

Cleaning up Sellafield

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Annual review 2017/18

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Scan the QR code to watch our video

What is Sellafield?

A waste site? A nuclear power station? Look again. Environmental remediation has gone nuclear.

This is Sellafield.

The Sellafield site in West Cumbria is one of the most complex and hazardous nuclear sites in the world.

States and

What is Sellafield?

Sellafield has served the UK for more than 70 years.

The home of world firsts

It started with a single mission in 1947; the production of plutonium for Britain's nuclear deterrent. As the nation's priorities shifted, the site's evolution included the pioneering of nuclear power generation, commercial reprocessing, decommissioning and nuclear material and waste management.

The result today is a site that represents one of the biggest environmental remediation challenges in Europe. It covers two-square miles and is home to more than 200 nuclear facilities and more than 1,000 buildings.

As commercial reprocessing comes to an end our focus is shifting to the accelerated clean-up of the site.

Making Sellafield safer, sooner.

Ale we?

Hundreds of years of combined knowledge, science and research are coming together to make Sellafield safer sooner.

Owned by the Nuclear Decommissioning Authority, we spend £2 billion every year but are a non-profit organisation. We are working with our supply chain partners, academia and research institutes to clean up Sellafield, one of the most complex environmental remediation challenges in the world.

Our purpose is to clean up Sellafield.

Our mission is to be a world leader in solving complex nuclear challenges.

Our vision is to safely and securely remediate the Sellafield site to benefit the industry, nation and region.



What do we focus on?

Safe, secure site stewardship

We spend more than £2 billion every year at Sellafield but are a non-profit organisation. That means that we put safety and security first. That includes everything from the safety of our employees and care for the environment through to the secure management of nuclear materials. It underpins every decision we make.

Demonstrable progress

Sellafield is home to the oldest nuclear facilities in the UK. We're focusing our efforts on accelerating the safe and secure clean-up of our legacy facilities. We are also demonstrating our progress through the completion of both the Thorp and Magnox reprocessing programmes.

Return on investment

Today the NDA invests nearly two-thirds (61%) of its annual £3.3 billion budget to fund our work at Sellafield. We'll ensure that we continue to demonstrate value for money through the delivery of our mission, best positioning both the site and its people for the future.

What are our values?

Safety and security

Safety and security are at the heart of all we do as we move to be an environmental remediation company.

Ambition

We work collaboratively and consider how we can improve at every opportunity.

Integrity

We do the right things and are open and honest.

Inclusion

We respect and include the individual and create an environment in which people grow, develop and perform at their best.





We're carrying out the environmental clean-up of the most complex and hazardous nuclear site in the UK.

The decommissioning of the Sellafield site will take over 100 years.

As reprocessing comes to an end, so our focus is shifting to high hazard retrievals, risk reduction, broader decommissioning activities and remediation.

We're working to clean up the site as quickly as possible but won't jeopardise our duty of care by working in haste.



We recycle and store used nuclear fuel.

As specialists in spent fuel management, Sellafield receives, treats, recycles, and packages all levels of nuclear waste.

Our new facilities will safely store nuclear fuel for EDF Energy.

We return any waste that arises from our overseas customers to the country of origin.

We're guarding the UK's special nuclear materials.

Sellafield was a pioneer in the development of the nuclear industry in the UK.

Now, as global experts in the safeguarding of special nuclear materials, our priority is the safe and secure stewardship of our country's stores of special nuclear materials.



We're global experts in nuclear waste management.

As our mission to clean up our legacy buildings progresses, we're building modern waste retrieval, processing and storage facilities to look after the resulting nuclear fuel and waste.

We are making Sellafield safer sooner

How are we doing it?

We have plans in place for the clean up of Sellafield but are always looking for a better way

Delivering with speed, not haste

At Sellafield Ltd we use, process, move, retrieve and store nuclear fuels, materials and sludge on a dayto-day basis. We treat these materials with respect and due care, for the safety of our employees, our community and our environment. We continue to seek and invest in ways to deliver our mission to clean up the Sellafield site as soon as possible – in ways that make the best use of taxpayers' money. We look for efficiencies but will not jeopardise our duty of care by working in haste.

Building with decommissioning in mind

As we move towards the completion of our commercial reprocessing operations and the environmental remediation of Sellafield, so construction activities are beginning on site. Built with decommissioning in mind, the construction of new waste retrieval, processing and storage plants is essential to our ability to empty our older buildings of their legacy fuels, sludge and waste.

Investing in research and development

Sellafield presents both unique challenges and unique opportunities for the brightest minds in the nuclear industry. As we complete our reprocessing operations and clean up the site, so we're investing in research and development. With project schedules that reach into the next century, our investment in new skills and talent will nurture the next generation of nuclear pioneers.

Promoting innovation with unique opportunities

As we learn more about the Sellafield site, and about the unique challenges presented by legacy fuel and waste, so our understanding deepens. Working without a blueprint to retrieve legacy waste, we're creating a culture of both technological and scientific innovation. Designers and engineers are developing new ideas and repurposing innovations from beyond the nuclear industry.

Supporting our supply chain

The Sellafield supply chain includes some of the biggest names in engineering, construction and decommissioning. As our business transforms, so an environment emerges that supports the technological advancement and promotes the growth of our supply chain.

Growing global expertise in nuclear waste management

Sellafield is the most complex nuclear site in the world. As we clean up the site, much is still unknown. The expertise, experience and current knowledge of our team and that of our supply chain, combined with emerging technologies and new learning, will cement our reputation as global experts in the safe and secure management of nuclear waste.

Building relationships with academia

We're building on our existing relationships with academia, nurturing graduate talent and offering unique opportunities within the nuclear industry. As the business transforms, we'll look to universities both in the UK and overseas for emerging research, developments and innovations to support our mission to make Sellafield safer sooner.

Collaborating and partnerships

Our work demands a mix of direct employment and supply chain capability. Together we are a team of more than 11,000 nuclear experts. We recognise that we can achieve more together than we can alone and work in partnership with the Nuclear Decommissioning Authority, our regulators, customers, stakeholders and our supply chain.

Transforming Sellafield

We are transforming Sellafield so that it is recognised both as a leading nuclear enterprise and as a national asset, which offers the UK Government value, opportunity and choices in support of the nuclear industry.

2017/18 Highlights



CUT six holes and installed six access doors onto the side of one of the oldest nuclear waste stores at Sellafield, the Pile Fuel Cladding Silo.

The silo was never designed to be opened but our teams are preparing to retrieve the nuclear waste held inside.

JOINED the Northern Powerhouse.

Our vision fits closely with the aims of the government initiative, such as improving connectivity and transport to enable future growth.



OPENED our doors to more small firms.

We've helped give more small to medium sized enterprises direct access to the packages of work we need to doing so they can compete directly and help us innovate.

AWARDED a metal recycling contract to Recycling Lives.

As well as recycling metal from the site, the company will offer new jobs and training opportunities at their new depot in Workington.

AWARDED a multi-million pound container contract.

This is essential to our clean-up work at Sellafield to two UK companies.

A report by the National Audit Office RECOGNISED that:

"Significant progress has been made in reducing high hazards, including removing 70% of the radioactive content of the Pile Fuel Storage Pond and accelerating the schedule for emptying the Pile Fuel Cladding Silo by six years compared with 2015 estimates"



TURNED ON our newest nuclear facility, Evaporator D.

It will evaporate highly active waste so that it can be turned into a solid, stable form for transport and is essential to the completion of reprocessing and the clean-up of the site.

RECEIVED the first stainless steel waste boxes.

These will be used to store hazardous nuclear waste retrieved from our oldest buildings. The boxes were manufactured in the UK.



REMOVED our tallest risk.

A redundant discharge stack – from 61 metres to 54 metres at a rate of 1 metre per week.

Completed work on a new interim nuclear waste store.

The store is based on a design already in use on the NDA estate and will be used to store skips retrieved from a legacy storage pond.



OPENED the doors to the northern hub of the National College for Nuclear.

Along with EDF Energy we are supporting the world class training facility that will deliver the workforce of tomorrow.



DEPLOYED a remotely operated machine, known as the AVEXIS, into our most hazardous nuclear waste store for the first time.

Are we on the second se

With the end of reprocessing, our focus is shifting to the environmental remediation of the Sellafield site.

This overview of our delivery shows the progress we've made so far.

We're carrying out the environmental clean-up of the most complex and hazardous nuclear site in the UK.

Our highest nuclear risks and hazards at Sellafield are two fuel storage ponds and two waste silos.

These four buildings, our legacy ponds and silos, are more than sixty years old. They are home to nuclear fuel, sludge and waste, some of which date back to the start of the UK's nuclear industry and to Sellafield's early roles in national defence and electricity generation.

These facilities were built to the standards of the 1950s and '60s and they were not intended for waste retrievals or long-term storage of waste.

Removing the inventory therefore carries a level of urgency. We have to work with the plants as they were built – and they weren't designed with decommissioning in mind. So our work to remove the inventory has to balance urgency with uncertainty, and reach a compromise between modern requirements for engineering solutions and the congested areas of work.

Here is an overview of the progress that we have made in the clean-up of these priority buildings.

The performance of our processing plants can be quantified in terms of tonnes or numbers of containers. Other aspects of our work, particularly in risk and hazard reduction are harder to quantify. In these instances our performance is measured on a range from acceptable to excellent.





environmental clean-up

Pile Fuel Storage Pond

Originally used to store, cool and prepare Windscale pile fuel for reprocessing, the pond is one of our four priority clean-up projects.



Workstreams

Sludge Exports

Low Level Waste

Intermediate Level Waste

Previous work completed

Bulk fuel removed from pond, therefore successfully moving 70% of the radioactive inventory to safer storage

2017/18 progress

- Deployed a Grindex Snake to carry out efficient desludging
- Exported 100th drum of sludge to the Waste Encapsulation Plant
- Used underwater diamond cutting tool to chop up waste items
- Passed the 250 tonne mark in inventory removed (one third of total)



Next steps

Continue with inventory removal. Current forecast date for completion of pond dewatering – **March 2029**

First Generation Magnox Storage Pond

Originally used to store, cool and prepare magnox fuel for reprocessing. The pond is one of our four priority clean-up projects.



Workstreams

Intermediate Level Waste	
Low Level Waste	
Zeolite skips	
Effluent	
Fuel	
Sludge	
Element	

Previous work completed

- Ø Built connecting sludge processing plant
- Started sludge transfers
- Started fuel exports

2017/18 progress

- Energised two rams and bogies in ST Bay
- Installed sonar sleeves in Sludge Packaging Plant 1
- Removed fuel from a redundant magazine for the first time in MT Bay
- Lifted in XYZ gantry to enable sludge and solid waste retrieval from the most hazardous wet bay
- Exported u-bit bins containing fuel fragments for the first ever time
- Took operational control of the new Interim Storage Facility



Next steps

Bulk D Bay Sludge exports complete - Forecast May 2022

Pond solids exports complete - Forecast June 2031

Ponds sludge exports complete - Forecast June 2031

Start of dewatering - Forecast June 2031



environmental clean-up

Pile Fuel Cladding Silo

The silo was the first storage facility for intermediate level waste at Sellafield and is one of our four priority clean-up projects.



Workstreams

Deflector Plate Removal Retrievals Access Penetration Module Assembly

Previous work completed

- Introduced inert argon system to remove risk of fire
- Removed transfer tunnel at top of silo
- Designed and built retrievals superstructure next to silo
- Installed six doors

2017/18 progress

- Cut all six access holes to allow waste retrievals
- Pabricated first of three flasks to transport 3m³ boxes
- Manufactured our first 'production line' 3m³ boxes
- Completed removal of deflector plates
- Started build of waste container handling area

As we are preparing to retrieve waste from the silo there was no retrieval target in 2017/18.

Next steps

1st 3m³ box of waste from early retrievals delivered to store – **Forecast July 2020** 3m³ box of waste from full retrievals delivered to store – **Forecast July 2023** Bulk waste retrieved from silo – **Forecast 2030**

Magnox Swarf Storage Silo

Used to store intermediate level waste from the site's magnox reprocessing, the silo is one of our four priority clean-up projects.



Previous work completed

from the third extension

Installed first Silo Emptying Plant

Started Liquor Activity Reduction retrievals

Workstreams

Separation 2

Separation 1

Separation 3

Liquor Activity Reduction

Box Encapsulation Plant

Encapsulated Product Store Waste Transfer Route

Element

2017/18 progress

- Installed manipulator arm in Silo Emptying Plant
- Operated specially designed remote operated vehicle for first time
- Tested and validated first package to transfer waste
- Installed east end crane £10m project to support waste retrieval
- Energised first Silo Emptying Plant

527 Good - 200 Annual target - 850

Next steps

First waste exported – Forecast June 2019

Bulk waste retrievals start to Box Encapsulation Plant - Forecast August 2022

Bulk retrievals completed - Forecast August 2046

We recycle and store used nuclear fuel.

Thorp Reprocessing

Thorp combines all of the facilities needed to reprocess spent oxide fuel from the UK and foreign customers under the roof.



Magnox Reprocessing

Decans and dissolves spent magnox fuel from the throughout the UK so that the uranium and plutonium can be recovered.





We're global experts in nuclear waste management.

Waste

Waste Vitrification Plant

757

Highly active liquor comes from reprocessing spent nuclear fuel. We turn it into a solid stable form through a process called vitrification.

WVP (total hazard reduction teU)

Excellent - 1,357 Good - 1,279 Acceptable - 883

Treatment Plant Tools and equipment that come into contact with plutonium

Into contact with plutonium during operations are classed as being 'plutonium contaminated materials'. These are treated as a form of intermediate level waste and as such are sealed in cement which makes the material suitable for long term storage.

WTC (Drum equivalents processed)

Annual target - 3,300

FLOC

'Floc' is classed as intermediate level waste. We are retrieving it from storage tanks and encapsulating it for safe storage.



We're guarding the UK's special nuclear materials.

Sellafield Product and Residue Store

Nuclear materials are safely and securely managed and stored on the Sellafield site.



SPRS Transfers

Excellent - 512 Good - 488 Acceptable - 464

Major Projects

Sellafield Product and Residue Store Retreatment Plant

The new facility will provide modern high security storage for nuclear materials.

Design	Build	Commission	Operation
\odot	0	0	0

Evaporator D

The Evaporator Delta project provides additional evaporative capacity to the current fleet of three Highly Active Liquor evaporators. This evaporative capacity is required to support completion of the Magnox, Thorp and Post Operational Clean Out of High Level Waste Plants operating plans.

Design	Build	Commission	Operation
Ø	Ø	Ø	Ø

Box Encapsulation Plant Product Store Direct Import Facility

The Box Encapsulation Plant Product Store and Direct Import Facility will provide safe storage for unconditioned containers and conditioned intermediate level waste until a Geological Disposal Facility becomes available. It will also provide services for the Box Encapsulation Plant and future stores.

The facility is critical to the Magnox Swarf Storage Silos, Pile Fuel Cladding Silo and First Generation Magnox Storage Pond programmes.

Design	Build	Commission	Operation
Ø	\bigotimes	0	0

SIXEP Contingency Plant

A replacement for our Site Ion Exchange Plant that treats effluents from our nuclear operations

Design	Build	Commission	Operation
\bigotimes	0	0	0

FINISHED
ONGOING
SCHEDULED

Replacement Analytical Project

The Replacement Analytical Project will provide the Sellafield Site with a new analytical capability to support the site's future operational missions. The existing analytical facility is approximately 60 years old. It supports circa 200 facilities with sample analysis.

Design	Build	Commission	Operation
\bigotimes	0	0	0

Box Encapsulation Plant

The Box Encapsulation Plant is an integral part of the programme to retrieve waste from our highest hazard facility, the Magnox Swarf Storage Silos. It will receive and process containers of intermediate level waste from the silos. The containers will then be stored in the Box Encapsulation Plant store and, once a final treatment has been applied, will be suitable for a Geological Disposal Facility.

Design	Build	Commission	Operation
Ø	\bigotimes	0	0

Interim Storage Facility

The Interim Storage Facility will provide interim or long term storage for self-shielded boxes containing zeolite skips that need to be retrieved from the First Generation Magnox Storage Pond. The design is based on an interim storage solution introduced at the Berkeley nuclear site. Removal of the zeolite skips will enable access to the fuel bearing material and sludge from the pond and allow expedited export operations in order to reduce the hazard posed by the facility.

Design	Build	Commission	Operation
Ø	Ø	Ø	v

Silos Maintenance Facility

The Silos Maintenance Facility will provide the capacity to store, decontaminate and maintain retrieval equipment and tool/waste packages for the Magnox Swarf Storage Silo programme.

It will also support the Pile Fuel Cladding Silo programme by storing equipment and providing the capacity for developing and testing equipment prior to deployment.

Design	Build	Commission	Operation
Ø	Ø	\oslash	0

Research, skills and training



Employment

14,000 employees as a result of our work at Sellafield

10,000+ direct Sellafield Ltd employees

4,000+ supply chain employees



Workforce of tomorrow

A world class training facility designed to deliver the 'workforce of tomorrow' officially opened in Cumbria. The UK's National College for Nuclear (NCfN) – a £7.5 million two-storey college at Lakes College, Lillyhall – will bring a new way of teaching to students while bridging the gap between further education colleges and university, and the workplace.

We and EDF Energy are leading industry input into the college which is based at two sites – Lillyhall and Bridgwater & Taunton College, Somerset – helping to ensure its curriculum and qualifications are based on employer need.

Next generation

In 2017/18 we employed: 884 apprentices



well above the national average

96 trainees 301 graduates

We are driving apprentice recruitment as a key commitment from our supply chain partners. As a result, organisations involved in our Decommissioning Delivery Partnership have committed to create a new apprentice/ trainee route to nuclear sector employment.

SME Spend

In 2017/18 we spent £79 million directly with small to medium sized enterprises.

Our supply chain spent a further £214 million* with small to medium sized enterprises.

*Data collected from ~77% of supply chain spend. Extrapolation applied for remaining uncaptured spend.



Research and development

£80m

We invested more than £80 million in research and development in 2017/18.

← () → ∠ () → Reskilling and redeployment

In 2018 we will shear the final batch of fuel in our Thorp reprocessing plant, signalling the end of an operation that directly

employs 470 people at Sellafield. Through a programme of reskilling and redeploying people to new roles on the site as well as turning the attention to cleaning up rather than running the plant, we have managed this change with no redundancies.



Project Academy for Sellafield

The project academy for Sellafield has gone from strength-to-strength in 2017/18. We ended the year with more than 1,300 people using the academy from our organisation, the supply chain and members of the public.

The latest cohort to complete their qualifications walked away with university certificates in project controls, foundation degrees in project management, and a new qualification for the UK – project scope baseline management.

We are making a difference

Our commitment to creating a positive social impact in our communities is unwavering. Here is an overview of what we achieved in 2017/18.

Our social impact

Delivering social impact is more than allocating budget to a project. It is about utilising everything that we have available – expertise, resources, influence and networks to maximise the positive difference we make with our community that remains in place for generations to come.

We also recognise that we can achieve far more social value by working with our supply chain as partners in social impact delivery. We work with our partners and stakeholders to direct our resources and assets to secure maximum impact.

We have a commitment and ambition to help develop a resilient economy and want to see a step change in our approach and in our impact.

To demonstrate this step change we are focusing our social impact activities around skills, growth and community and have five key objectives: resilient economic, thriving communities, social value chains, sustainable incomes and collective impact.

Our objectives

Skills

Sustainable incomes

Improving access to sustainable incomes, beyond Sellafield, by increasing skills, knowledge, aspirations and access to opportunities. Growth

Resilient economies

Enabling inclusive growth in the capacity, diversity and capability of the economies in which we serve.

Social value chains

Creating a wide-reaching positive social impact with our supply chain.

Community

Collective impact

Leveraging collective impact and investment by engaging and working with our stakeholder, partners and communities.

Thriving communities

Assisting our communities to thrive by supporting sustainable activities which create self-reliance and independence. In 2017/18 we continued to deliver social impact activities including working with local schools on Science, Technology, Engineering and Maths (3,957 students from 45 local schools engaged); supported our employees as they served our communities in volunteer roles (22,944 hours); and made charitable donations (£474,488).

We also started a step-change in our social impact, directing our resources to strategic investments that will create sustainable benefit over the coming years.

We invested £9.9 million in 2017/18

Whitehaven Campus £4.1 million

In partnership with the Nuclear Decommissioning Authority we are helping to create a new shared education campus for Mayfield School and St Benedict's Catholic High School and community sports facilities.

Our investment has unlocked funding from other bodies to make up the total project cost of £30.8 million.

Construction contractor Waites made a commitment to use local suppliers and sub-contractors, spending over $\pounds7$ million with them.

The new school building will raise educational aspirations for both schools and work is due to be completed in the autumn of 2018.

Bus station regeneration £2.6 million

We have invested £2.6 million to transform Whitehaven's dilapidated former bus station into a multi-million-pound business hub for tech, digital, media, and creative start-ups.

The project is part of a wider £300 million regeneration of the town, led by developer BEC and partners including Whitehaven Harbour Commissioners and Copeland Borough Council.

The building will be developed with our strategic input and could be open as early as 2019. Alongside units for fledgling firms, the plan includes: conference and meeting space for 75 people; an artisan food and drink outlet, open to the public; health and wellbeing facilities.

Local authority social funds £1 million

We invest a total of $\pounds1$ million every year in social funds for Copeland and Allerdale Borough Councils.

Elected Members of the Authorities, working with their officers, identify projects and programmes within their own local areas and have full autonomy over their own social funds.

In 2017/18, Allerdale Borough Council focused their spending on providing business grants, often with match funding to create or safeguard jobs and bring derelict buildings back into use. Copeland Borough Council invested their social fund to support health and wellbeing activities, environmental improvements, financial and digital inclusion and addressing social isolation.

Community Choices £580,000

Community Choices, launched by Sellafield Ltd in association with CN Group, CFM, Cumbria Community Foundation and Phoenix Enterprise Centre, was aimed at giving a financial boost to not-for-profit organisations enabling them to deliver projects within West Cumbria and also helping to raise their profile in the process.

Community groups and organisations working across Allerdale and Copeland applied for the chance to win up to £50,000 through five categories – Improving Cumbria, Improving Health and Wellbeing, Improving Social Inclusion, Supporting Stronger Communities, and Supporting the Younger Generation. Through an online portal, members of the public were encouraged to vote for the causes they felt best addressed the issues within their local communities.

After all the votes were counted, the 19 worthy causes benefiting people across West Cumbria who received the most votes in their respective categories benefited from a share of over £580,000-worth of funding.

Well Whitehaven £350,000

Well Whitehaven is a programme that is tackling social issues affecting residents in Mirehouse and the Valley areas of the town.

Working with residents and the other organisations, the team aims to create long lasting solutions that are driven and owned by the community.

They have already launched a hugely successful 'Men in Sheds' initiative aimed at tackling social isolation for males who are unemployed or under employed and are taking over the disused Mirehouse Library to bring it back into public use as a community hub and cafe.

Beacon Museum £325,000

We continue to support Whitehaven's Beacon Museum, in collaboration with Copeland Borough Council.

The museum houses our own 'Sellafield story' exhibition, and we work in conjunction with them to deliver educational workshops.

West Cumbria Works £205,000

West Cumbria Works is an employment brokerage set up to support those furthest away from employment become more employable and get into work.

It provides individuals with support and guidance increasing their skills, knowledge, aspirations and access to opportunities.

The programme is supported by, but not solely for the nuclear industry.

In 2017/18, 55 people gained employment as a result of the support they received.

"The key to our success at Sellafield is collaboration between our teams, our supply chain colleagues, academia and our stakeholders. I thank them for helping us make progress in 2017/18.

We are making Sellafield safer, sooner."

Paul Foster Chief Executive Officer, Sellafield Ltd

Discover more at www.gov.uk/sellafieldltd

