

Decommissioning overview

Delivering Decommissioning through People, Partnering and Performance



The first skip of historic legacy waste is removed from Sellafield's First Generation Magnox Storage Facility Pond



Successfully ma the UK's nuclear



naging legacy

Decommissioning of some of the historic legacy facilities commenced on the Sellafield site in the late 1980s. Since then we have acquired over 25 years experience on some of the most challenging projects in the world, ranging from plutonium reactor chimneys through to laboratories used for medical research.

When Decommissioning commenced the site focus at that time was on commercial reprocessing and waste management.

Minimal funding delayed real decommissioning progress until the formation of the Nuclear Decommissioning Authority which shifted the emphasis to accelerated decommissioning.

Sellafield Ltd is focused on high hazard risk reduction at the Sellafield and Capenhurst sites.

This portfolio is one of the largest and most diverse in the world today, with a total value of approximately

£23 billion

The portfolio includes

- Magnox and Pile fuel storage ponds
- Nuclear Reactors
- Solid nuclear waste stores
- Legacy reactor exhaust stacks
- Legacy reprocessing plants
- Contaminated land
- Sea discharge lines

What is there to decommission?

- 170 major nuclear facilities and 2,200 other buildings dating from the 1940s
- 1 million m³ of concrete above ground, 1 million m³ below ground
- Approximately 61,000 m³ conditioned Intermediate Level Waste
- Ongoing commercial operations



Sellafield site, situated on the West Cumbrian coastline, comprises a range of nuclear facilities, including both operational reprocessing and redundant legacy waste facilities



Capenhurst stores safely and securely the bulk of the UK's inventory of depleted uranium and uranium hexafluoride

170

There are over 170 major facilities and 2,200 other buildings dating from the 1940s to decommission at Sellafield.



A considerable amount of planning goes into every project to ensure that work is carried out safely and securely at all stages of the Decommissioning process



Decommissioning Challenges

The Sellafield site provides one of the most varied and challenging decommissioning portfolios in the world today, with both radiological and conventional hazards to overcome.

Some of the greatest challenges include:

Degraded legacy plants with nuclear inventories, some of which are UK highest priority

The legacy plants at Sellafield date back to the 1940s and were originally established to home Royal Ordnance factories producing explosives for World War II.

They were not designed with decommissioning in mind and were built to the standards required at that time, rather than the standards required for today's nuclear facilities



Much of our work is carried out under difficult and challenging conditions

"Decommissioning is accountable for the clean up of legacy wastes from over five decades of operations on the Sellafield site. Our plants are degraded and despite our care continue to deteriorate. The facilities hold some of the UK's highest nuclear hazards and we are dedicated to expeditiously reducing those hazards.

This will be done by designing, building and integrating waste retrieval equipment, preparing the facilities for retrieval operations and then retrieving and immobilising or treating the waste to put it into a safe state.

This presents us with significant challenges, however by applying modern techniques and treatments to the decommissioning process we are able to deliver some absolutely excellent work, and deliver it safely."

Russ Mellor, Executive Director,
Decommissioning



Diverse and highly constrained decommissioning activities

The expansion of the site over the last five decades means many of the facilities are now tightly packed together. This creates additional challenges and restricts many conventional construction and demolition techniques from being used.

Radiological conditions can also prevent manual operations and so remotely operated decommissioning vehicles have to be utilised in some areas.

Requirement to upgrade and improve aged facilities prior to decommissioning

The existing equipment was designed to put equipment into facilities, but getting it out again was not considered. Changes to the plants such as different contents to the original design intent create additional challenges to be addressed.

The unknown

In some cases, no current plans, drawings or records exist and decommissioning teams need to start from scratch, upgrading the facilities before decommissioning work can commence. Much of the work is also unique and has never been done before.

Excellent progress is being made on some of the most difficult challenges in the world

Current Projects

We have a very varied portfolio of facilities to be decommissioned or new facilities to be constructed to support future decommissioning work, each with its own set of challenges to overcome.

"We cover a vast range of tasks, all relating to waste removal and our teams have the expertise to remove waste from plants and dispose of it via the most effective route."

Linda Moore, Sellafield Waste Teams Contract and Support Team Manager



Current projects at Sellafield include:

Pile Fuel Storage and Magnox Storage Pond Retrievals Projects

Work to decommission two of the highest hazards at Sellafield has commenced, with the start of de-sludging activities in the Pile Fuel Storage pond.

Sludge, in the form of corrosion products and wind blown materials, has been mobilised from two of the twelve bays where fuel was decanned and exported for reprocessing, by the use of water lances and flushed back into the main pond. This enables it to be retrieved and moved to an in-pond corral for storage prior to the construction of a new interim storage and treatment facility, currently under way.

In addition, the project team has also installed and started to operate a Local Effluent Treatment Plant to help treat and control activity in the pond water.

New technologies are being used to help us safely decommission the legacy waste facilities at Sellafield

HANO Cell stabilisation

The Primary Separation Plant's Highly Active North Outer Cell provided a shielded discharge route for Separation ventilation streams, however the warm, moist, acidic nature of the air routed through it between 1966-88 caused major corrosion to the mild steel vessels and pipework.

Laser scanning techniques were used to confirm the poor condition of the pipework, vessels and steelwork supports, prior to filling the cell with a foam filled lightweight grout to stabilise them.

Once the ventilation system has been diverted to the new ventilation plant, the building will be stripped out prior to ultimate demolition.

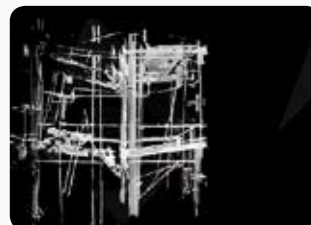
Windscale Pile Chimney 2

The two 125m high Windscale pile chimneys were built to cool and discharge heat from the two pile reactors, which supported production of plutonium for civil nuclear programme in the 1950s

They operated until a fire in Pile Chimney 2 in 1957, after which they were shutdown and left with everything intact, including contamination.

One of the first major decommissioning projects on site, Pile Chimney 1 was decommissioned and demolished to reactor level in 2002.

Conventional tools and a holistic approach were used to prepare waste for monitoring. Following treatment and processing over 75% of Pile 1 was free released for reuse elsewhere. Learning from this was then applied to the more challenging and contaminated Pile 2, currently going through the decommissioning process.





The Gantry Refurbishment System is lowered into place, a key enabler for future waste retrievals from the First Generation Magnox Storage Facility Pond

Sludge Packaging Plant

The Sludge Packaging Plant (SPP1) will hydraulically receive legacy sludge from the First Generation Magnox Storage Pond and process it into a product suitable for long term storage or disposal. SPP1 is made up of two components the Buffer Storage Facility and the Process and Export Plant.

Site clearance commenced in November 2005 involving the demolition and clearance of a number of redundant facilities to create space. This was completed in September 2007 and construction commenced in late 2007.

Although not yet a nuclear facility, the project faces a number of challenges due to its location in a highly confined space, and the team have had to adapt traditional construction tools and techniques to manage these.



Construction of Sludge Packaging Plant 1, which will receive legacy sludge from the First Generation Magnox Storage Pond and process it into a product suitable for long term storage or disposal

Achievements

5 years without a single Lost Time Accident

The Sludge Packaging Plant team have achieved 5 years without a single Lost Time Accident, a tremendous achievement for a construction based project

De-sludging activities have started in the Windscale Pile Fuel Storage Pond. Sludge, in the form of corrosion products and wind blown material, has accumulated in the pond since it was commissioned in 1952.



The Magnox Swarf Storage Silo Compartment 7 Project team have successfully removed contamination dating from an incident in the 1990s which prevented access to an area where retrievals work is required.

The First Generation Magnox Storage Pond Gantry Refurbishment System has successfully been brought into service, a key risk reduction enabler for recovery of the pond inventory.

Over 50 redundant buildings on site have been demolished down to base slab level, providing space for the future construction of decommissioning facilities.

Capenhurst is due to become the UK's first nuclear site to complete its main plant decommissioning programme – and on the way has delivered the biggest demolition projects ever undertaken in the UK nuclear industry.

Its management of the final stages of decommissioning offers other sites an insight into the challenges they will face and provides a blueprint for success.

Demolition activities under way at Capenhurst and Sellafield



Recent Achievements

"We are very proud of our project and our standards, however we are only as good as our last shift. Every day counts."

Karl Mason, Sludge Packaging Plant 1 Project Manager



With over 25 years of decommissioning having been carried out on the Sellafield site, a considerable number of projects have been completed, covering all aspects of the nuclear industry. The following are just some examples of the diversity of the work undertaken.

Calder Hall Cooling Tower Demolition

The four 88 metre high cooling towers were successfully demolished by implosive demolition on 29 September 2007, the first time explosive demolition had been used on an operational nuclear site in the UK.

Prior to demolition, 75 tons (1 mile) of asbestos piping, 6,000 m³ plastic packing, and 260 tons of tanalised timbers was removed, segregated and disposed of from each tower, and over 5,600 holes were drilled to enable the explosive charges to be loaded.

The 4-year project was delivered without a single accident, injury or event.



PFR Fuel Fabrication Plant clearance

57 gloveboxes from the canning and fuel lines have been removed from a redundant fuel fabrication facility, in radiological conditions which meant the area could only be accessed by operators in air fed suits.

The facility operated from 1971 to 1992 manufacturing mixed oxide fuel assemblies for the Dounreay prototype fast reactor.

Using a combination of manual and remote techniques, gloveboxes as large as 4m³ were size reduced and packaged into over two thousand 200 litre drums under intense regulator scrutiny.

The decommissioning of this facility allows for the reuse of the building or the land by other decommissioning projects.

Uranium Purification Plant

Situated in the heart of the Chemical Separation Area the Uranium Purification Plant was the first major nuclear facility on the Sellafield site to complete the full lifecycle from design and construction through to demolition.

Constructed in 1951 to process uranyl nitrate arising from the Primary Separation Plant, the three storey asbestos cement clad building contained a central rectangular core of four shielded process cells. The cells contained over 12,000m of stainless steel process pipework and 60 vessels that were alpha contaminated to a level requiring air fed suits for man entry.

Decommissioning, involving the removal of all process vessels and pipework from both inside and outside the cells, commenced in 1992 and was completed in 2005.

Demolition commenced in 2006 when the structure was taken down to base slab. Approximately 75% of the waste material was made available for reuse or recycling.

The iconic Calder Hall Cooling Towers were the first structures in the UK to be demolished using implosive demolition on an operational nuclear site

High Hazard Risk Reduction

We are safely accelerating decommissioning
at Sellafield and Capenhurst





The decommissioning portfolio is one of the largest and most varied nuclear programmes in the world today and excellence in project delivery is the key to the successful execution of this work.

Our key focus is on hazard reduction, thereby reducing the risk to all and reducing our care and maintenance costs. These benefit not only Sellafield, but also the UK as a whole.

Whilst carrying out some of the most innovative and complex decommissioning projects in the world, safety remains our key priority. For conventional safety we set our own standards and for radiological safety we are set standards by our independent regulator, the Nuclear Installations Inspectorate.

Our focus is to exceed these standards.

Capenhurst has completed the biggest demolition on a nuclear site in UK history. Vast structures, adjacent to operational vibration-sensitive facilities, have been taken down largely by hand, without any accidents.



The Future

Sellafield Ltd will make the most of its leading edge technology and skills to provide specialist nuclear decommissioning services



We also aim to leave the lightest environmental footprint by reducing, reusing and recycling as much as possible. Our environmental standards are set by the Environment Agency and again our job is to exceed these standards both in radiological and conventional terms.

Waste minimisation is a high priority throughout all aspects of our work. By ensuring we apply the most up to date decommissioning techniques we are able to remove significant amounts of contamination, enabling as much waste as possible to be reused, helping to minimise the long term impact of operations at Sellafield.

For that which cannot be reused, we aim to ensure that waste is treated and made into a stable form suitable for long term storage and then placed into safe interim storage until a long term UK strategy is fully developed.

Our overall approach is based around the importance of achieving world class performance. By applying a consistent set of values we aim to continue to increase stakeholder and regulator confidence in us and deliver safe successful projects.

Our mission is to respect the past, but look to the future.



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