courtesy of Posiva Oy*