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Nuclear Decommissioning Authority | Sellafield Ltd | Nuclear Management Partners

Sellafield Plan

www.nda.gov.uk | www.sellafieldsites.com | www.nuclearmanagementpartners.com

Sellafield Plan

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Overview

Introduction to the Sellafield Plan

The Sellafield Plan is an underpinned and deliverable plan for the Sellafield nuclear site. This section explains the background to the document and how to use it.

Overview: Foreword

Foreword

On behalf of the UK Government and taxpayers we oversee the clean-up and decommissioning of a range of nuclear sites across the UK which in some cases date back to the 1940s. The largest, most complex and challenging part of our mission is at Sellafield.

Tony Fountain, Nuclear Decommissioning Authority (NDA)

Although a very compact site for the range of activities contained within it, Sellafield is the largest industrial site in the UK. The early pioneering work on nuclear technology for both defence and electricity generation has left a significant legacy at the site: Windscale, Calder Hall, the Ponds and Silos, Reprocessing plants, a myriad of other handling and processing facilities and an array of nuclear materials all need to be safely managed, safely operated and safely decommissioned.

This is no easy task which is why we need the support of a range of key stakeholders: Government, Regulators, customers, the workforce and the community. Together with the site's operators our task is to deliver the safe and successful clean-up of the Sellafield site as quickly as we can, whilst working with the community to help deliver a sustainable future for the area.

That commitment is demonstrated both in our published Strategy and in the recent Government spending round which secured record levels of expenditure for the Sellafield site. Over 50% of our total budget is now dedicated to cleaning up the Sellafield site – around £1.5bn annually.

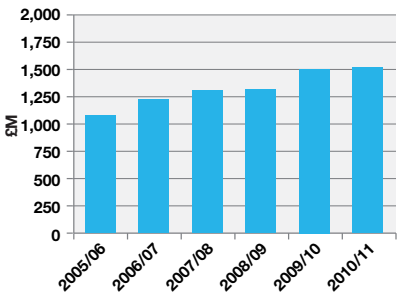
In order to build on the expertise already at the site and maximise innovation we competed the ownership of Sellafield Ltd to bring in global decommissioning experts to accelerate the programme of work and support the drive for delivering value for money for the taxpayer. It was the single largest UK public sector contract of its time.

Nuclear Management Partners were successful and started working in November 2008. They have spent necessary time and energy gaining an in-depth knowledge of the challenges at Sellafield in order to give us a true picture of the site and its challenges.

That has led to the creation of a new plan for the site which is explained in detail in this document. It sets out how NMP will apply their global experience to improve operations, generate efficiencies and deliver detailed programmes of work with the aim of accelerating decommissioning and providing value for money. Successful delivery of the plan will also ensure the site continues to effectively operate critical national infrastructure that supports the UK's energy programme, and maintains the safe and secure management and storage of nuclear materials.

It is against this plan that the performance and success of Nuclear Management Partners will be judged.

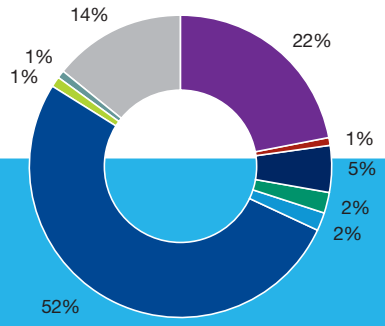
Sellafield funding levels since 2005



We have to recognise that even a plan of this detail may have to change due to new circumstances, whether that be changes in policy, resource allocation or other events that could impinge on our industry. However I believe that for the first time we now have a credible plan for Sellafield that is underpinned both technically and in terms of capability, and one that gives us all the best chance of success.

We will work with NMP, the Sellafield Ltd management team and other stakeholders to oversee its delivery and in doing so our aim is to build confidence amongst Government and others that the nuclear legacy is being tackled effectively, safely and responsibly.

Allocation of expenditure by SLC

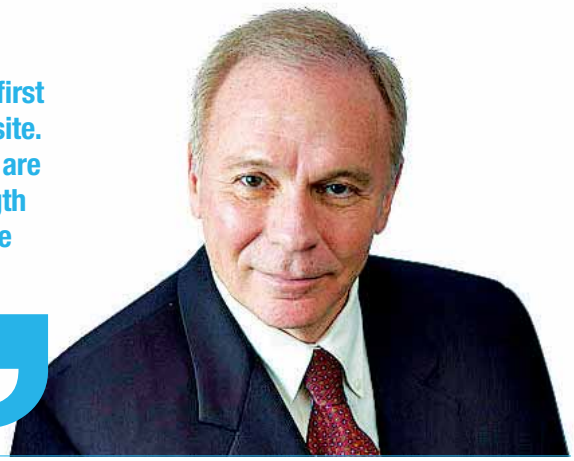


Information taken from the NDA Annual Report & Accounts 2010/2011

Overview: Foreword

We have applied world leading expertise, to produce the first credible and underpinned lifetime plan for the Sellafield site. Nuclear Management Partners and its Parent Companies are now fully committed to applying our full corporate strength to delivering the plan and accelerating the clean-up of the high hazard facilities.

Tom Zarges, Nuclear Management Partners



When Nuclear Management Partners (NMP) arrived at Sellafield in 2008 our immediate task was to evaluate and absorb the full extent of Sellafield's issues, operational concerns and condition of the site's infrastructure. With this understanding as a solid foundation we now have a credible plan for accelerated delivery at Sellafield. We are absolutely committed to achieving – in fact improving upon – this plan. No doubt the plan will be dynamic and require active response and leadership from us all as it is undertaken. But the pace and objectives are clear – and the commitment to it unwavering.

Sellafield's greatest resource is its people. The men and women who operate the Sellafield site are, collectively, the greatest concentration of nuclear expertise in Europe. I am pleased that this year has seen us continue to supplement and complement the Sellafield Ltd team with experts from the parent organisations – URS, AMEC and AREVA. There are currently over 80 key personnel from these global organisations who are on the ground, working with their colleagues from Sellafield Ltd.

The dedication and initiative of this collaborative team are fundamental to stepping up our performance.

By working much more efficiently and effectively than has historically been the norm at Sellafield, we will achieve true value for money for our customer, the NDA; delivering accelerated clean-up and greatly improved operational performance.

Delivery of this plan also requires significant funding from NDA and Government; we do not underestimate the expectations and level of responsibility this puts upon us to deliver.

We are very aware of the importance of our success to the local community of West Cumbria. It is vitally important for the future of Sellafield, the local West Cumbria economy and the future of the UK nuclear industry that Sellafield is operated safely, more productively and more efficiently than before.

To achieve this, we will have to change the way we go about our business. The driving force behind cultural change and delivering efficiencies is the Integrated Change Programme, which is a wide ranging programme of carefully conceived and expected change initiatives. This is being managed comprehensively with clearly identified scope, milestones and benefit targets. It is by driving through the Integrated Change Programme that we will deliver this Performance Plan.

Our overriding business priorities remain; the safety of our workforce, the public and the environment; and our relentless pursuit of excellence in these areas.

We believe that the best years are to come. We are working in partnership with the site owners, the Nuclear Decommissioning Authority, to make Sellafield and its workforce the obvious choice for potential new missions. This is a team that can rise to the challenge.

URS

URS manages more US government nuclear clean-up projects and sites than any other company

amec

AMEC is the leading UK nuclear engineering and project management company

AREVA

AREVA operates the French fuel cycle programme – the industry's model

Overview: Introduction

Building the Sellafield Plan

“As owners of the Sellafield site we have a contract model in place to formally manage our relationships with Sellafield Ltd as the site licence company operating the site; and Nuclear Management Partners (NMP) as the Parent Body Organisation for Sellafield Ltd. This model allows us to monitor their performance, set challenging targets and play our part in a shared drive towards excellence.”

Dr Ian Hudson, Head of Programme for Sellafield, Nuclear Decommissioning Authority

The development of a new plan for Sellafield in which the industry, Government, and stakeholders can have confidence was seen as a critical piece of work following the NDA competition to secure a new Parent Body for Sellafield Ltd, which culminated in 2008 with the appointment of Nuclear Management Partners. Given its significance, the development and agreement of that plan was built into the contractual relationship between the NDA and NMP.

Contract structure

The contract in place between the NDA and NMP can run for a maximum period of 17 years. At the end of every five years the contract has breakpoints for a formal review of progress. Provided performance has been satisfactory the NDA will renew the contract for a further five years. Any decision to recompete the contract would lead to a two year EU procurement process. In any event the contract will be competed after a maximum of 15 years, hence the maximum term of 17 years – five + five + five + two.

The revised structure of having the NDA as owner of the site and its assets and liabilities, Sellafield Ltd as the operator of the site and NMP as the owner of Sellafield Ltd means there are two separate but complementary contracts in place.

The first, as described above, is between the NDA and NMP which puts NMP as the owner of Sellafield Ltd for the duration of the contract. The second contract is between the NDA and Sellafield Ltd and this sets out specific work which needs to be undertaken at the Sellafield site. This work specification links back to the NDA’s Strategy and business planning, ensuring there is a strong and auditable link between those priorities, and activity at an operational level across the Sellafield site.

Setting targets

NDA’s strategic objectives are set by the Department of Energy and Climate Change, which are then reflected in the NDA’s annually published Business Plan. From that Business Plan rigorous targets are set for the Sellafield site, and performance against them is closely monitored through the contract that exists between the NDA and Sellafield Ltd.

NMP appoint an executive team to lead Sellafield Ltd. They are then held to account for the overall performance of the site.

As with any system of robust contract management, clear, specific targets are identified and agreed, against which successful performance can be judged.

Of course the main drivers of the competition to secure a new Parent Body was to improve performance at the site whilst maintaining the overriding commitments to safety, security, environmental protection and value for money for the Government and taxpayer. These remain at the heart of the new Performance Plan.

In order to judge the improvement in performance it was first necessary to establish what would have happened if there had not been a competition and we moved forward on the basis of historic performance levels.

NMP became the Parent Body Organisation for Sellafield Ltd in November 2008

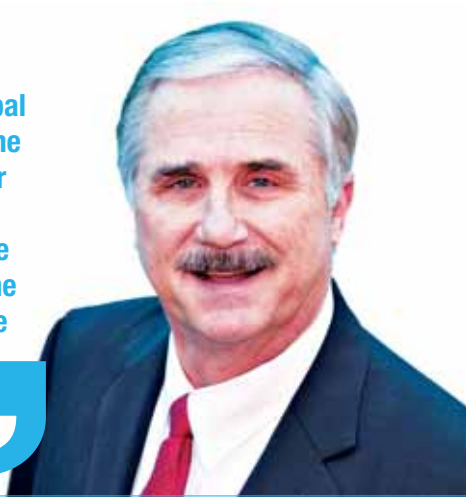
The contract to run Sellafield Ltd is a complex set of documents which were signed by Nuclear Management Partners in 2008

The Contract Baseline is based on the proven performance and operational norms at Sellafield, including how long construction projects have taken to complete on the site in the past

Overview: Introduction

What Nuclear Management Partners brings to Sellafield is a global network of nuclear experts who can, and have, complemented the highly skilled and experienced Sellafield Ltd workforce. Together we are challenging the norm, exploring new solutions and approaches to work and safely accelerating the rate at which we deliver for our customer. As a result of this, we have delivered the first underpinned plan for the Sellafield site and we will continue to deliver on the commitments it contains.

Dr Todd Wright, Managing Director, Sellafield Ltd



The Contract Baseline

Like all Site Licence Companies, Sellafield Ltd is required to set out Lifetime Plans for the sites under its control so whilst an inherited plan was in place when NMP took ownership of Sellafield Ltd in November 2008 it was collectively agreed that the plan was not realistic and could not be delivered.

It had been built upon a significant number of key assumptions such as the availability of downstream plants for decommissioning, the rates at which waste can be retrieved and treated and estimates for the duration of construction of new plants at Sellafield.

Consideration was given to simply updating this plan but it was agreed the best approach was to completely rebuild that plan, based on historic delivery levels and updated priorities. This is known as the Contract Baseline, as it gives us a solid base against which we can judge how much improvement is being made across the site.

The Contract Baseline was subjected to thorough assurance reviews by both NDA and NMP.

The Performance Plan

NMP were then tasked with building a new plan that would capture what they believed could be delivered across the site by applying their expertise, innovation and leadership whilst retaining the key safety and economic factors referred to earlier.

Indeed it is against this Performance Plan, accepted by the NDA in April this year, that performance across the site can be truly judged, and it is the milestones and objectives of that plan that are highlighted in this document.

The Performance Plan reflects the current and expected availability of resources and policy priorities, and takes account of the improvements NMP can bring. It has a particular focus to 2025/26, the maximum duration, following potential extensions, of the current contract between the NDA and NMP as the Parent Body Organisation for Sellafield Ltd.

Reviewing performance

At regular intervals throughout the financial year, the NDA will review Sellafield Ltd's performance against this plan. Indeed the NDA will only pay Sellafield Ltd fee if it meets the targets in the performance plan, not the contract baseline. So, in order to earn fee, Sellafield Ltd needs to consistently improve the way it operates, under the strategic guidance of NMP.

Those performance targets are also captured in this document so we can report against them both at the end of each financial year but also in-year so stakeholders can assess progress across the site. It must be remembered of course, that this plan can only reflect what we know now. It will by its very nature be subject to change in response to different circumstances that may arise resulting from Government policy, resource availability or other significant factors.

NMP and Sellafield Ltd don't just hope to successfully deliver the new Performance Plan, we will also challenge performance so we will be able in some areas to beat it and further accelerate progress and deliver further value for money. You can be reassured that we will keep you informed of progress.

Early reviews brought subject matter experts from Sellafield Ltd and URS, AMEC and Areva together

The Integrated Change Programme launched in 2009 to coordinate the implementation of improvements across Sellafield Ltd

Safety underpins all of the work that we do

Overview: Roles and Responsibilities

NDA Core Processes

Key Factors in Building the Sellafield Plan

The key task for NMP in establishing the Contract Baseline was to quickly understand the existing performance of the Sellafield site. Sellafield is the most complex nuclear site in Europe. NMP has taken the time to properly understand the operations and issues on the site in order to build a deliverable plan.

A programme of intensive reviews – called Partner, Assess, Innovate and Sustain (PAIS) – was carried out within the first 12 months of the NMP contract. The PAIS reviews partnered subject matter experts from Sellafield Ltd with those from the Parent Body Organisations. Together, they assessed the processes and procedures across Sellafield Ltd against industry best practice. They then brought innovations in order to close any identified gaps.

Sellafield's proven performance

NMP and Sellafield Ltd also undertook an intensive review into what the Sellafield site could achieve, based on historic performance, if everything stayed the same and no improvements were made. A number of areas were looked at including the normal production rates of our operational facilities and how long it traditionally takes to construct a new building at Sellafield. This provided a sound baseline performance that was realistic, not aspirational.

Integrated Change Programme

To make sure that any changes made at Sellafield are made in a coordinated way, the Integrated Change Programme was launched. This centralised programme monitors the changes that need to be made and how they are implemented across the site. The improvements that are being delivered through the Integrated Change Programme provide confidence that the accelerated delivery dates in the Performance Plan are underpinned and the required efficiencies are being delivered.

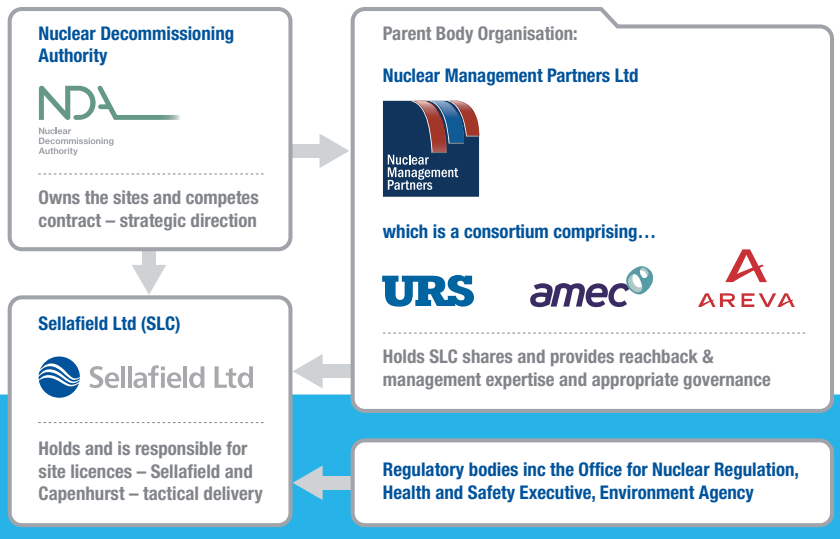
The Integrated Change Programme provides a great opportunity to deliver a site that reflects the best practices from across the world and one which its workforce and the wider Cumbrian community can be justly proud of.

Underpinned by performance

NMP is fully committed to applying its full corporate strength to delivering the plan and accelerating the clean-up of the high hazard facilities as our priority. By working much more efficiently and effectively than has historically been the norm at Sellafield, we are bringing true value for money to the UK Government and taxpayer, delivering accelerated clean-up and greatly improved operational performance.

Working together, we are planning significant schedule acceleration in most areas, but especially focused on Legacy Ponds and Silos, where we are already moving legacy fuel skips for the first time in decades and retrieving active liquors and sludges.

We will achieve sustained higher throughputs in production facilities, we will maintain investment in asset care for ageing facilities and infrastructure and we are targeting £1.2bn of cost-efficiencies against the contract baseline over the first five years of our contract.



Relationship diagram

Working together NDA, NMP and Sellafield Ltd are making Sellafield cleaner, safer, more productive and a better neighbour

Overview: **Supporting documents**

Map of supporting documents

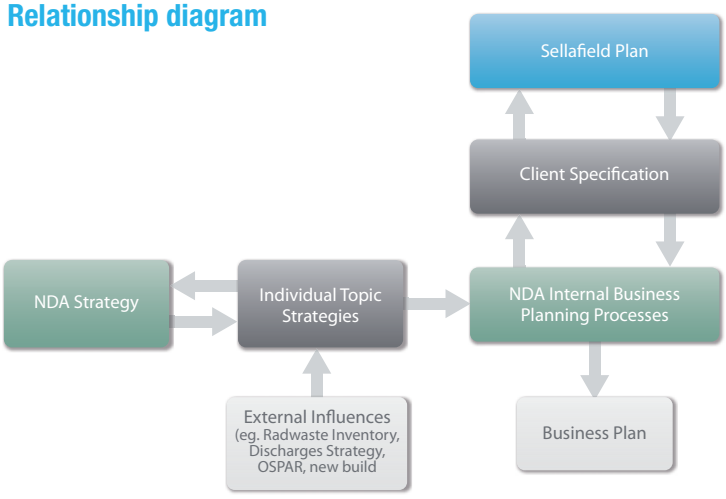
The Sellafield Plan sets out in detail the work that will be completed over the coming years, when it will be completed and how much that work will cost. Although comprehensive in its own right, it is only part of a whole suite of documents which are produced by the Nuclear Decommissioning Authority (NDA) and Sellafield Ltd to set out what currently happens and what will happen at Sellafield.

Supporting documents

The table on the right sets out how the Sellafield Plan fits into a wider range of documents. This ensures that there is a direct link from the Strategy set by the NDA through their annual Business Plan and into the Sellafield Plan.

Members of the public are invited to take part in consultations on the NDA Strategy and the Business Plan as well as a range of subject specific consultations to do with operations on the Sellafield site.

Relationship diagram



The Nuclear Decommissioning Authority's Strategy document is made available for comment prior to publication

The Nuclear Decommissioning Authority's Business Plan is also made available for consultation and sets out priorities

Overview: Supporting documents

Sellafield Ltd undertakes a formal consultation process on specific issues as they arise and members of the public and interested parties are encouraged to take part. Consultations have already been completed on a number of key Sellafield areas:

- **The preferred end-state of the Sellafield site**
- **Waste strategies**
- **Individual plant clean-up strategies**

Document descriptions

The Sellafield Plan is just one of a series of documents which are in place as part of the contractual relationship between the NDA, Sellafield Ltd and NMP.

This page sets out the other primary documents which are produced by the NDA, some of which are open to public consultation prior to publication. Throughout the Sellafield Plan we have indicated where our individual programme plans deliver against the objectives outlined in the NDA's Business Plan.

NDA Strategy

The Energy Act 2004 requires the NDA to review and publish its Strategy at least every five years. It undergoes a formal consultation process and sets the strategic direction for the NDA for the duration of its mission.

NDA Business Plan

The Business Plan supplements the NDA Strategy which sets out near term objectives and plans for delivering our priorities over the following three year period.

Individual Topic Strategies

The underpinning detail behind the NDA Strategy is shown in the individual topic strategy documents. These documents give the technical information on the development and implementation of the individual strategies.

NDA Internal Business Planning processes

Internally, the NDA has processes for the consideration of the short, medium and long term plans for its sites. The information from these plans supports the development of the annual Business Plan, and the revision of the Strategy document (when required).

Client Specifications

The NDA issues the SLCs with a specification that describes the strategic requirements of the contract, and has introduced the concept of strategic tolerance reporting as a way to monitor the health of strategies.

Sellafield Plan

The Sellafield Plan is produced by Sellafield Ltd to meet a contractual requirement of the NDA, and is revised annually. It gives details of the planned activities and costs of the work required to fully decommission the site to an agreed end-state.

Overview: **Document guide**

How to use the Sellafield Plan

The Sellafield Plan sets out the work that will be completed at Sellafield over the coming years. The information is set out firstly in sections – such as 'risk and hazard reduction' and 'spent fuel management'. Within these sections are individual work programmes – such as 'Pile Fuel Storage Pond' and 'First Generation Magnox Storage Pond'. The following pages will help you to find the information that you are looking for at individual work programme level.

Milestone timeline example:

This part of the table identifies the different financial year periods

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Design, Install and Inactive Commission Retrieval Equipment						
Retrievals Operations and Maintenance						
Preparation for Decommissioning						

This part of the table lists the key activities to be completed

The grey line represents the 'contract baseline' schedule for the work

The purple line represents the 'performance plan' schedule for the same work

Summary of costs example:

Summary of costs:

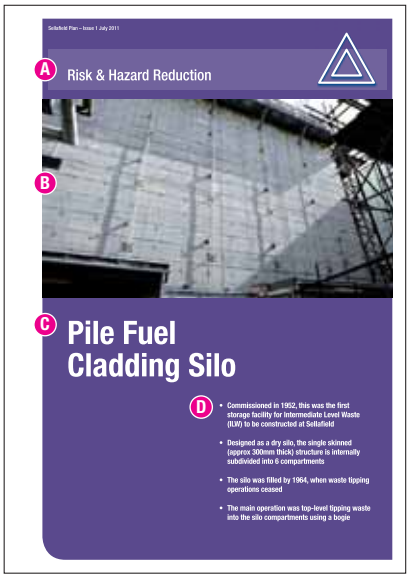
Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
41,658.5	43,322.5	73,052.0	158,033.0	457,554.8	615,587.9

You will find cost summary information for each individual work programme. This information is split between the initial contract term and future contract terms.

This section details the investment in the project for the remainder of the initial contract term (ie the first five years of the NMP contract, starting in year 3)

This section sets out the total cost of the remainder of the initial contract term (years 3, 4 and 5), the total cost of the remaining potential contract term (12 years), and the total investment over the maximum contract term.

Overview: Document guide



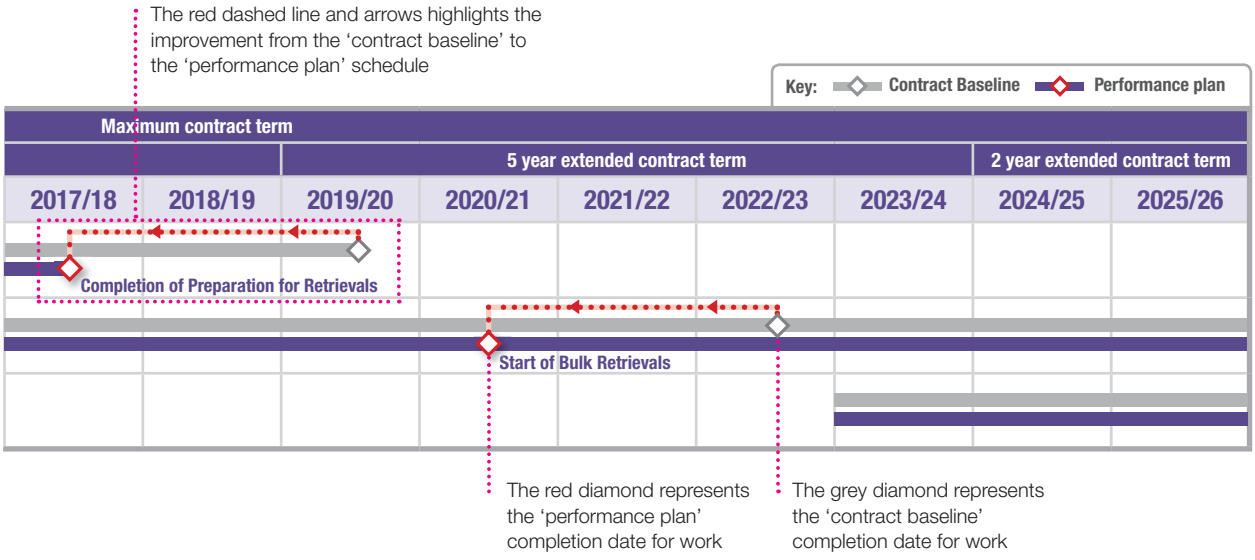
The front page of each work programme section sets out some 'at a glance' information. From this page you can see

A. **Section title**

B. **Picture of plant or key activity**

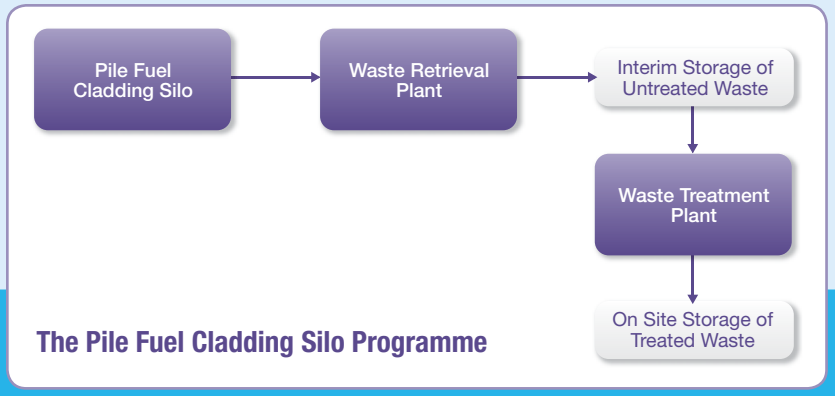
C. **Programme title**

D. **Overview of current status, key activities and processes from the past or present day**



Plant programme diagram example:

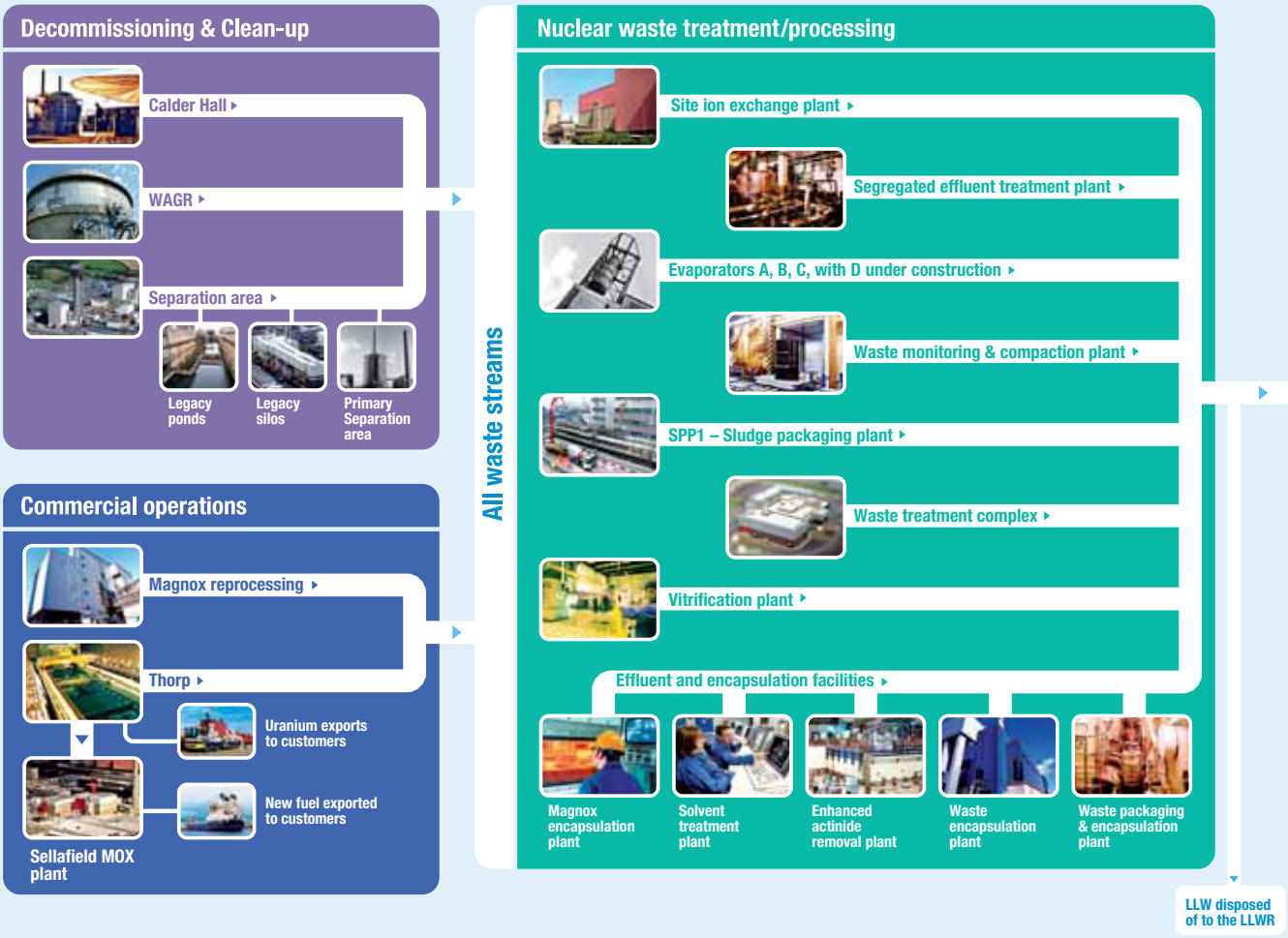
The majority of plants and processes at Sellafield rely in some way on the availability of other plants and processes. Each section features flow diagrams like this which highlight the work programme in relation to others.



Overview: Sellafield site activities

Sellafield site activities

The Sellafield site is home to a wide range of interdependent nuclear facilities and operations. These range from hazard and risk reduction, decommissioning, reprocessing, fuel manufacturing and nuclear waste management.



In order to decommission the Sellafield site it is necessary to first build some new facilities that will treat and store the waste generated

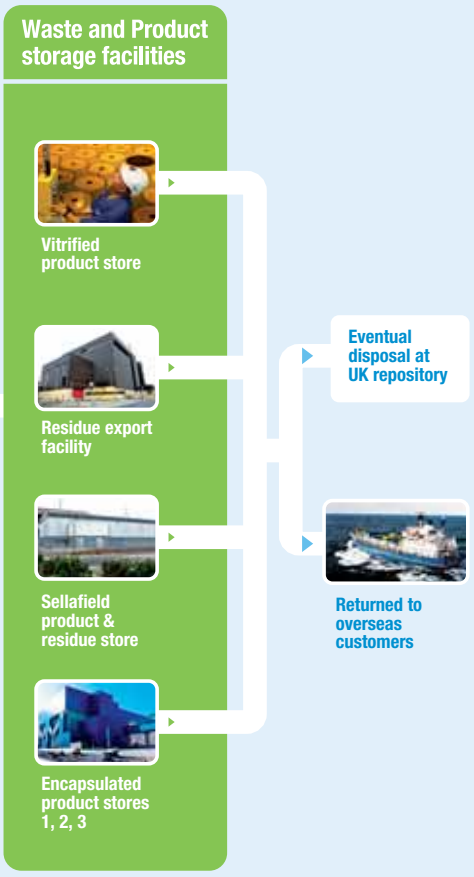
The safe management of nuclear waste is a specialist area for the Sellafield workforce

The Sellafield site is home to two reprocessing plants – the Thermal Oxide Reprocessing Plant and the Magnox Reprocessing Plant

Overview: Sellafield site activities

Measuring 2 square miles, the Sellafield site is home to over two hundred nuclear facilities and over one thousand buildings. The primary mission on the site is the safe acceleration of risk and hazard reduction.

Other operations on the Sellafield site include nuclear waste management, reprocessing and fuel manufacturing. This is all carried out by a 10,000 strong workforce.



Primary operations:

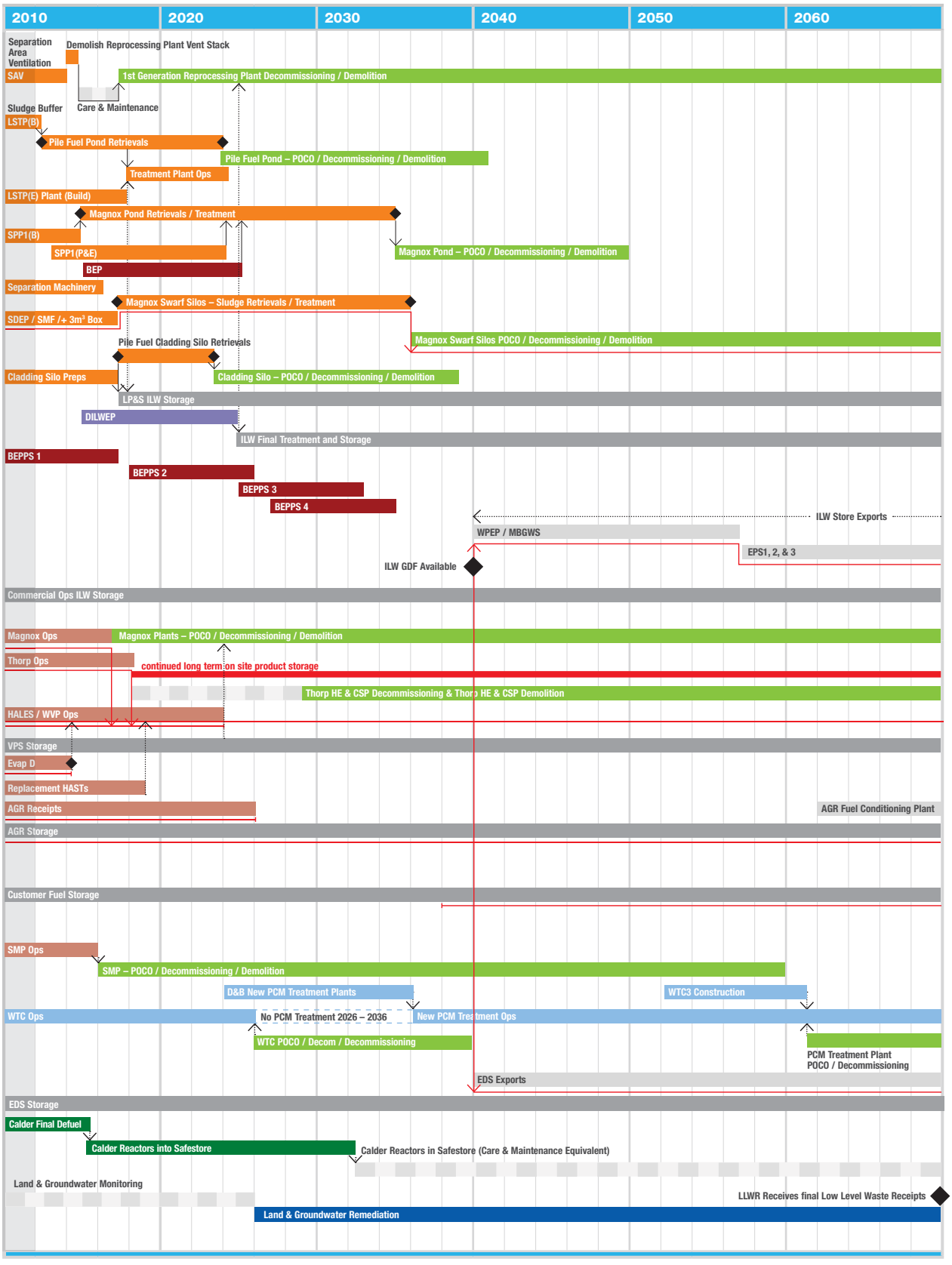
- Risk and hazard reduction including decommissioning Legacy Ponds and Silos buildings which are among the oldest facilities on the Sellafield site
- Commercial operations including spent fuel management and associated operations with UK and foreign customers
- The safe treatment of low level, intermediate level and high level waste. Low level waste is compacted and sent to the Low Level Waste Repository for storage. Intermediate level waste is mixed with grout and stored in drums inside engineered stores. High level waste is mixed with molten glass to create a stable solid substance suitable for long term storage
- Asset care and maintenance – some of the facilities at Sellafield are over 60 years old so a significant investment is required to ensure that they remain operational and in a safe state prior to decommissioning

Where possible to treat very low level waste, removing the surface contamination and allowing the remaining material to be recycled

The final stage of the decommissioning programme is the demolition of the empty facilities

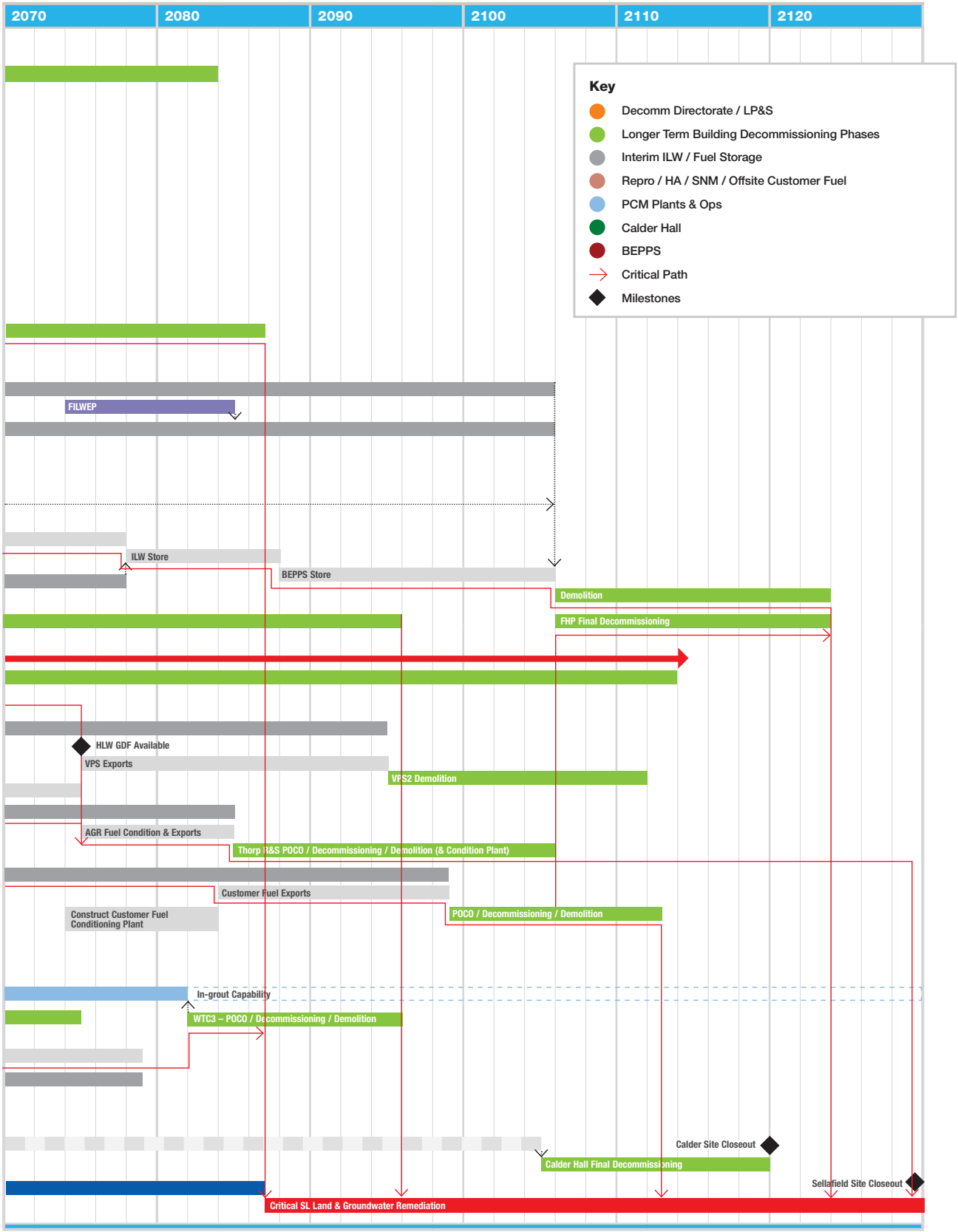
Overview: Key plants and projects

Key plants and projects



Overview: Key plants and projects

The chart below provides a very high level overview of the Sellafield Plan in its entirety. Further detail on this scope can be found in the relevant section of this document.



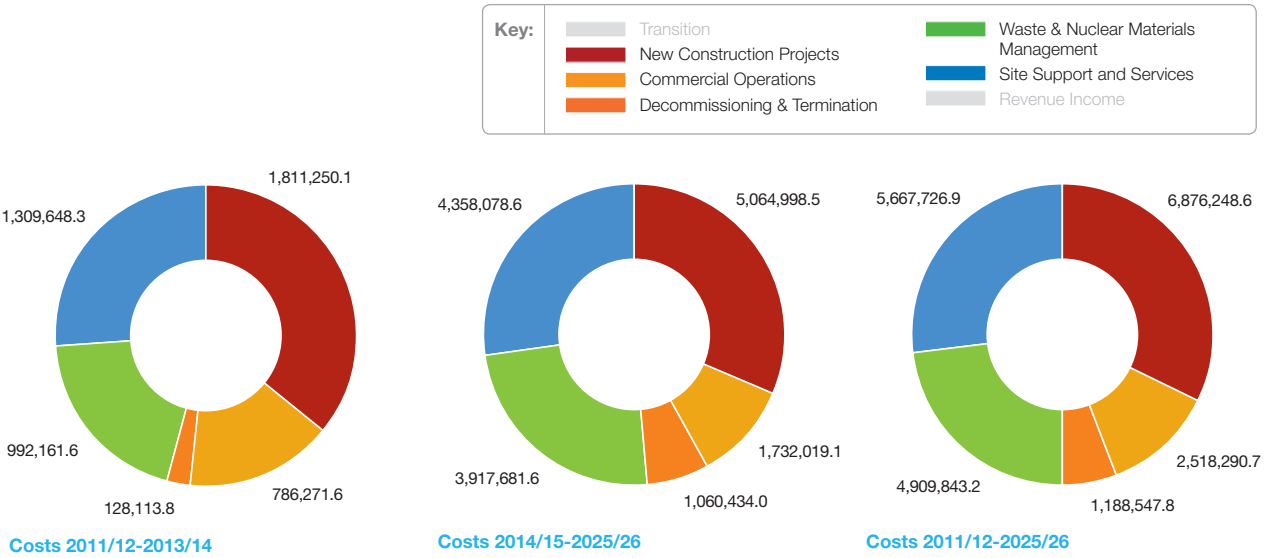
Overview: Sellafield Plan Summary Costs

Sellafield Plan Summary Costs 2011/12-2025/26

Category	Initial contract term		
	2011/12	2012/13	2013/14
Transition	–	–	–
New Construction Projects	554,879.1	601,369.4	655,001.6
Commercial Operations	264,136.0	264,584.4	257,551.3
Decommissioning & Termination	44,492.8	44,253.5	39,367.6
Waste & Nuclear Materials Management	324,702.5	335,994.1	331,465.1
Site Support and Services	455,185.7	440,638.2	413,824.3
Total	**1,643,395.9**	**1,686,839.5**	**1,697,209.9**
Escalated value	**1,643,395.9**	**1,739,131.5**	**1,804,068.0**
Discounted value	**1,643,395.9**	**1,650,527.9**	**1,624,926.7**
Revenue Income	13,742.9	13,635.0	13,748.4

The four year spending settlement from Government implies an annual site funding for Sellafield Ltd around £1.5bn, as reflected in the illustrations above. The costs shown in the tables included in the separate sections of the plan are based on a set of assumptions on the level of efficiencies and acceleration for completing the overall work programme. Actual levels of efficiencies achieved will determine how much work can be delivered within the spending settlement. For that reason costs shown in those separate sections are indicative and are not directly comparable with those shown above. Some sections do not contain detailed financial information, where commercial confidentiality prevents publication.

Overview: Sellafield Plan Summary Costs



Category	Total (£k) 2011/12-2013/14	Total (£k) 2014/15-2025/26	Total (£k) 2011/12-2025/26
Transition	–	–	–
New Construction Projects	1,811,250.1	5,064,998.5	6,876,248.6
Commercial Operations	786,271.6	1,732,019.1	2,518,290.7
Decommissioning & Termination	128,113.8	1,060,434.0	1,188,547.8
Waste & Nuclear Materials Management	992,161.6	3,917,681.6	4,909,843.2
Site Support and Services	1,309,648.3	4,358,078.6	5,667,726.9
Total	5,027,445.4	16,133,211.8	21,160,657.2
Escalated value	5,186,595.5	20,770,204.3	25,956,799.8
Discounted value	4,918,850.5	13,564,331.4	18,483,182.0
Revenue Income	41,126.2	154,589.5	195,715.8

Overview: Glossary

Glossary

Advanced Gas-cooled Reactor
An Advanced Gas-cooled Reactor (AGR) is a type of nuclear reactor. These are the second generation of British gas-cooled reactors, using graphite as the neutron moderator and carbon dioxide as coolant.

Analytical Services Labs
Provides two main functions: Facilities for undertaking scientific research and facilities for undertaking analytical work.

Box Encapsulation Plant
Designed to sort and encapsulate in cement a wide range of solid radioactive intermediate level waste and export boxes of encapsulated product to a purpose-built store for interim storage pending the availability of a Geological Disposal Facility.

Box Transfer Facility
Will provide export routes for waste retrieved from the Magnox Swarf Storage Silos and processed in the Silos Direct Encapsulation Plant. Currently under construction.

Calder Hall
The world's first commercial nuclear power station and part of the UK's fleet of Magnox nuclear power stations. Calder Hall ceased operations in March 2003.

Clinoptilolite
A sand material which is used in the Site Ion Exchange Plant.

Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1
Will incorporate the completion and expansion of a purpose-built above ground nuclear waste store and an import/export facility to handle the waste. Currently under construction.

Decommissioning
Withdraw a facility from service and make it inoperative, dismantling and decontaminating it ready for demolition.

Engineered Drum Stores
Provide modern fit-for-purpose storage for intermediate level waste.

Engineered Product Store
Intermediate level waste store at Sellafield.

Enhanced Actinide Removal Plant
Supports both Magnox and Thorp reprocessing and removes radioactive components from waste liquid effluent streams.

Evaporator D
This new highly active evaporator is currently under construction and will support reprocessing operations.

First Generation Magnox Storage Pond
Constructed in the 1950s and 1960s, the facility was used to store, cool and prepare Magnox fuel for reprocessing.

First Generation Reprocessing Plants
Constructed during the late 1940s and early 1950s, the facility carried out the first stage of reprocessing fuel from the Windscale Pile reactors.

Floc Storage Tanks
A series of ten concrete storage tanks which were built in the 1950s. They were used to store liquid effluents produced from reprocessing operations. Overlying liquid was discharged from the tanks leaving a sludge like substance which is now being retrieved for processing.

Fuel Fabrication Facilities
Redundant fuel fabrication facilities.

Fuel Handling Plant
Responsible for receiving, storing and mechanically processing spent nuclear fuel from Magnox and Advanced Gas-cooled Reactor stations from across the UK.

Highly Active Liquor Tank
Commissioned to generate radiotherapy sources for commercial and medical use.

Highly Active Liquor
Highly Active Liquor is classed as high level waste and is a by-product of reprocessing spent nuclear fuel. It contains 99% of the radioactivity from spent nuclear fuel.

Highly Active Liquid Effluent Storage Plant
The plant stores, concentrates and conditions Highly Active Liquor (HAL) in evaporators for buffer storage in Highly Active Storage Tanks (HAST).

Highly Active Evaporators
The highly active evaporators at Sellafield play a pivotal role in the delivery of reprocessing, historic clean-up and hazard reduction missions across the site. They reduce the volume of highly active liquors which are then fed to the Vitrification Plant.

Inactive commission
Work done to prepare the facility for operations before radioactive material is introduced. Once radioactive material is introduced to the facility a period of active commissioning is undertaken before the facility goes into full operations.

International Nuclear Services
International Nuclear Services a wholly owned subsidiary of the NDA, is the commercial agency for spent fuel management services in the UK and is the world's most experienced global shipper of nuclear materials.

Low Active Effluent Treatment Tank
Sludge storage tanks which are being emptied as part of the Floc Retrieval Project (see Floc Storage Tanks section of the plan).

Low Level Waste Repository
The UK's national low level waste repository is situated approximately seven miles south of the Sellafield site.

Magnox Encapsulation Plant
Designed to process solid intermediate level waste, packaging it into drums which are grouted to create a waste which is suitable for handling, transport, storing and eventual disposal.

Magnox Reprocessing Plant
Magnox reprocessing operations began in 1964. The plant is used for the decanning, dissolution and retrieval of uranium and plutonium components of spent Magnox fuel from throughout the UK.

Magnox Swarf Storage Silos
Constructed in the 1960s and extended during the 1970s and 1980s, the facility was built to hold irradiated decanning wastes (Magnox swarf and miscellaneous intermediate level waste).

Overview: Glossary

Medium Active Liquor Tank Farm
Provides buffer capacity for day-to-day plant operations in both Thorp and Magnox reprocessing plants, whilst also providing an interim storage facility for solvent and aqueous liquors before they are processed in the Enhanced Actinide Removal Plant and the Solvent Treatment Plant.

Metal Decontamination Facility
Used to mechanically remove the outer surface of contaminated steel to clean metal for recycling.

Miscellaneous Beta Gamma Waste Store
The facility packs different types, sizes and shapes of waste materials and equipment, minimising the volume for storage. The waste packages are then placed into a temperature and humidity-controlled store.

Multi-element Bottles
Multi-element bottles are used to store Light Water Reactor spent fuel assemblies in Thorp storage ponds.

North Group Compound
Historic contaminated waste stores.

Pile Chimney
Originally there were two pile chimneys built between 1947 and 1950. The chimneys (or ventilation shafts) discharged cooling air from the two Pile Reactors.

Pile Fuel Cladding Silo
Built in the 1950s, the building was the first storage facility for intermediate level waste to be constructed at Sellafield. It is one of Sellafield's Legacy Pond and Silo facilities.

Pile Fuel Cladding Silo Retrievals Building
The building which will house the remote equipment needed to empty the Pile Fuel Cladding Silo.

Pile Fuel Storage Pond
Constructed between 1948 and 1952, the facility was used to store, cool and prepare Windscale Pile fuel for reprocessing.

Plutonium Contaminated Materials
Tools and equipment that come into contact with plutonium during operations. These items are treated as intermediate level waste.

POCO
The actions taken by the plant operators at the end of the plant's operational life to allow the structured and recorded removal of residual plant process inventory or stored wastes, utilising existing plant facilities and processes.

Residue Export Facility
A key facility in the programme of returning vitrified waste to its country of origin.

Salt Evaporator Plant
Supports the operation of the Thorp and Magnox reprocessing operations. It evaporates high 'salt' liquors that would otherwise limit the evaporation factors achieved in other on-site evaporators.

Sellafield MOX Plant
Manufactures mixed oxide fuel.

Segregated Effluent Treatment Plant
Receives, neutralises and buffer-stores low active effluents to facilitate sampling and analysis prior to discharge.

Separation Area
The Separation Area at Sellafield is home to some of the oldest buildings on the site, including the Legacy Pond and Silo facilities.

Separation Area Lagoon
This lagoon provides a collection and discharge facility for surface water drainage and pumped groundwater from the Separation Area.

Separation Area Ventilation Plant
Comprises a new ventilation plant room and the equipment needed to carry ventilation ductwork from the existing donor plants through to the monitoring plant room and up to the new discharge stack. Currently under construction.

SEP Product Finishing and Storage Facility
Provides interim storage capacity for plutonium products from Magnox Reprocessing.

SEP Purification Plant
Constructed to purify plutonium nitrate from fission products.

Silos Direct Encapsulation Plant
Will be used to immobilise waste exported from the Magnox Swarf Storage Silos.

Site Ion Exchange Plant
Used to treat pond storage water from across the Sellafield site by removing the radio nuclides before the effluent is discharged to sea, within the appropriate discharge limits set by our regulators.

Sludge Packaging Plant 1
Will hydraulically receive sludge from the Fist Generation Magnox Storage Pond. Currently under construction.

Solid Waste Storage Cells
Used as a store for Medium Beta Gamma Waste arising from Magnox reprocessing.

Solvent Treatment Plant
Used for the treatment of waste solvent from Thorp, Magnox and historic solvent in storage. It is the only UK facility which can process radioactive solvent.

Thorp
The Thermal Oxide Reprocessing Plant (Thorp) combines all of the facilities needed to reprocess spent oxide fuel under one roof. It reprocesses both UK and foreign spent fuel.

Vitrification
Involves drying high level liquid waste to a powder, mixing it with glass and heating it to a temperature of around 1,200 degrees Celsius. Molten mixture is poured into stainless steel containers and allowed to solidify. The process reduces the liquid waste volume to about a third of its original liquid size.

Vitrified Product Store
Once high level waste has been vitrified the full stainless steel containers are stored in the Vitrified Product Store.

Waste – low level waste
Makes up the largest physical volume of radioactive waste and is only slightly radioactive. Includes things like protective clothing, paper towels, gloves and building fabric.

Glossary cont.

Waste – intermediate level waste
Includes materials such as fuel element cladding, contaminated equipment, radioactive sludge and plutonium contaminated material (PCM) that arises from both historic and current operations. The waste is put into stainless steel drums, which are then filled with cement grouting before being placed into a special above-ground storage facility.

Waste – high level waste
High level waste is produced when spent fuel has been reprocessed through the Magnox and Thorp facilities. At Sellafield, this waste is treated through a process called vitrification. This involves converting the high-level liquid waste into a solid form, reducing the volume of the liquid waste to one third of its original size. Vitrifying the waste enables the material to be stored safely and in preparation for eventual transport and disposal.

Waste Monitoring and Compaction Plant
Low level waste is monitored and compacted in this facility. The compaction process reduces the low level waste to a quarter of its original size before it is exported to the Low Level Waste Repository.

Waste Packaging and Encapsulation Plant
Treats waste which arises from the Low Active Effluent Treatment facilities (including the Enhanced Actinide Removal Plant).

Waste Treatment Complex
Provides for the supercompaction of plutonium contaminated material in 200 litre drums.

Waste Treatment Facility
Will condition intermediate level waste into a format for long term storage and eventual disposal when a Geological Disposal Facility becomes available. Currently under construction.

Wet Inlet Facility
Safely manages used nuclear fuel on behalf of customers.

Windscale
Windscale was historically a separate licensed site located on the Sellafield site. On 1 April 2008 the site licence for Windscale was transferred to Sellafield Ltd, integrating the two sites. Windscale is home to the iconic Windscale Advanced Gas-cooled Reactor.

Risk & Hazard Reduction

Risk & Hazard Reduction Sellafield's Top Priority

The Nuclear Decommissioning Authority's Strategy, approved by the Secretary of State for Energy and Scottish Ministers in March 2011 has at its heart the priority of reducing risk and hazard and to deliver the clean-up mission cost-effectively.

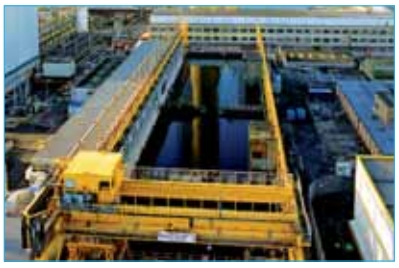
This is particularly relevant at Sellafield where the Legacy Ponds and Silos pose the most significant challenges, and where it is essential that tangible, demonstrable progress is made.

The Legacy Ponds and Silos comprise of four main plants on the site which were used historically to prepare fuel for reprocessing or store waste.

They are:

- Pile Fuel Storage Pond
- First Generation Magnox Storage Pond
- Magnox Swarf Storage Silos
- Pile Fuel Cladding Silo

Radioactive materials have accumulated and remain since operations ended. For over five decades plant conditions have deteriorated and there is now an increased urgency to reduce the risk they pose. The facilities were not designed with decommissioning in mind so innovative technology is being used to retrieve the radioactive material for storage in modern containment facilities, ahead of its subsequent treatment, packaging and storage.



Aerial view of Pile Fuel Storage Pond

Elevated view of First Generation Magnox Storage Pond

The importance placed on making real progress in this area has driven the increase of resources the Government and NDA have made available at Sellafield, as referred to in the Overview section of this document.

External view of Magnox Swarf Storage Silo

External view of Pile Fuel Cladding Silo

The work programmes to deliver risk and hazard reduction in the Legacy Ponds and Silos are detailed in this section of the plan and are a national priority.

Risk & Hazard Reduction

Floc Storage Tanks

- Series of ten concrete storage tanks built in the 1950s
- Used to store liquid effluents produced through reprocessing operations
- Overlying liquid was discharged leaving floc – a sludge like substance – in the tanks
- Tanks operated until the mid-1990s when the Low Active Effluent Treatment plants came online

Risk & Hazard Reduction: Floc Storage Tanks

Overview

'Floc' is a sludge like material which is classed as intermediate level waste. It is currently being retrieved from storage tanks at Sellafield and being processed and encapsulated in cement before being stored in modern fit-for-purpose stores pending long term disposal.

Legacy

The Floc Storage Tanks at Sellafield are a series of ten concrete tanks built in the 1950s. Liquid effluents produced as a result of reprocessing operations were historically held in these large concrete tanks.

Although the overlying layer of liquid was discharged to the sea as liquid waste, the remaining floc stayed in the tanks. More than 99% of the radioactivity was contained in this floc – which remained in the tanks. The tanks operated until the mid-1990s when the Low Active Effluent Treatment plants came on stream.

The tanks are now over fifty years old and are unsuitable for indefinite storage of the waste.

Arrangements have been made to treat this intermediate level radioactive waste and encapsulate it in cement. In order to do this the sludges from the tanks must first be resuspended with water and then transferred into a buffer store from which they will be fed into the Low Active Effluent Treatment plants for processing and encapsulation.

Although emptying a tank takes a matter of weeks, processing the material from each tank will take approximately two years.

Once treated in the Enhanced Actinide Removal Plant at Sellafield, the material will be further processed through an ultra filtration system, before being sent to the Waste Packaging and Encapsulation Plant as intermediate level waste for storage.

Floc is contained within a series of storage tanks at Sellafield which are now over fifty years old

A project was completed in the 1990s to install an overbuilding above the storage tanks and to refurbish the tanks themselves

Risk & Hazard Reduction: Floc Storage Tanks

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high risk and hazard reduction**
- **Progress decommissioning and clean-up**

The floc is being treated as intermediate level waste and encapsulated into steel drums for long term storage

Solutions:

The forward programme for the clean-up and decommissioning of the Floc Storage tanks is to:

- Immobilise and transfer floc to the Enhanced Actinide Removal Plant
- Treat floc in the Enhanced Actinide Removal Plant and then transferred to the Waste Packaging and Encapsulation Plant as intermediate level waste
- Decommission tanks
- Demolish buildings

Key challenges:

- **The floc is currently stored in tanks which are over fifty years old. This ageing infrastructure is a key challenge to the project**
- **Once retrieved the floc is processed in the enhanced actinide removal plant at Sellafield, so the availability of this plant is crucial to the success of the programme**
- **The programme relies on the availability of a number of other downstream waste plants including the Waste Packaging and Encapsulation Plant**

Risk & Hazard Reduction: Floc Storage Tanks

The Plan

Floc Storage Tanks Strategic Objectives:

1. **Maintain the asset and ensure the continued safe storage of the radioactive waste inventory**
2. **Retrieve floc (around 95% of inventory) from the tanks for processing through the Enhanced Actinide Removal Plant and the Waste Packaging and Encapsulation Plant**

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Floc Retrieval Operations						
Sludge Storage Tanks POCO						
Sludge Storage Tanks Decommissioning						
Sludge Storage Tanks ID2 – Local Encapsulation Plant Construction		Technical & Development work commences			Capital Project Commences	

The Floc Storage Tanks programme retrieves floc created from the first Generation Reprocessing programme and stored in the floc tanks to a buffer tank. This floc is immobilised and sent to intermediate level waste storage.

The programme to complete the retrieval of the floc material is scheduled for completion during the 2020/21 financial year. Following a Post Operational Clean Out (POCO) phase, the sludge storage tanks will begin their decommissioning programme in 2022/23. This programme will include the retrieval of the heels and clinker.

In parallel, a programme to design and construct a local encapsulation plant is being undertaken with construction scheduled for completion during the 2024/25 financial year.

In 1998 a containment building was constructed and slid into position over the storage tanks

Successful transfers of the floc material to the Enhanced Actinide Removal Plant have already taken place

Risk & Hazard Reduction: Floc Storage Tanks

3. Develop a process to retrieve heels and clinker beds

4. Retrieve heels and clinker

5. Decommission the floc storage tanks complex

6. Support the delivery against UK discharge strategy on liquid discharges

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
3,206.4	4,448.2	3,393.7	11,048.2	58,998.6	70,046.8

For more information please see pages 16 and 17 of the overview section

Risk & Hazard Reduction: Floc Storage Tanks

Enablers

Enhanced Actinide Removal Plant

The Enhanced Actinide Removal Plant supports both Magnox and Thorp reprocessing operations as well as processing material that has been retrieved from the floc storage tanks, and the historic backlog and future arisings of medium active liquor at Sellafield.

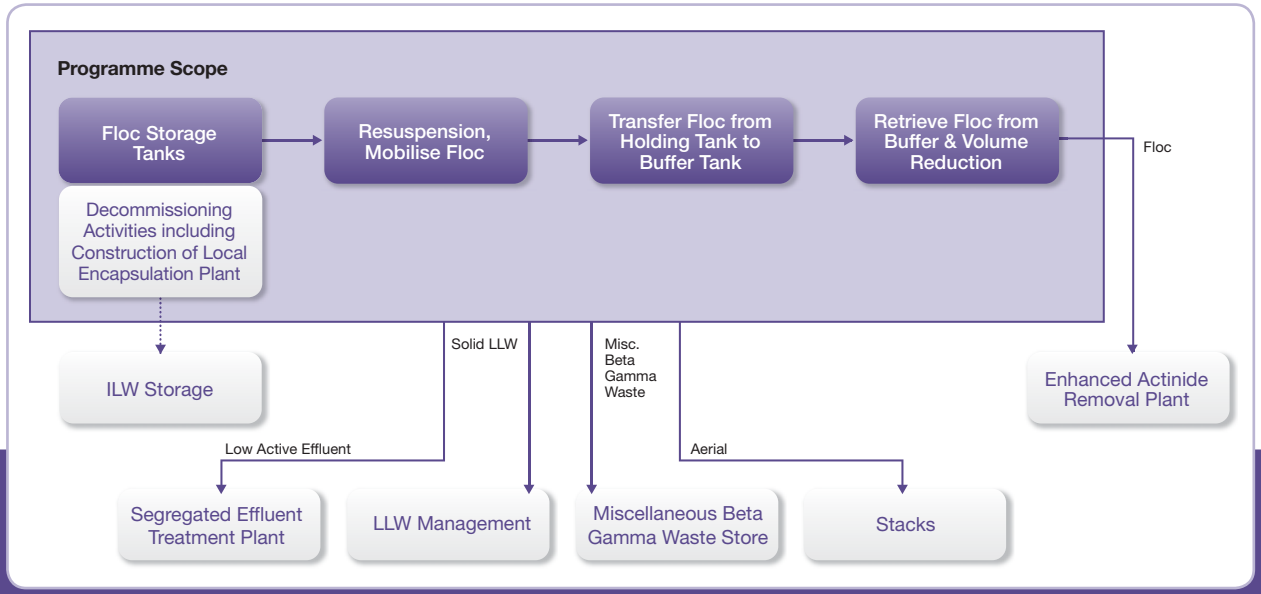
It provides the means for the removal of radioactive components from waste liquid effluent streams.

Waste Packaging and Encapsulation Plant

The Waste Packaging and Encapsulation Plant at Sellafield is a facility for the treatment of wastes arising from the Low Active Effluent Treatment facilities (including the Enhanced Actinide Removal Plant).

The Enhanced Actinide Removal Plant (above) is a key enabler to this programme as it processes the retrieved floc

The Waste Packaging and Encapsulation plant – encapsulation line



The Floc Storage Tanks Programme

Risk & Hazard Reduction

First Generation Reprocessing Plants

- Constructed during the late 1940s and early 1950s
- Carried out first stage of reprocessing fuel from Windscale Pile Reactors at Sellafield
- Ceased operations in the 1970s

Risk & Hazard Reduction: First Generation Reprocessing Plants

Overview

Constructed during the late 1940s and early 1950s, the First Generation Reprocessing Plants carried out the first stage of reprocessing for fuel from the Windscale Pile Reactors and later for oxide fuel before it closed in the 1970s.

Legacy

The First Generation Reprocessing Plants were constructed in the early 1950s to carry out the first stage of reprocessing fuel from the Windscale Pile Reactors. It was later modified for oxide fuels following the opening of the Magnox Reprocessing Plant, before ceasing operations in the 1970s.

The plant was used to reprocess early reactor fuel before being converted to a head-end treatment plant where fuel was sheared.

The plant contains four highly active cells, each containing redundant radioactive material and two medium active cells. The Highly Active North Outer cell was also used as a shielded ventilation route from 1966 to 1988.

The building also has a 61m stack which is housed on the building roof. The primary decommissioning challenge associated with the First Generation Reprocessing Plants is the safe removal of this stack.

The location of the stack on the roof of the building presents a unique demolition challenge.

Physical demolition of the plant can not be completed until a new ventilation plant – the Separation Area Ventilation Plant – is constructed and commissioned.

The First Generation Reprocessing Plants programme of work also includes the decommissioning of the Thorp Miniature Pilot Plant.

Historic image of the First Generation Reprocessing Plants

A laser image of the inside of the First Generation Reprocessing Plants

Risk & Hazard Reduction: First Generation Reprocessing Plants

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high hazard and risk reduction**
- **Progress decommissioning and clean-up**

The construction of the new Separation Area Ventilation Plant is a key step in the programme. The construction of the stack is already complete

Solutions:

The forward programme for the First Generation Reprocessing Plants is to:

- Construct a new Separation Area Ventilation Plant
- Stabilise the Highly Active North Outer cell
- Demolish the existing First Generation Reprocessing Plant stack
- Decommission the Thorp Miniature Pilot Plant
- Decommission the Primary Separation Head End Plant
- Decommission all facilities

Key challenges:

- **The facility is situated in a congested area of the Sellafield site, which presents a unique environment for decommissioning work**
- **The high levels of radiation in the facility and potential for contamination**
- **Availability of existing downstream waste plants**
- **Availability of new facilities when needed – crucially the completion of the Separation Area Ventilation project**

Historic aerial view of Sellafield with the First Generation Reprocessing Plants in the foreground

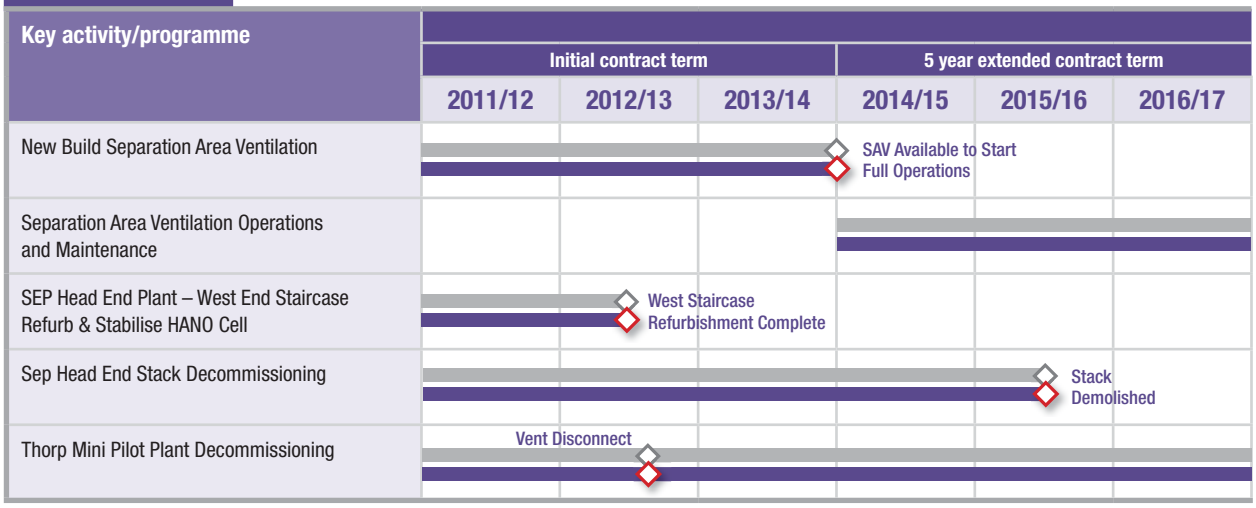
Risk & Hazard Reduction: First Generation Reprocessing Plants

The Plan

First Generation Reprocessing Plants Strategic Objectives:

1. Maintain safe operations
2. Construct and operate the Separation Area Ventilation Plant
3. Remove First Generation Reprocessing Plants stack
4. Decommissioning of all facilities

Milestones:



The First Generation Reprocessing Plants programme scope is the decommissioning of the Primary Separation Head End Plant, the Thorp Miniature Pilot Plant housed in legacy buildings and their associated secondary buildings.

The construction and subsequent operation of the Separation Area Ventilation Plant along with removal of the separation area ductwork made redundant by the Separation Area Ventilation project are also covered in this programme.

The short term priority is the demolition of the Separation Head End Plant Stack which cannot be completed until the new Separation Area Ventilation Plant is constructed and commissioned with all associated pipework in place.

The Separation Area Ventilation Stack will be available to start full operations in 2014.

The Separation Area Ventilation project is a key deliverable in this work programme

The decommissioning of the First Generation Reprocessing Plants is already under way

Risk & Hazard Reduction: First Generation Reprocessing Plants

Key: Contract Baseline Performance plan

Maximum contract term								
		5 year extended contract term					2 year extended contract term	
2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
41,344.0	22,966.2	10,476.2	74,786.4	82,458.9	157,245.3

For more information please see pages 16 and 17 of the overview section

Risk & Hazard Reduction: First Generation Reprocessing Plants

Enablers

Separation Area Ventilation Plant

The Separation Area Ventilation project – a major design and build – comprises a new two-storey ventilation plant room housing the ventilation equipment, a ventilation discharge monitoring plant room and a series of new steel support structures.

These carry ventilation ductwork from existing donor plants through to the monitoring plant room and up to the new discharge stack.

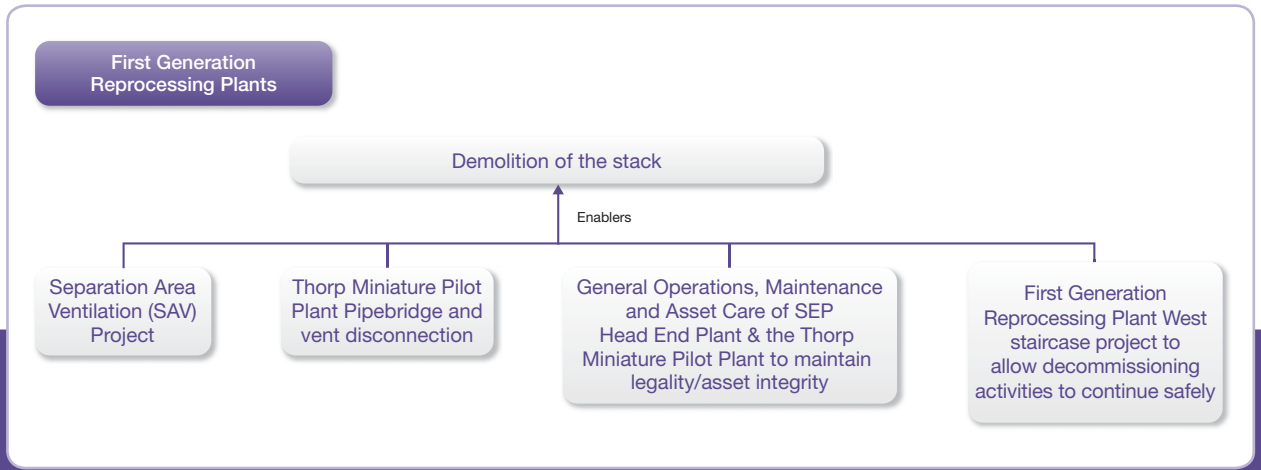
Thorp Miniature Pilot Plant vent disconnection

Thorp Miniature Pilot Plant's ventilation discharge is to be disconnected from Primary Separation Plant ventilation stack, as an enabler to the stack demolition. This work will also allow the ventilation duct and supporting bridge between Thorp Miniature Pilot Plant and the Primary Separation Plant to be removed, thus avoiding the costs of further repair and maintenance of the corroding structure.

First Generation Reprocessing Plants West Staircase Project

The SEP Head End Plant external west staircase is being subject to extensive renovation in order to ensure that the building meets statutory fire escape regulations to allow decommissioning work to continue unhindered throughout the facility. The 6th to 10th floors will be enclosed with cladding to allow the refurbished staircase to meet the requirements of decommissioning which is scheduled to run until 2077.

The Separation Area Ventilation project discharge stack has been constructed on the Sellafield site



The First Generation Reprocessing Plants

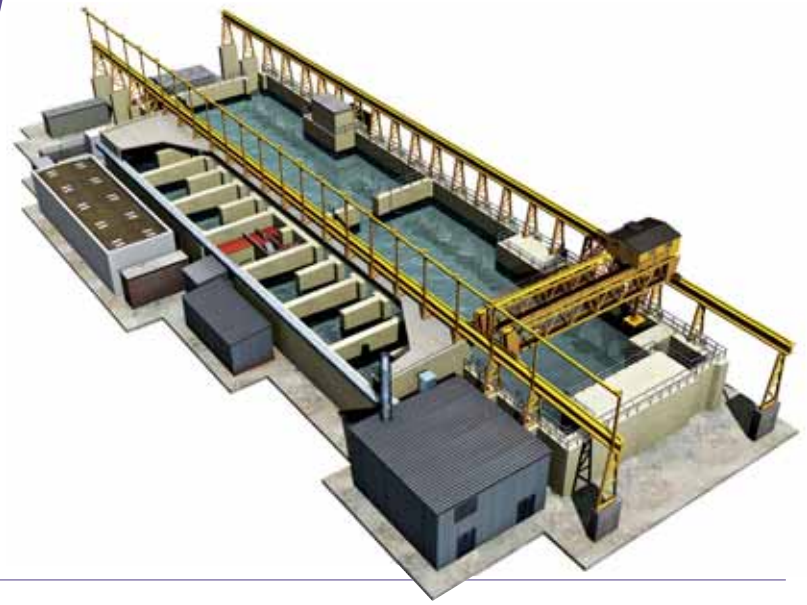
Risk & Hazard Reduction

Pile Fuel Storage Pond

- Constructed between 1948 and 1952
- Used to store, cool and prepare Windscale Pile fuel for reprocessing
- Waste consists of fuel, sludge and miscellaneous intermediate level waste (ILW) and low level waste (LLW)

Risk & Hazard Reduction: Pile Fuel Storage Pond

Overview



The Pile Fuel Storage Pond at Sellafield is one of the site's four Legacy Pond and Silo facilities. We are focused on safely decommissioning these buildings as part of our hazard and risk reduction programme.

Legacy

The construction of the First Generation Magnox Fuel Storage Pond at Sellafield started in 1948 and the facility was commissioned in 1952. It was constructed to receive, cool and decan fuel from the Windscale Piles, prior to reprocessing.

The facility was modified in the mid-1950s to allow the receipt of spent Magnox fuel from the Calder Hall reactors.

The pond and adjoining decanning building provided the storage and cooling facility for used fuel and isotopes from the two Windscale reactors.

The pond is a sub-divided outdoor storage pond containing skips of irradiated fuel. The building contains a series of sub-ponds, otherwise known as bays, connected underwater to the main pond.

Following the closure of the Windscale Pile reactors and the commissioning of the First Generation Magnox Fuel Storage Pond, plant operations were scaled down, although the facility was still used as a cooling and decanning facility for some materials.

When decanning in the plant stopped in 1962 the pond continued to be used as storage for fuel, contaminated items, and operational waste.

During its working life the pond processed 2,100te of pile fuel and 300te of Magnox fuel. All operations in the pond ceased in the 1970s.

The Pile Fuel Storage Pond combines used nuclear fuel, sludge, intermediate level waste and pond water, each of which needs to be safely removed and processed through separate routes.

Historic view of the Pile Fuel Storage Pond at Sellafield

Historic aerial view of the Pile Fuel Storage Pond

The Pile Fuel Storage Pond in operation

Risk & Hazard Reduction: Pile Fuel Storage Pond

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high risk & hazard reduction**
- **Progress decommissioning and clean-up**

The ultimate aim for the programme is to empty the Pile Fuel Storage Pond

Solutions:

In order to safely empty and decommission the Pile Fuel Storage Pond the solution is to:

- Retrieve sludge to an in-pond corral
- Construct Local Sludge Storage Tanks and Local Sludge Treatment Plant and export facility (see enablers) for short term storage of sludge
- Provide long term interim storage of the retrieved waste in 3m^3 product boxes
- Recover oxide fuel for reprocessing
- Transfer metal fuel to the Fuel Handling Plant at Sellafield for interim storage
- Package remaining solid ILW inventory into 3m^3 boxes for long term interim storage

Key challenges:

- **The facility is situated in a congested area of the Sellafield site, which presents a unique environment for decommissioning work**
- **The high levels of radiation in the facility and potential for contamination**
- **Availability of existing downstream waste plants including the fuel handling plant and effluent management plants**
- **Availability of the new local sludge treatment plant and the Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1 when needed**

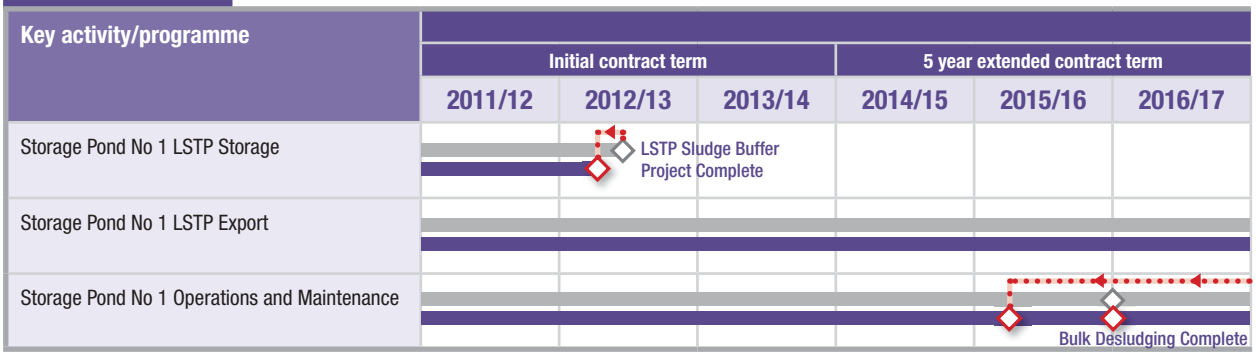
Risk & Hazard Reduction: Pile Fuel Storage Pond

The Plan

Pile Fuel Storage Pond Strategic Objectives:

1. Safe stewardship of nuclear material
2. Restore the basic condition of the asset
3. Reduce risk associated with the storage of nuclear material

Milestones:



The Pile Fuel Storage Pond programme scope is to progressively remove the radiological inventory, reducing the risk and hazard posed by the storage of wastes within the legacy facility.

The sludge is currently being transferred into an in-pond Sludge Corral, where it will be stored pending treatment through the Local Sludge Treatment Plant.

The first major milestone will be to complete the Local Sludge Treatment Plant Sludge Buffer project which involves the transfer of sludge from the in-pond corral to the Local Sludge Storage Tanks.

Bulk desludging will be completed during the 2015/16 financial year and the completion of the Local Sludge Treatment Plant Export Project is planned for the 2017/18 financial year.

The final phase of the programme will see the dewatering and dismantling of the remaining structure to base slab.

A Local Effluent Treatment Plant has been installed to control the activity of the pond liquor using an ion exchange process

In-pond sludge corral installed to provide interim storage for sludge prior to final treatment

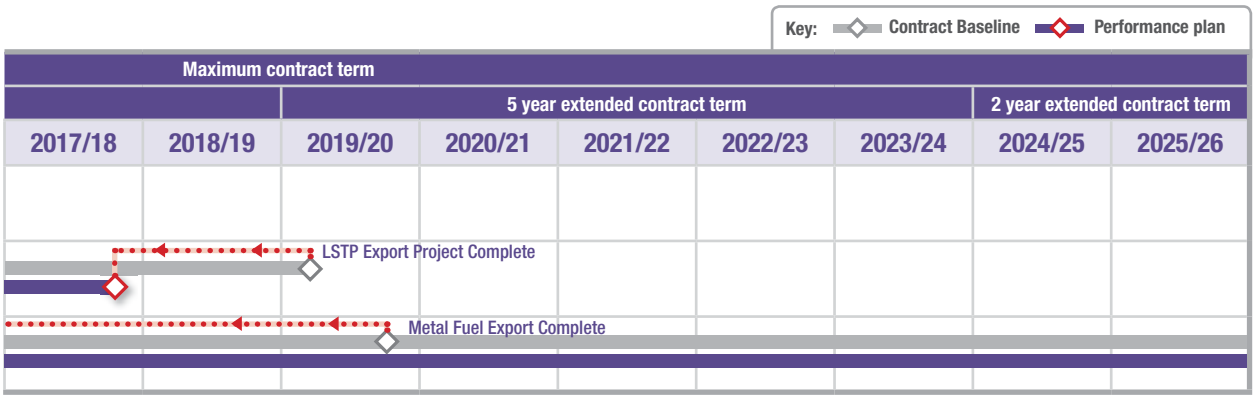
24 fuel skips have already been retrieved from the pond, creating more room for desludging operations

Risk & Hazard Reduction: Pile Fuel Storage Pond

4. Prepare plant for retrievals

5. Retrieve the waste

6. Decommission all of the facilities and reduce the pond to base slab



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
23,573.9	38,110.5	38,102.5	99,786.9	228,918.0	328,704.9

For more information please see pages 16 and 17 of the overview section

A sludge retrieval hood has been installed into the pond. Together with other equipment the hood will help with sludge retrieval operations

A skip tip and wash mechanism has been installed in the building to assist with the recovery of in-pond skips

Risk & Hazard Reduction: Pile Fuel Storage Pond

Enablers

Local Sludge Treatment Plant

The Local Sludge Treatment Plant (LSTP) project will provide the plant and equipment for the safe interim storage of the radioactive sludge once retrieved from the Pile Fuel Storage Pond. The project involves the construction of a new plant located to the north side of the existing pond.

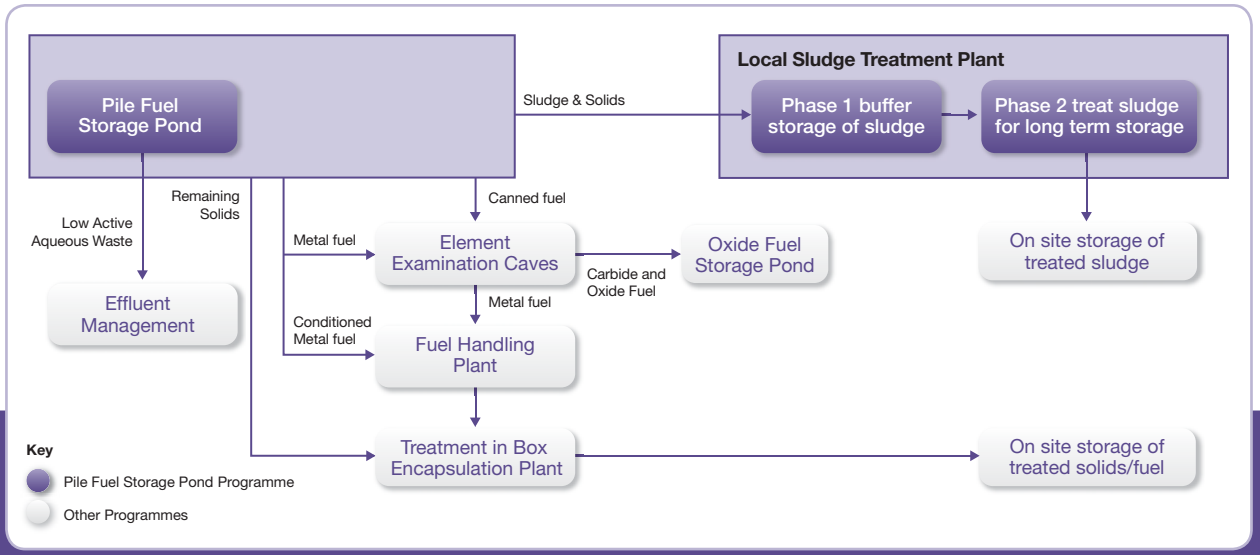
The facility has been designed to provide the equipment to receive the sludge from an in-pond corral then thicken and store the sludge in buffer storage tanks. The project also includes provision of the services, sentencing and sampling equipment required to export the sludge to a future treatment process.

Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1

The BEPPS1 and CIEF project will incorporate the completion and expansion of a purpose built above ground nuclear waste store and the construction of a new import/export facility to handle radioactive waste, arising from the ongoing nuclear decommissioning and high hazard reduction operations at Sellafield.

A Local Sludge Treatment Plant has been constructed near to the Pile Fuel Storage Pond

The Local Sludge Treatment Plant (seen behind the pond) will receive sludge which has been retrieved from the pond



The Pile Fuel Storage Pond programme

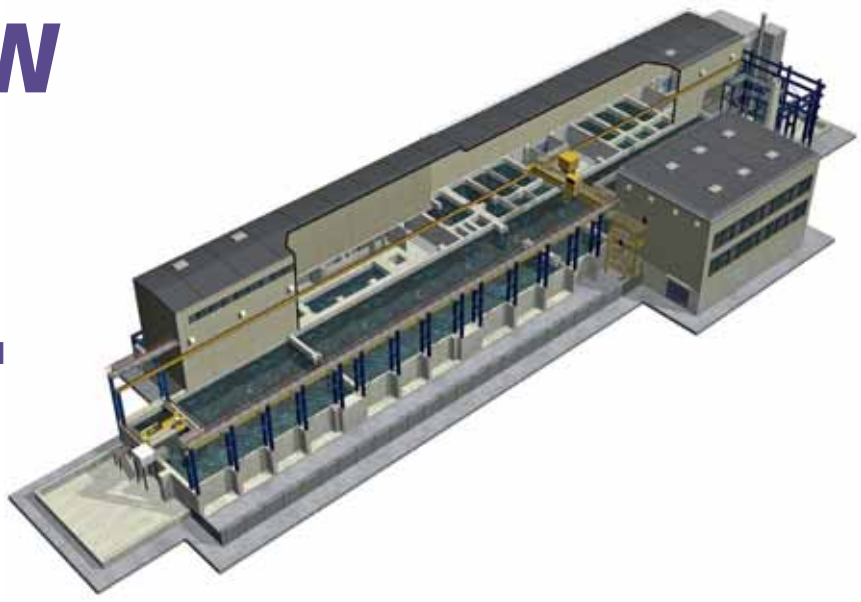
Risk & Hazard Reduction

First Generation Magnox Storage Pond

- Constructed in the 1950s and 1960s
- Constructed to store, cool and prepare Magnox fuel for reprocessing
- Waste consists of sludge, Magnox fuel, miscellaneous intermediate level waste (ILW) and low level waste (LLW) material

Risk & Hazard Reduction: First Generation Magnox Storage Pond

Overview



The First Generation Magnox Storage Pond at Sellafield is one of the site's four Legacy Pond and Silo facilities. We are focused on safely decommissioning these buildings as part of our hazard and risk reduction programme.

Legacy

The Magnox Storage and Decanning Facility was constructed during the 1950s and 1960s as part of the UK's expanding nuclear programme. Its role was to receive and store irradiated fuel from Magnox reactors, and to remove the fuel cladding prior to the fuel being processed.

In 1974, a long reprocessing shutdown at Sellafield caused fuel to be stored underwater in the storage pond for longer periods than normal. This resulted in the Magnox fuel corroding in the pond, which in turn gave rise to increased radiation levels and poor underwater viewing.

This slowed the rate of decanning leading to increased residence times and further fuel corrosion. The plant continued to operate until its replacement, the Fuel Handling Plant at Sellafield, was commissioned in 1986. The final fuel was received into the First Generation Magnox Storage Pond in 1992.

The First Generation Magnox Storage Pond was constructed as an open-air pond. Over the years the pond has accumulated significant quantities of waste materials, sludges from corrosion of fuel cladding, fuel fragments and other debris which has blown into the pond, and skips of fuel.

The First Generation Magnox Storage Pond combines used nuclear fuel, sludge, intermediate level waste and pond water, each of which needs to be safely removed and processed through separate routes.

Historical aerial view of the First Generation Magnox Storage Pond during construction

Historical internal view of the First Generation Magnox Storage Pond before operations

Historical aerial view of the First Generation Magnox Storage Pond

Risk & Hazard Reduction: First Generation Magnox Storage Pond

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high risk and hazard reduction**
- **Progress decommissioning and clean-up**

Sludge will be removed from the pond and transferred to new facilities at Sellafield

Solutions:

In order to safely empty and decommission the First Generation Magnox Storage Pond the solution is to:

- Combine technical innovation, major construction and restoration of historic plant to deliver:
  - sludge retrieved for short term interim storage in a new facility
  - sludge immobilisation into 3m^3 boxes and export for long term storage
- Export fuel to Fuel Handling Plant at Sellafield for short term interim storage
- Export pond solids and fuel in the Fuel Handling Plant for treatment and long term storage

Key challenges:

- **The facility is situated in a congested area of the Sellafield site, which presents a unique environment for decommissioning work**
- **The high levels of radiation in the facility**
- **Availability of existing downstream waste plants including the Fuel Handling Plant and waste treatment plants**
- **Availability of new facilities when needed including the Sludge Packaging Plant 1, Sludge Packaging Plant 1 Process and Export Facility and the Box Encapsulation Plant**

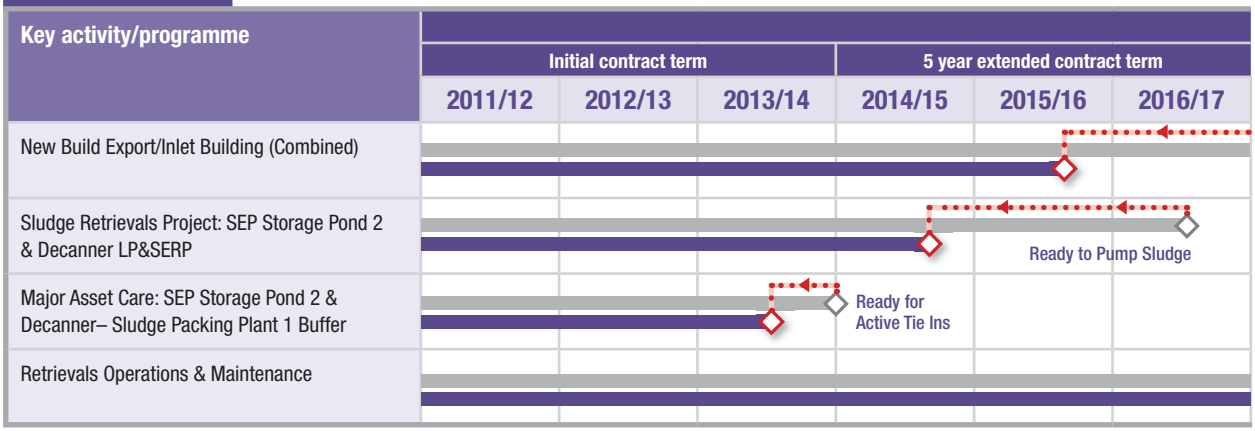
Risk & Hazard Reduction: First Generation Magnox Storage Pond

The Plan

First Generation Magnox Storage Pond Strategic Objectives:

1. Maintain safe storage of the radioactive waste inventory
2. Retrieve sludge
3. Export and immobilise sludge

Milestones:



The First Generation Magnox Storage Pond programme scope is to progressively retrieve and treat the radiological inventory residing within the facility, reducing initially the risk posed by its ongoing storage and then reducing the inherent hazard of the materials.

A new facility – the Sludge Packaging Plant 1 – is currently under construction and will temporarily store the sludge retrieved from the pond. Active tie-ins to the Sludge Packaging Plant are expected to begin during the 2013/14 financial year.

Operations and maintenance work will continue throughout this period.

The plants will be ready to retrieve sludge during 2014/15.

The export of fuel and skips is scheduled to begin during the 2015/16 financial year with bulk desludging complete (2018/19).

Completion of retrieval operations will then enable the dewatering and subsequent dismantling of the remaining structure to its base slab.

The First Generation Magnox Storage Pond Gantry Refurbishment System has successfully completed a key risk reduction enabler for recovery of the pond inventory

We have completed a project to install the first of a series of hammock restraints which will support and capture the High Level Service Lines pipework in the event of a failure

A new pond purge unit will treat the radioactivity in the pond water and is expected to reduce radioactive dose rates for people working around the pond, reduce aerial discharges and reduce operator doses during fuel retrievals

Risk & Hazard Reduction: First Generation Magnox Storage Pond

The Skip Handler steelwork, which supports the return to work of the Skip Handling Machine within the First Generation Magnox Storage Pond, has been extensively refurbished bringing it back into service for use in removing hazardous bulk sludge and solid waste inventory from the pond.

4. Retrieve solids

5. Passivate solids

6. Decommission all facilities and demolish the pond to base slab

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Redundant pipework which used to link the bays within the pond are being isolated and decommissioned. A new emergency pumping system has already been successfully installed

Risk & Hazard Reduction: First Generation Magnox Storage Pond

Enablers

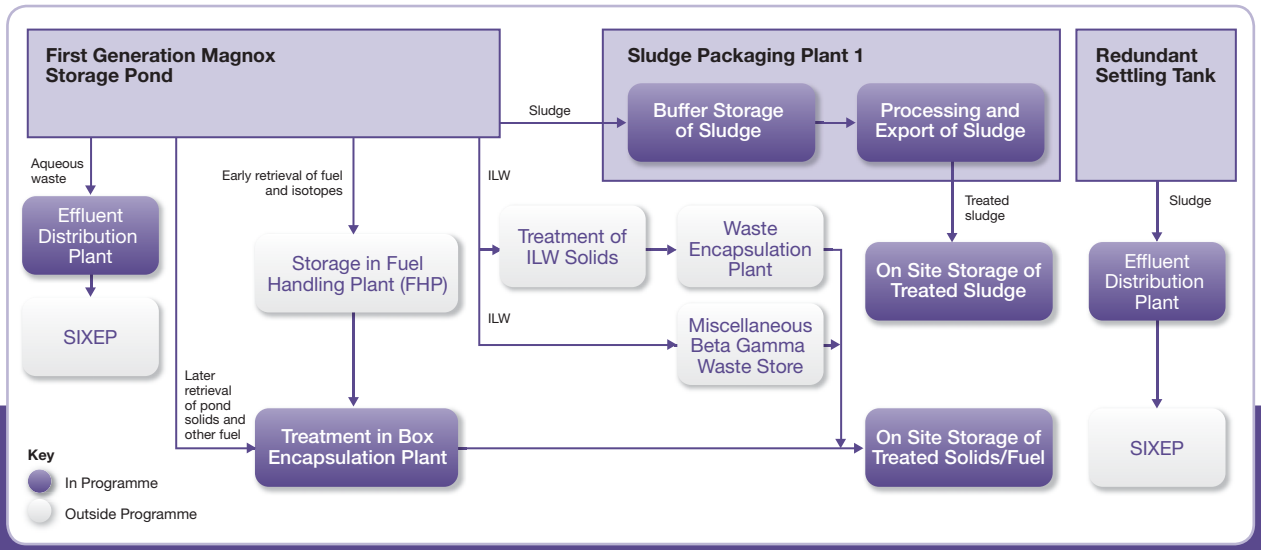
Sludge Packaging Plant 1

The Sludge Packaging Plant 1 (SPP1) is being built to hydraulically receive over 1,350m^3 – that's equivalent to a half full Olympic sized swimming pool – of sludge from the First Generation Magnox Storage Pond.

The plant is a key risk reduction project for the First Generation Magnox Storage Pond. It comprises three stainless steel buffer storage vessels to contain the sludge, to allow it to decant and settle.

Site clearance for the plant began in November 2005 and required the removal of a number of redundant facilities. In 2007 a perimeter fence was erected around the site to move it out of the Separation Area and improve accessibility for construction. In 2008 the first concrete pour took place and the main civil build has now been completed.

The Sludge Packaging Plant 1, which will receive sludge from the First Generation Magnox Storage Pond is being constructed and commissioned



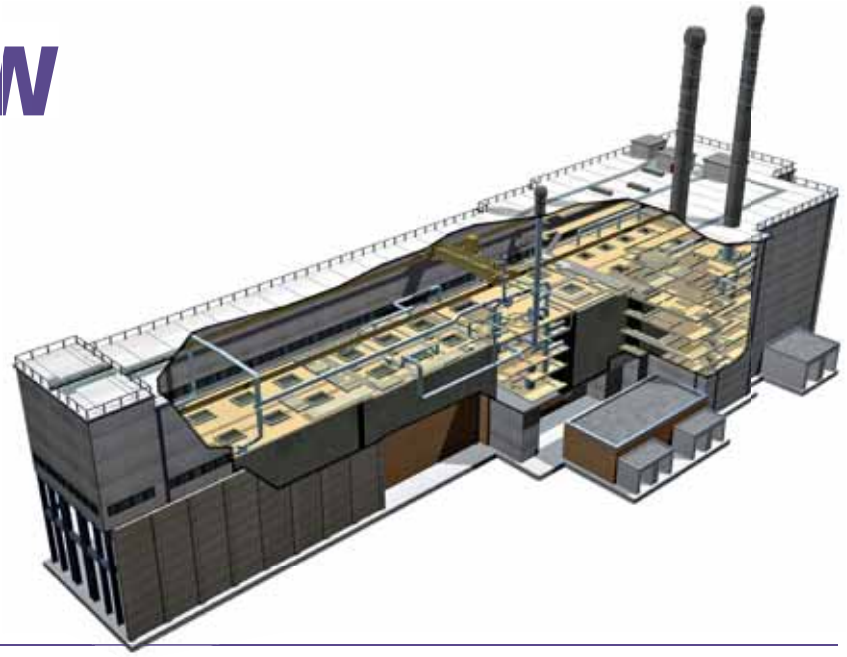
Risk & Hazard Reduction

Magnox Swarf Storage Silos

- Constructed in the 1960s to 1980s
- Constructed to hold irradiated decanning wastes (Magnox swarf and miscellaneous intermediate level waste)
- Received waste until 2000

Risk & Hazard Reduction: Magnox Swarf Storage Silos

Overview



The Magnox Swarf Storage Silos at Sellafield is one of the site's four Legacy Pond and Silo facilities. We are focused on safely decommissioning these buildings as part of our hazard and risk reduction programme.

Legacy

The Magnox type nuclear reactor was the first type to generate nuclear electricity in the UK. Including Calder Hall at Sellafield a total of eleven Magnox power stations were commissioned during the 1950s, 60s and early 70s.

In support of the growing contribution of electricity generated by the Magnox power stations, the Magnox Swarf Storage Silos Facility was built at Sellafield to accommodate the swarf waste produced by the Magnox fuel decanning operations. The cladding swarf was removed from the fuel prior to reprocessing.

The facility became operational in 1964 for the underwater storage of swarf waste.

Following its inception in 1964 with six wet silos, the facility was extended on three further occasions to cater for the increased storage demands; by 1983, a complement of 22 silos had been established.

By the early 1990s, technological developments meant that 'wet storage' of Magnox swarf was no longer seen as the best solution. Dry waste, immobilised in discrete containers offered positive advantages: it becomes more passive and much more practical to manage.

Therefore the Magnox Encapsulation Plant was constructed at Sellafield to receive dry Magnox swarf, encapsulate it in cement and seal it in stainless steel drums.

The Magnox Swarf Storage Silos received Magnox fuel cladding from the First Generation Magnox Storage Pond and the Fuel Handling Plant along with a range of other items of intermediate level waste. The swarf was transported in purpose built flasks and tipped into the silo compartments.

In 1992, swarf received from the Fuel Handling Plant was routed to the Magnox Encapsulation Plant. Various facilities continued to use the Magnox Swarf Storage Silos to aid their own Post Operational Clean Out (POCO). The final receipts were tipped into the compartments in June 2000.

The Magnox swarf, which is almost 100% magnesium, is stored underwater. The swarf then undergoes a process which results in the release of gaseous hydrogen. The plant design and operations ensure that the heat and hydrogen cannot build up and risk exceeding safe levels within the plant.

Between 1994 and 1999, a significant quantity of metal swarf was retrieved from the facility, by use of the Swarf Retrieval Facility. The waste was exported to the Magnox Encapsulation Plant for encapsulation and storage.

Historical view of the inside of the Magnox Swarf Storage Silos during construction

Historical external view of the Magnox Swarf Storage Silos during construction

Risk & Hazard Reduction: Magnox Swarf Storage Silos

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high risk and hazard reduction**
- **Progress decommissioning and clean-up**

Waste from the Magnox Swarf Storage Silos will be exported from the building in 3m^3 boxes

Solutions:

In order to safely empty and decommission the Magnox Swarf Storage Silos the solution is to:

- Transfer Liquor Activity Reduction to Site Ion Exchange Effluent Plant at Sellafield
- Construct Silo Emptying Plants for remote mechanical waste retrievals
- Export waste to Sellafield Direct Encapsulation Plant for immobilisation in 3m^3 boxes
- Provide long term intermediate storage

Key challenges:

- **The facility is situated in a congested area of the Sellafield site, which presents a unique environment for decommissioning work**
- **The high levels of radiation in the facility and potential for contamination**
- **Availability of existing downstream waste plants including the effluent management facilities at Sellafield**
- **Availability of new facilities when needed including the Silos Direct Encapsulation Plant, Box Transfer Facility and the Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1**
- **Installation of heavy mechanical machinery in an ageing facility and upgrading of the building systems for retrievals**
- **Design of retrieval and waste treatment systems to process the full range of waste**

The Magnox Swarf Storage Silos during construction

Risk & Hazard Reduction: Magnox Swarf Storage Silos

The Plan

Magnox Swarf Storage Silos Strategic Objectives:

1. Maintain continued safe storage of the radioactive waste inventory
2. Restore asset and systems to fit for purpose state
3. Prepare the asset and install retrievals equipment

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
SEP Solid Waste Storage Prepare for Retrievals						
Design and Construct Retrievals & Treatment Facilities						
Nuclear Safety Surveillance Operations & Maintenance						
Retrieve and Treat Silo Waste						

The Magnox Swarf Storage Silos programme scope is to retrieve the waste from compartments within the silos and treat to form an interim storage product. The product will be stored above ground pending availability of the Intermediate Level Waste Conditioning Facility and consignment to the Geological Disposal Facility.

A major milestone for the facility will come with the completion of a project to design and construct retrieval and treatment facilities. The first silo emptying plant will be ready to retrieve during the 2016/17 financial year with preparation for retrievals complete in the same period.

The start of active retrievals will begin during 2017/18 financial year when the Treatment Facility is available.

Over nine liquid activity reduction (LAR) transfers have already taken place with the liquid transferred to the Site Ion Exchange Plant (SIXEP) at Sellafield

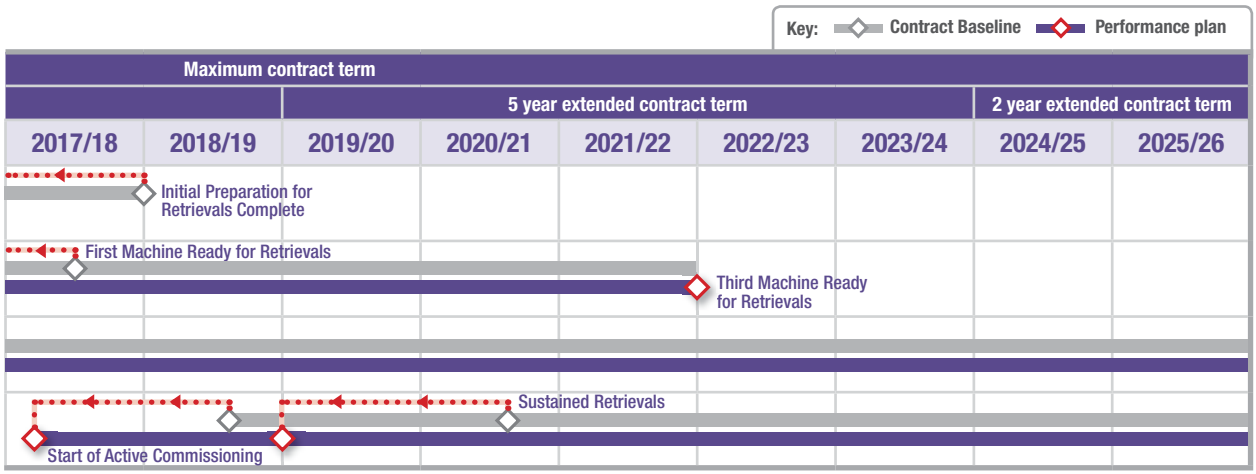
After each transfer, the silos are topped up with clean water to maintain shielding of the solid waste

Risk & Hazard Reduction: Magnox Swarf Storage Silos

4. Retrieve inventory

5. Process and immobilise inventory in the Silos Direct Encapsulation Plant

6. Decommissioning of all facilities



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Risk & Hazard Reduction: Magnox Swarf Storage Silos

Enablers

Silos Direct Encapsulation Plant

The original Silos Direct Encapsulation Plant was constructed between 1995 and 2001, however work was halted when new information on the waste streams to be processed meant that a decision had to be taken to put the project on hold. The building was then placed in a care and maintenance regime.

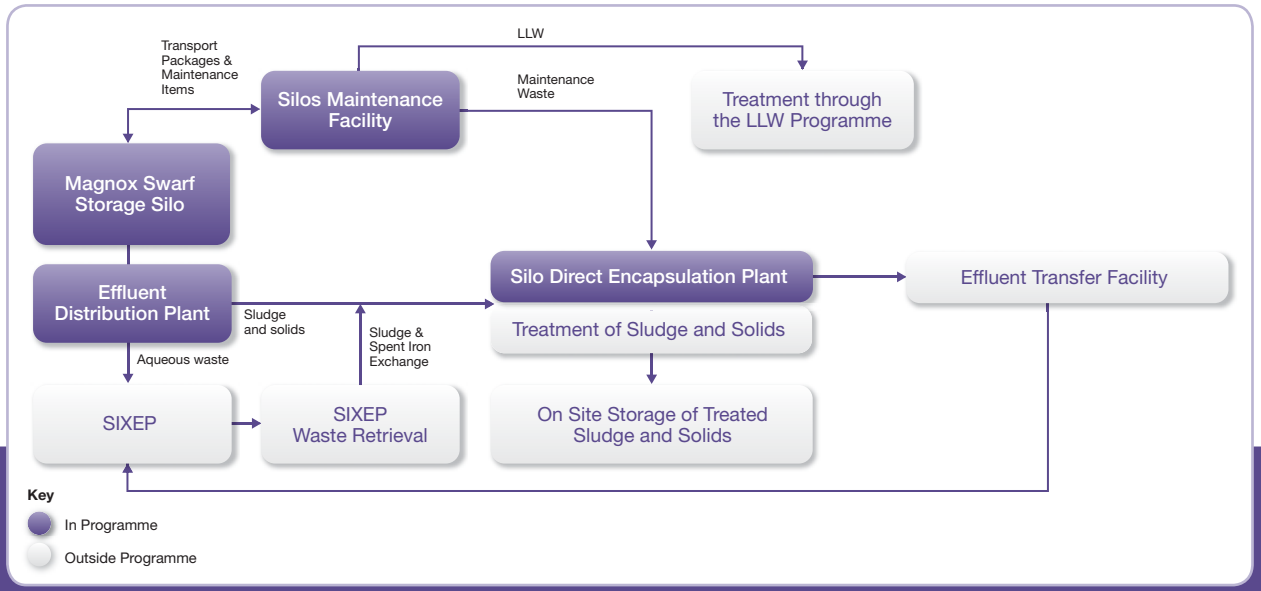
In 2004 work was carried out on the new process options for the plant and in 2005 significant elements of the redundant plant and equipment were stripped out, in preparation for the new plant.

Construction of the plant is programmed to be completed in 2018, however accelerated programmes are looking to bring this forward.

Box Transfer Facility

The Box Transfer Facility will provide export routes for waste retrieved from the Magnox Swarf Storage Silos and processed in Silos Direct Encapsulation Plant (SDP). The waste will be in the form of 3m^3 product boxes which will be exported via the Box Transfer Facility to the Encapsulation Product Store 3 and eventually the Box Encapsulation Plant Product Store via the Comprehensive Import/Export Facility when it has been completed.

Construction of the Box Transfer Facility at Sellafield is under way



Magnox Swarf Storage Silos programme

Risk & Hazard Reduction

Pile Fuel Cladding Silo

- Commissioned in 1952, this was the first storage facility for intermediate level waste (ILW) to be constructed at Sellafield
- The silo was filled by 1964, when waste tipping operations ceased
- A programme of upgrade work has been completed to enable the building to continue to store waste safely. The next task in the programme is to safely retrieve the waste and store it in compact concealed units

Risk & Hazard Reduction: Pile Fuel Cladding Silo

Overview

The Pile Fuel Cladding Silo at Sellafield is one of the site's four Legacy Pond and Silo facilities. We are focused on safely decommissioning these buildings as part of our hazard and risk reduction programme.

Legacy

Built between 1950 and 1951 the Pile Fuel Cladding Silo is 21m high and, inside, houses six extremely tall waste containers known as 'silos'.

Commissioned for use in 1952 the facility's primary role was to receive and safely store radioactive fuel cladding from the military project at Windscale. As Magnox power stations started to generate electricity for domestic use, it also received fuel cladding from the Calder Hall and Chapelcross power stations.

Between 1952 and 1965, flasks of decanning waste (aluminium, graphite, and later on Magnox) were sent to the Pile Fuel Cladding Silo on a road transporter. The flasks were lifted to the east end tower and placed onto a trolley. The trolley took the flask into a shielded antechamber where the lid was removed and the flask transferred to a second trolley.

The second trolley carried the lidless flask into the transfer tunnel where the flask was turned upside down. The waste dropped out of the flask and into the compartment. The flask was then removed, its lid replaced and the flask returned to the Pile Fuel Storage Pond.

The Pile Fuel Cladding Silo has six compartments and now holds over 3,200 cubic metres of intermediate level waste.

By the mid 1990s, the silo was nearing the end of its intended life. And, like any building exposed to the weather for 50 years, it required care and maintenance. A programme of upgrade work was completed to enable the building to continue to store waste safely, prior to the next task in the programme: to safely retrieve the waste and store it in compact concealed units.

Historical aerial view of the Pile Fuel Cladding Silo

The Pile Fuel Cladding Silo with the Calder Hall Cooling Towers in the distance

Aerial view of the Pile Fuel Cladding Silo during the 1970s

Risk & Hazard Reduction: Pile Fuel Cladding Silo

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high risk and hazard reduction**
- **Progress decommissioning and clean-up**
- **Ensure safe and secure management of radioactive waste and materials**

A 'superstructure' is being constructed opposite the Silo which will be used to retrieve the waste

Solutions:

In order to safely empty and decommission the Pile Fuel Cladding Silo the solution is to:

- Construct a retrieval system adjacent to the silo
- Provide short term interim storage of the retrieved waste in product boxes
- Retrieve the raw waste from Box Encapsulation Plant Product Store 1 (see enablers) before conditioning in the Waste Treatment Complex (see enablers) into 3m^3 boxes
- Return the 3m^3 boxes to Box Encapsulation Plant Product Store 1 for long term interim storage

Key challenges:

- **The facility is situated in a congested area of the Sellafield site, which presents a unique environment for decommissioning work**
- **The facility contains high levels of argon gas, preventing physical access and presenting a unique decommissioning challenge**
- **Availability of existing downstream waste plants**
- **Availability of new facilities when needed including the new retrievals building, the Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1 and the new Waste Treatment Facility**

The Pile Fuel Cladding Silo following external refurbishment work

Risk & Hazard Reduction: Pile Fuel Cladding Silo

The Plan

Pile Fuel Cladding Silo Strategic Objectives:

1. Maintain continued safe storage of the radioactive waste inventory
2. Prepare for retrievals
3. Retrieve inventory for interim storage prior to treatment

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Design, Install and Inactive Commission Retrieval Equipment						
Retrievals Operations and Maintenance						
Preparation for Decommissioning						

The first major milestone will be to design, install and inactive commission the retrieval equipment which includes the construction of a waste retrievals building adjacent to the silo (see enablers on the following page). Completion of preparation for retrievals is planned for the 2017/18 financial year.

Once retrievals begin within the facility, the programme moves to its retrievals operations and maintenance phase. The start of bulk retrievals is planned for the 2017/18 financial year.

The final phase of the programme for the Pile Fuel Cladding Silo will be the preparation for decommissioning of both the silo and the retrievals building.

The transfer tunnel on the roof of the building was emptied and removed

A passive off gas system has been installed

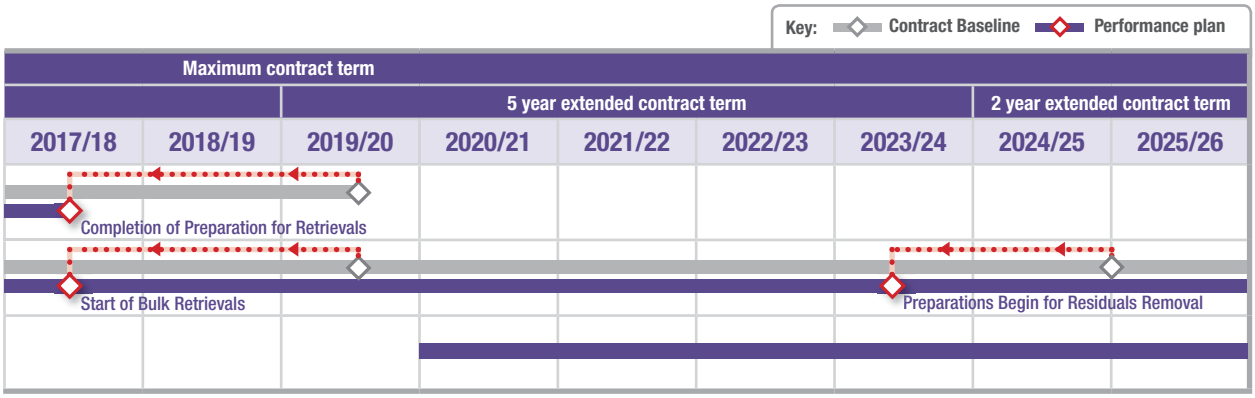
Storage of the intermediate level waste has been significantly improved following an extensive programme of strengthening, re-pointing and rendering

Risk & Hazard Reduction: Pile Fuel Cladding Silo

4. Build treatment plant to immobilise the waste

5. Immobilise inventory ready for long term storage

6. Decommission the facilities



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
41,658.5	43,322.5	73,052.0	158,033.0	457,554.8	615,587.9

For more information please see pages 16 and 17 of the overview section

The storage environment within the silo has been changed from air to inert gas, vastly reducing the potential risk of fire. New argon plants provide a continuous supply of argon to the silo

Work is under way to construct the 'superstructure' which will house the equipment needed to retrieve waste from the silo

A Silo Retrieval Facility is being constructed opposite the silo which will be used to retrieve the waste

Risk & Hazard Reduction: Pile Fuel Cladding Silo

Enablers

Retrievals Building

The waste retrieval facility will consist of a reinforced concrete support skeleton structurally independent from the silo, but adjoining it. A number of modules will be bolted on: retrieval modules; waste loading modules and waste container modules.

Holes will be cut into the north side of the silo so that each of the compartments can be accessed in turn. Access doors will be made for each compartment, which will be bolted to the silo structure and sealed against the face of the silo. The retrieval module will dock against each compartment.

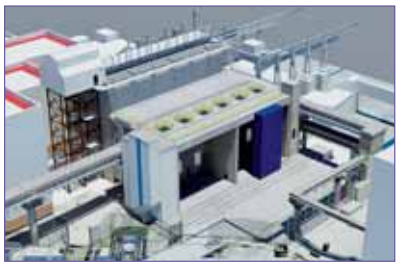
A telescopic boom and grab will be deployed through the new holes in the side of the silo. This grab will pick up the waste from within the silo, retract, rotate through 180 degrees and lower the grab full of waste into the waste characterisation module. A robotic arm will spread the waste out within the module where photographic and video footage of the waste will be taken along with basic radiological measures to aid characterisation and treatment. When characterisation is completed the waste will be transferred into 3m^3 storage boxes which will be raised up to the lidding station, swabbed and exported for storage prior to treatment and final storage.

Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1

The BEPPS1 and CIEF project will incorporate the completion and expansion of a purpose built above ground nuclear waste store and the construction of a new import/export facility to handle radioactive waste, arising from the ongoing nuclear decommissioning and high hazard reduction operations at Sellafield.

Waste Treatment Facility

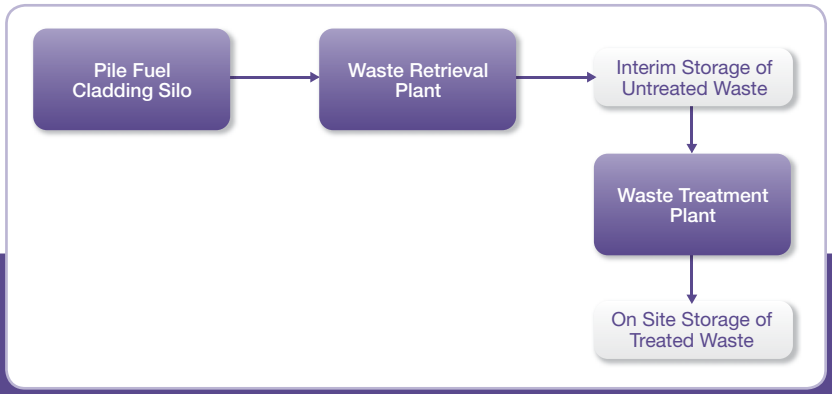
The retrieved waste will be characterised in the retrievals facility prior to packaging in 3m^3 boxes. Characterisation data gathered will be used as a basis to design a new Waste Treatment Facility. The WTF will condition the waste into a format for long term storage and eventual disposal when a geological disposal facility (GDF) becomes available.



The ‘superstructure’ used to empty the silo will consist of a reinforced concrete skeleton

Holes will be cut into the side of the silo so that the compartments can be accessed in turn. Trials of this work are under way

A telescopic boom and grab will be deployed through the new holes in the side of the silo to retrieve the waste



The Pile Fuel Cladding Silo Programme

Risk & Hazard Reduction

HAL Workstream

- Highly Active Liquor (HAL) arises as a result of reprocessing irradiated nuclear fuel
- HAL is turned into a solid stable form through a process called vitrification
- Vitrified UK HAL is stored at Sellafield while overseas vitrified residue is returned to the country of origin

Risk & Hazard Reduction: HAL Workstream

Overview

Highly Active Liquors (HAL) is classed as high level waste and is a by-product of reprocessing spent nuclear fuel. It is treated at Sellafield in the vitrification plant where it is converted into a solid stable form for transport and long term storage.

Legacy

At Sellafield, processes have been developed for the processing of high level wastes, including highly active liquors (HAL), a result of reprocessing irradiated nuclear fuel.

HAL is stored in Highly Active Storage Tanks which provide controlled storage conditions including cooling, agitation and monitoring.

At the Sellafield site, HAL has been safely stored for more than 40 years. A vitrification technology has been implemented where the liquid waste is converted to a stable, solid state suitable for transport and long term storage.

This process takes place at Sellafield in the Vitrification Plant which has been in operation since 1991. Here the liquid high level waste is turned into dense solid glass blocks and reduces the liquid waste volume to about a third of the original liquid waste size.

Vitrification involves drying the liquid waste to a powder, mixing it with glass and heating it to a temperature of around 1,200 degrees Celsius.

The molten mixture is poured into stainless steel containers and allowed to solidify. The vitrified waste is then placed into a specially engineered Vitrified Product Store pending final disposal in the UK or return to its country of origin.

Returning this waste to overseas customers fulfils contractual obligations and also UK government policy, which states that the waste from reprocessing contracts signed since 1976 should be returned to the country that benefited from the reprocessed fuel.

Historic construction of the HAL evaporation and storage facilities at Sellafield

Vitrified high level waste is stored in the Vitrified Product Store at Sellafield

Risk & Hazard Reduction: HAL Workstream

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high hazard and risk reduction**
- **Progress decommissioning and clean-up**
- **Ensure safe and secure management of radioactive waste and materials**

Highly active liquors are processed in the Vitrification Plant where they are turned into a stable form in vitrified product containers (above)

Solutions:

The forward programme for the highly active liquor (HAL) workstream is to:

- Process highly active raffinate in support of Thorp and Magnox reprocessing operations
- Evaporate and store the raffinate in Highly Active Storage Tanks
- Construct a new evaporator to provide continued evaporative capacity
- Vitrify the evaporated waste through the Waste Vitrification Plant
- Store vitrified waste in the Vitrified Product Store
- Export the vitrified waste to overseas customers
- Export the vitrified HAL which is of UK origin to the national Geological Disposal Facility

Key challenges:

- **Processing the legacy HAL stocks to buffer levels by 2014**
- **HAL contains 99% of the radioactivity from spent nuclear fuel and as such presents a unique waste management challenge**
- **Availability of facilities required to manage and process HAL including the Highly Active Storage Tanks, the Vitrification Plant and the Highly Active Evaporators**
- **Availability of downstream effluent management plants**
- **Availability of new evaporator – Evaporator 'D'**
- **Effective Post Operational Clean Out (POCO) of the Highly Active facilities**

Risk & Hazard Reduction: HAL Workstream

The Plan

HAL Workstream Strategic Objectives:

1. Maintain safe operation of all facilities
2. Receive, process and store HAL
3. Processing the legacy HAL stocks to buffer levels by 2014
4. Design, construct and operate additional evaporative capacity
5. Vitrify the HAL into solid waste

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
HALES Operations & Maintenance (Including preparations for POCO)			Evaporator D Online	Active Safety Commissioning	Evaporator D Full Operations	
Final HALES POCO						
HA Liquor Tanks – preparation for Decommissioning						
WVP Lines 1 & 2 Operations & Maintenance						
WVP Lines 1 & 2 POCO						
WVP Line 3 Operations						
VPS/REF Operations & Maintenance						

The Highly Active Liquor (HAL) programme scope is to receive highly active raffinate from Thorp and Magnox reprocessing plants. The raffinate is evaporated and stored in Highly Active Storage Tanks. The concentrated HAL is then vitrified in the Waste Vitrification Plant. The resultant vitrified product containers are stored in the Vitrified Product Store.

HAL evaporation and storage also takes medium active effluents and concentrate arisings. All of these arisings require evaporation and storage via the HAL Evaporation and Storage facilities.

Additional evaporative capacity will be provided by a new evaporator (Evaporator D – see enablers) which is due to come online during the 2014/15 financial year and will be fully operational during the 2016/17 financial year. Replacement Highly Active Storage Tanks are due to become available for use during the 2017/18 financial year.

In the Vitrification Plant, lines 1 and 2 are due to cease operations during the 2017/18 financial year.

The Residue Export Facility which is used to facilitate the return of vitrified waste to its country of origin is currently operational. Operations in this facility are targeted for completion in 2018.

The first high level waste return was safely completed in January 2010

The construction of a new evaporator on the Sellafield site, Evaporator D, is well under way and will support the ongoing safe management of HAL

Risk & Hazard Reduction: HAL Workstream

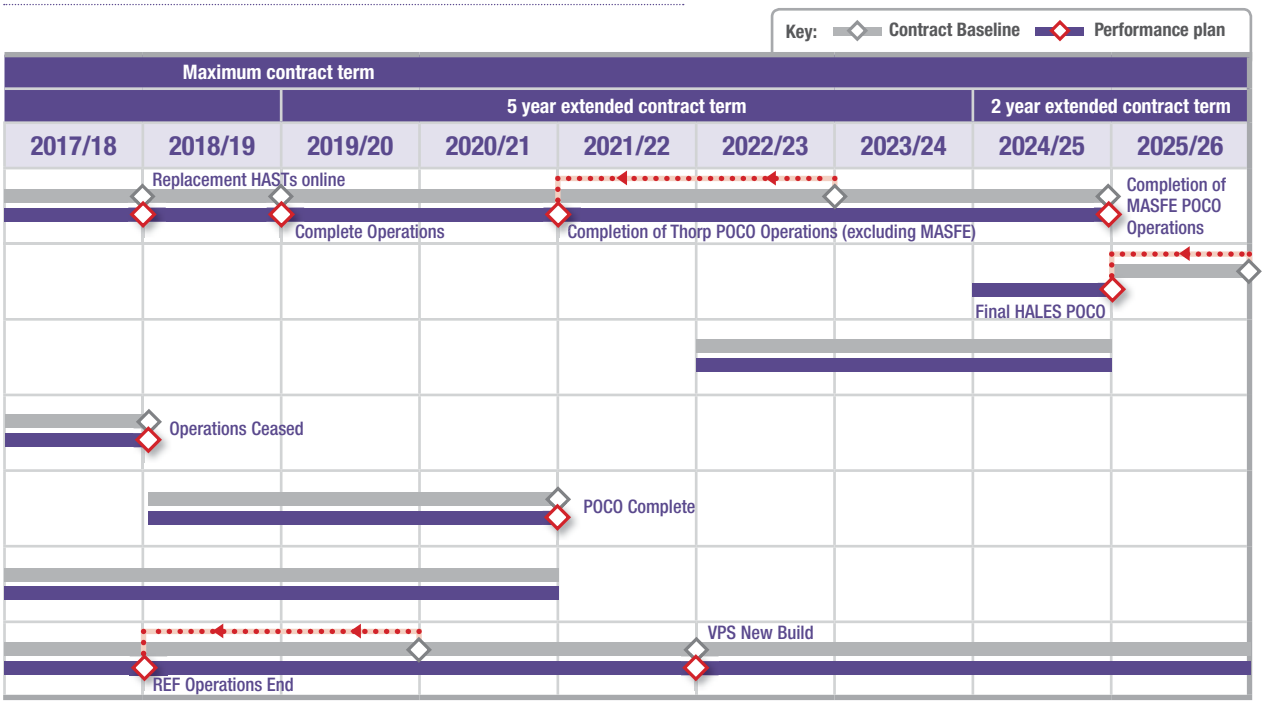
6. Safely store vitrified HAL

7. Export vitrified HAL to overseas customers

8. Remove tanks heels/Post Operational Clean Out (POCO) of Highly Active facilities

9. Export vitrified (UK origin) HAL to a national Geological Disposal Facility

10. Decommission the Highly Active facilities



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Risk & Hazard Reduction: HAL Workstream

Enablers

Evaporator D

One of the largest projects under way at Sellafield is the construction of a new evaporator to support continued reprocessing operations. Until this project is complete, reprocessing throughput will be limited by the capacity of existing evaporators.

Vitrification Plant

One of the key waste streams from reprocessing is the liquid high level waste. This waste is separated out from the reusable uranium and plutonium during reprocessing. The first part of treating this waste is to concentrate it down in evaporators to reduce its volume in preparation for its incorporation into glass – a process known as vitrification, which takes place in the Waste Vitrification Plant.

Residue Export Facility

The Residue Export Facility has state-of-the-art safety systems with practical, fit-for-purpose plant and equipment designed to deliver customers' requirements.

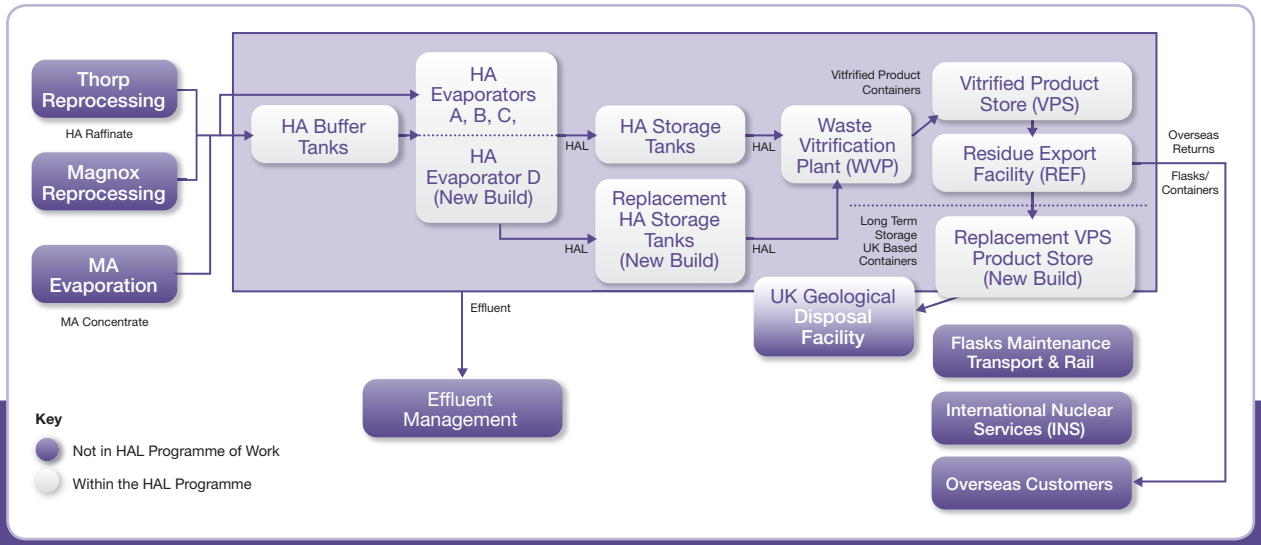
It consists of a series of heavily shielded cells containing equipment that prepares, checks and confirms that the product canisters meet the requirements of the customers.

With the customer present the canisters are accepted, and then safely loaded into a shielded flask. The first stage in this process is for the canisters to be retrieved from Vitrified Product Store and placed in the Residue Export Facility where there are three main process cells, the cleaning cell (prepares the canisters), the inspection cell and the flasking cell.

Two more cells – the buffer and transfer cells – are required to assist with the logistics of loading the flask. Before transporting the flask with its loaded contents of solid waste, it is checked to confirm it meets the regulatory requirements for transport.

Historic internal view of a highly active storage tank at Sellafield

A new evaporator is currently under construction. The first two modules of the new evaporator were safely delivered to Sellafield by sea in June 2011



The Highly Active Liquor Workstream Programme

Risk & Hazard Reduction

PCM Treatment & Storage

- Plutonium contaminated material exists at Sellafield as a result of a range of operations
- These operations include reprocessing, fuel fabrication, maintenance and decommissioning
- The majority of plutonium contaminated material at Sellafield is stored in steel drums in modern engineered drum stores

Risk & Hazard Reduction: PCM Treatment & Storage

Overview

Tools and equipment that come into contact with plutonium during operations are classed as being 'plutonium contaminated materials'. These are treated at Sellafield as a form of intermediate level waste and as such are grouted in cement which makes the material suitable for long term storage.

Legacy

During spent fuel reprocessing, fuel fabrication, maintenance, decommissioning, refurbishment and other site operations, tools and equipment come into contact with plutonium and thus become contaminated.

These wastes are classified as 'plutonium contaminated materials'. Due to the toxicity of plutonium, these plutonium contaminated materials are subject to a higher level of control than other radioactive wastes such as those disposed at the Low Level Waste Repository.

Plutonium contaminated material at Sellafield is classified into several generic groups, according to their type and how they are packaged for storage prior to treatment.

Mixed plutonium contaminated material predominantly consists of a combination of items such as PVC gloves, PVC protective suits, small items of plant, hand tools and laboratory equipment. These wastes are double-bagged in heat-sealed PVC linings within mild steel 200 litre drums.

Whole equipment and dismantled items consist of such things as contaminated gloveboxes and machinery. These items are packaged in crates.

Filters are used throughout Sellafield to remove particulate material, including plutonium containing dust, from air in building ventilation systems. Older filters are double-wrapped in heat-sealed PVC sheeting. The filters from newer Sellafield buildings are cylindrical and designed to fit directly into a 200 litre drum.

Plutonium contaminated material is treated at the waste treatment complex on the Sellafield site. The waste treatment complex provides for the supercompaction of mixed plutonium contaminated material in 200 litre drums. The resulting compacted pucks are stacked in larger 500 litre drums which are then backfilled with a cement grout.

Some of the plutonium contaminated material was retrieved from the Low Level Waste Repository site and returned to Sellafield

Risk & Hazard Reduction: PCM Treatment & Storage

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high hazard and risk reduction**
- **Progress decommissioning and clean-up**
- **Ensure safe and secure management of radioactive waste and materials**

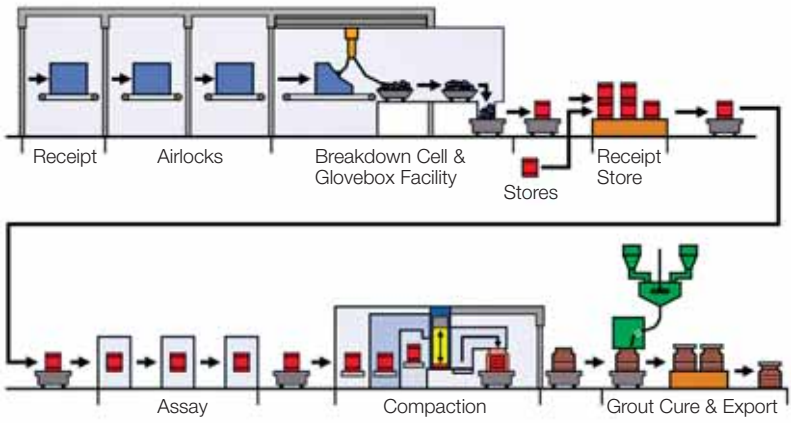
Solutions:

The forward programme for PCM Treatment and Storage at Sellafield is to:

- Continue to safely manage and process plutonium contaminated material
- Compact the majority of plutonium contaminated material and store in large steel drums filled with grout
- Provide modern, fit-for-purpose storage for plutonium contaminated material in engineered drum stores
- Educate consignors to avoid plutonium contaminated material waste being generated unnecessarily

Key challenges:

- **Historical plutonium contaminated material waste to be transferred to engineered drum stores**
- **By its nature, the material managed as part of this project contains levels of plutonium contamination and as such presents a potential radiological hazard**
- **Availability of facilities required to manage and process plutonium contaminated material such as the Waste Treatment Complex and engineered drum stores**
- **Availability of new facilities such as additional engineered drum stores and treatment and processing plants when needed**
- **A new process needs to be developed that will process material which is not suitable for the Waste Treatment Complex**



Outline process of waste management in the Waste Treatment Complex

Risk & Hazard Reduction: PCM Treatment & Storage

The Plan

PCM Treatment & Storage Strategic Objectives:

1. Maintain safe operation of all associated facilities
2. Maximise the utilisation of existing treatment capability
3. Ensure adequate storage capacity and treatment capability for the lifetime of plutonium contaminated material arising

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Waste Treatment Complex Treatment Operations & Maintenance						
Engineered Drum Stores – Storage Operations & Maintenance						
Engineered Drum Store 4 – New Build/ Construction						

The plutonium contaminated material treatment and storage programme scope treats and stores plutonium contaminated material arising from routine operations on the site or during decommissioning.

A plutonium contaminated material waste drum being loaded into an assay monitor

Plutonium contaminated material drums being transported by rail

Preparing drums of plutonium contaminated material for transport

Risk & Hazard Reduction: PCM Treatment & Storage

4. Transfer historical plutonium contaminated material to modern containment

5. Ensure all waste products are disposable

6. Optimise waste packing fractions in order to minimise volumes for storage and disposal

7. Decommission all facilities

Key: Contract Baseline Performance plan

Maximum contract term								
		5 year extended contract term					2 year extended contract term	
2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
20,574.0	25,072.0	21,931.4	67,577.4	253,354.7	320,932.1

For more information please see pages 16 and 17 of the overview section

Nupak container inners were developed for the transport of plutonium contaminated material from the Low Level Waste Repository to Sellafield

Risk & Hazard Reduction: PCM Treatment & Storage

Enablers

Engineered Drum Stores

Engineered Drum Stores have been constructed at Sellafield in order to provide modern fit-for-purpose storage for intermediate level waste, including plutonium contaminated material, which has been compacted and placed in steel drums.

Waste Treatment Complex

Plutonium contaminated material is treated at the Waste Treatment Complex on the Sellafield site. The waste treatment complex provides for the supercompaction of mixed plutonium contaminated material in 200 litre drums. The resulting compacted pucks are stacked in larger 500 litre drums which are then backfilled with a cement grout.

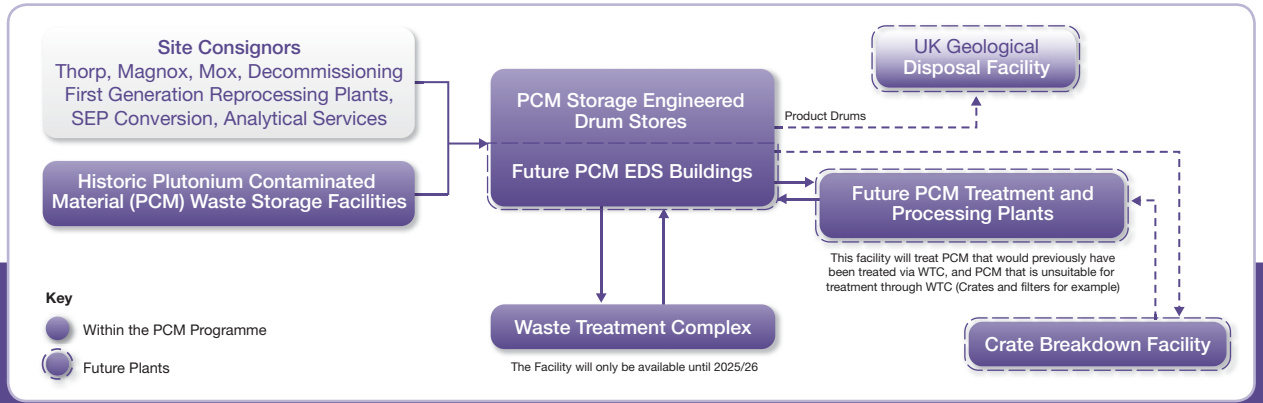
Engineered Drum Store Assay Suite

The Engineered Drum Store Assay Suite will improve the throughput of the Waste Treatment Complex by reclassifying plutonium contaminated waste below accountancy level to the Low Level Waste Repository.

New Waste Treatment Plant

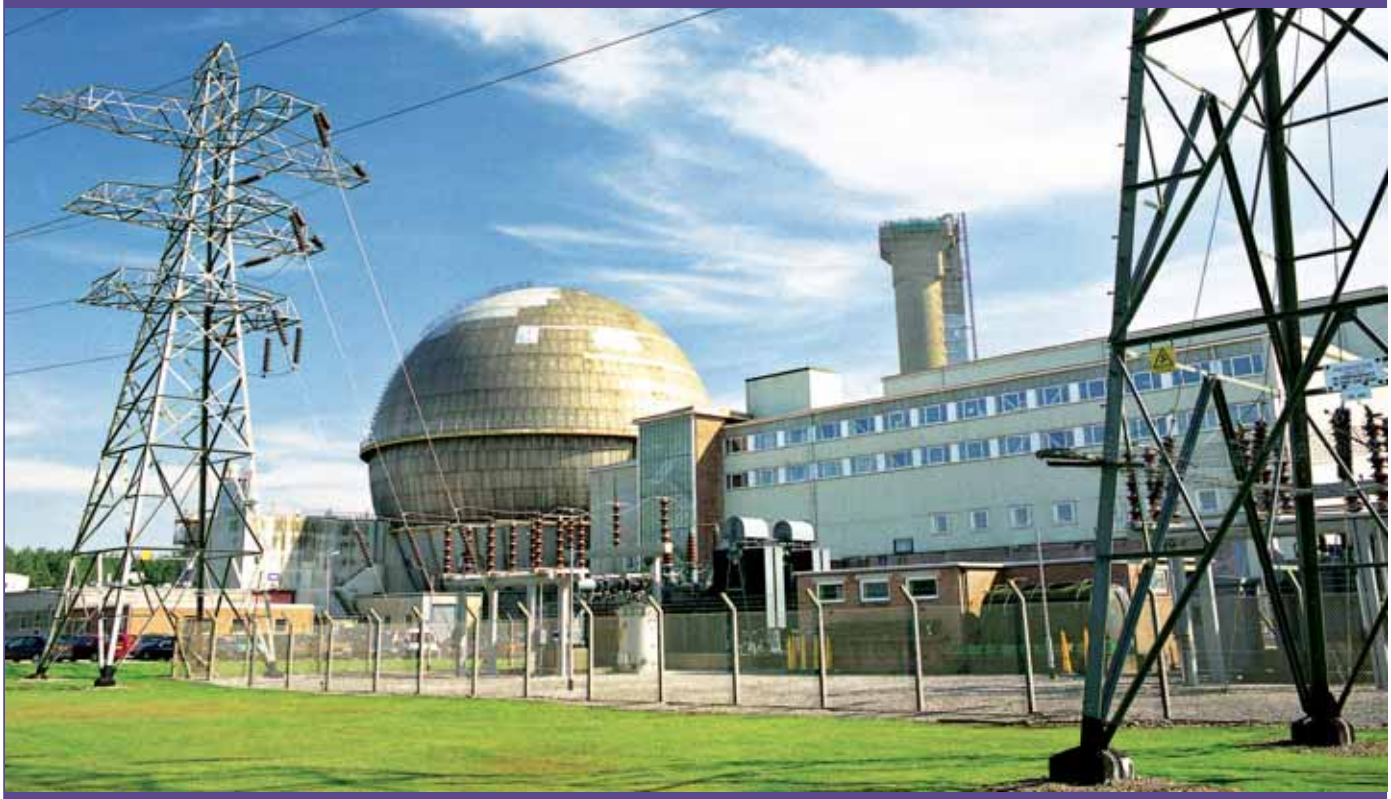
We are developing a business case for a new type of treatment plant which will replace the Waste Treatment Complex at the end of its operational lifetime.

One of the engineered drum stores which have been constructed at Sellafield to provide modern fit-for-purpose storage for intermediate level waste



The Plutonium Contaminated Material Treatment & Storage Programme

Risk & Hazard Reduction



Windscale

- Construction work on the Windscale site started in September 1947
- The iconic Windscale Advanced Gas-cooled Reactor (WAGR) was constructed between 1957 and 1961
- The reactor within WAGR has been decommissioned, reducing the hazard associated with the building
- The programme is now subject to a number of deferrals allowing us to transfer resources to high hazard work

Risk & Hazard Reduction: Windscale

Overview

Windscale was historically a separate licensed site located on the Sellafield site. On 1 April 2008 the site licence for Windscale was transferred to Sellafield Ltd, integrating the Windscale and Sellafield sites. It comprises three reactors, two of which were shut down in 1957 and the third in 1981. Decommissioning activities began in the mid 1980s.

Legacy

The Windscale Pile reactors were constructed to support the British Atomic programme. The Piles were the country's first large scale nuclear reactors producing plutonium for the UK's nuclear deterrent. Following a fire in Pile one in October 1957, both reactors were shut down. Phase 1 decommissioning started in the early 1980s and recent work has focused on carrying out intrusive survey work of the Pile 1 core and developing approaches to remove the fuel and isotopes from the fire damaged reactor.

In the late 1950s, Windscale was chosen as the setting for a new reactor which was to explore the potential of high pressure and temperature gas-cooled reactor fuel and components. The Windscale Advanced Gas-cooled Reactor (WAGR) was constructed between 1957 and 1961 and operated successfully. WAGR was built to study and prove in service the performance of gas-cooled fuel elements suitable for a commercial reactor. It also served as a test bed for the development of advanced fuel and other components and provided operational experience of power production. WAGR was the forerunner of a family of 14 reactors on seven sites built to generate cheaper and more efficient electricity in the UK.

WAGR has been a decommissioning demonstration project, showing that a full sized reactor can be decommissioned safely, cost-effectively and in an environmentally acceptable manner. The decommissioning of the reactor within WAGR was safely completed in May 2011, significantly reducing the hazard associated with the iconic 'golf ball' structure.

The iconic Windscale Advanced Gas-cooled Reactor under construction at Sellafield

The giant reactor vessel was lowered into the Windscale Advanced Gas-cooled Reactor through the roof

The completed Windscale Advanced Gas-cooled Reactor became known as 'the golf ball'

Risk & Hazard Reduction: Windscale

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Deliver high hazard and risk reduction**
- **Progress decommissioning and clean-up**

The Windscale programme is subject to a number of deferrals which will allow us to move resources to complete higher hazard work at Sellafield

Solutions:

The forward programme for the clean-up and decommissioning of the Windscale site:

- The Windscale programme is not on the critical path, therefore the programme has been subject to a number of deferrals, this has allowed us to transfer time and funding to higher hazard work
- We will:
  - maintain safe operation of all facilities
  - operate Active Handling Facility fuel element facilities
  - decommission facilities

Key challenges:

- **The Windscale programme is not on the critical path; therefore the programme has been subject to a number of deferrals. However, this presents its own challenges in terms of care and maintenance and ensuring that the facilities stay in good condition until decommissioning work resumes.**
- **The pile 1 chimney within the Windscale programme is highly contaminated and therefore decommissioning the chimney presents a potential radiological risk. Learning from the decommissioning of its sister chimney will be applied to mitigate against this risk.**
- **Availability of downstream facilities needed during the decommissioning of the pile 1 chimney**

Decommissioning operations under way at Windscale

Risk & Hazard Reduction: Windscale

The Plan

Windscale Strategic Objectives:

1. Maintain safe operation of all facilities
2. Operate Active Handling Facility fuel element facilities
3. Decommission facilities

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Active Handling Facility – Tenant Operations						
Decommissioning Western Area						
Decommissioning Redundant Active Handling Facility						

The Windscale programme constitutes an area which is presently subject to a separate Nuclear Site Licence, within the Sellafield Ltd boundary. The scope of the programme is to reduce hazards through the decommissioning and demolition programmes of legacy nuclear facilities and the environmental restoration of the site.

Due to the fact that the Windscale programme is not on the critical path, the programme has been subject to a number of deferrals, this has allowed time and funding to be transferred to higher hazard work.

In the Active Handling Facility the cave refurbishment project is due for completion during the 2025/26 financial year.

The Pile 1 Fuel and Isotope Removal Capital Phase is scheduled to start in the 2017/18 financial year. For further details on the decommissioning of the Pile Chimney please see the Decommissioning section of the Sellafield Plan.

The giant reactor vessel was removed from the Windscale Advanced Gas-cooled Reactor the same way it went in – through the roof

There were originally two pile reactors and associated chimneys

One of the pile chimneys has been safely decommissioned and dismantled

Risk & Hazard Reduction: Windscale

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
21,152.3	18,388.7	18,016.5	57,557.5	178,142.7	235,700.2

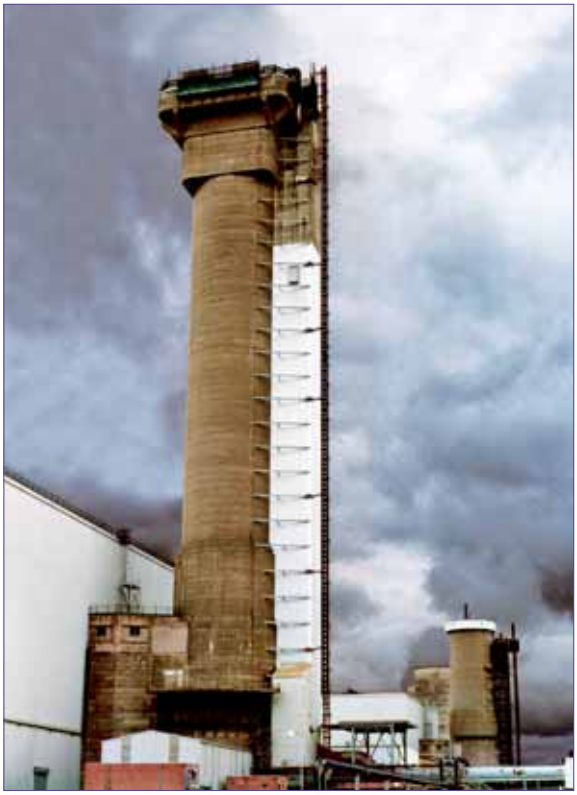
For more information please see pages 16 and 17 of the overview section

The view of the pile chimney capped after being dismantled

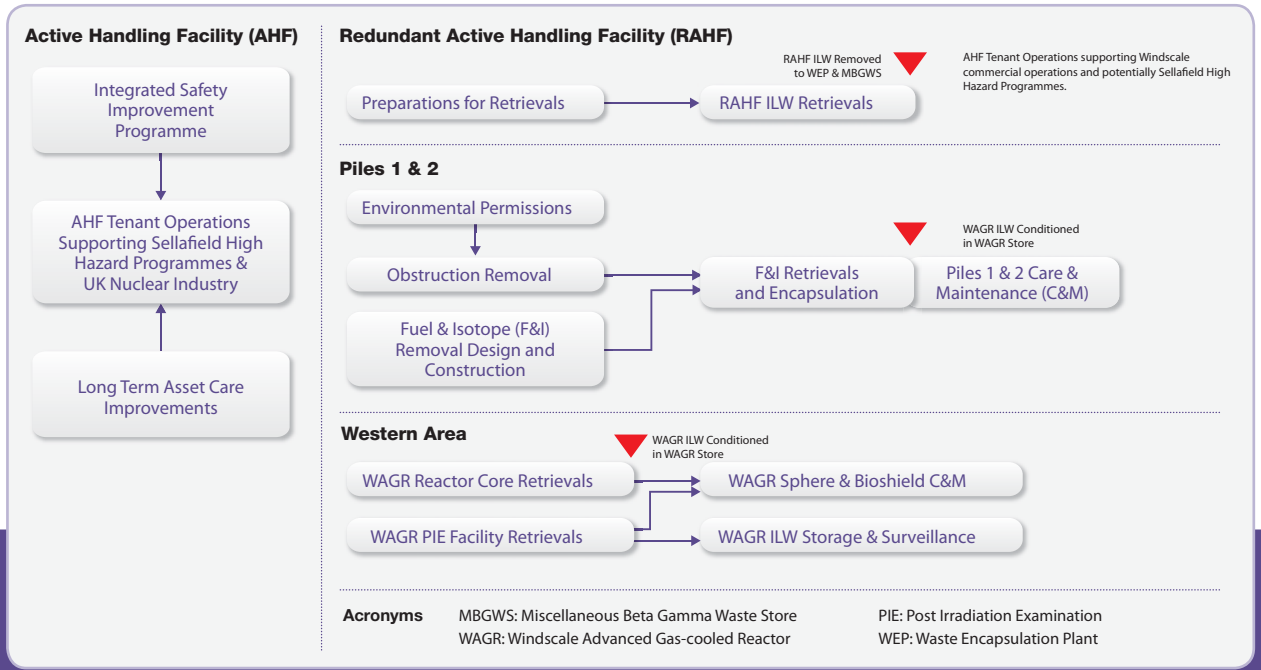
Decommissioning under way inside the Windscale Advanced Gas-cooled Reactor

Risk & Hazard Reduction: Windscale

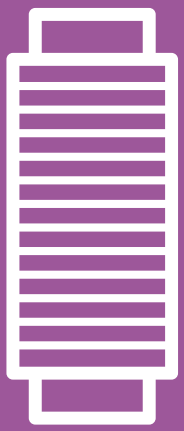
Enablers



The decommissioning of the remaining Pile Chimney will continue throughout this period. Further information on the project can be found in the Decommissioning section of the Sellafield Plan.



Spent Fuel Management



Spent Fuel Management

Magnox Reprocessing

- Started operations in 1964
- Used for decanning, dissolution and retrieval of uranium and plutonium components of spent Magnox fuel from throughout the UK
- Magnox Reprocessing is expected to end in 2017

Spent Fuel Management: Magnox Reprocessing

Overview

The Magnox Reprocessing plant at Sellafield reprocesses spent nuclear fuel from Magnox nuclear power stations across the country – including Sellafield's Calder Hall station.

Operations

There are two nuclear fuel reprocessing plants at Sellafield. The Thermal Oxide Reprocessing Plant (Thorp) deals with fuel from British Advanced Gas-cooled Reactors (AGR) and Light Water Reactors (LWR) from around the world. For more information please see the Thorp section of the Sellafield Plan.

The second deals with Magnox fuel from Britain's early nuclear reactors, like the ones which were used at Calder Hall power station at Sellafield which ceased generation in March 2003.

Before it can be reprocessed, irradiated Magnox fuel must be stored for at least 180 days in ponds to allow short lived fission products to decay. Following transport to Sellafield and a period of further storage the cladding (magnesium alloy) is removed from the uranium bar.

This all happens in the Fuel Handling Plant. The fuel is then transferred to the Magnox Reprocessing Plant.

The main Magnox Reprocessing plant began operations in 1964.

The reprocessing operation within Magnox Reprocessing entails the dissolution of the irradiated uranium rods in nitric acid. The solution is then subject to a series of solvent extraction processes in which the uranium, plutonium and fission products are separated into three different streams.

These streams are directed to other plants at Sellafield where the uranium, in the form of uranium nitrate, is converted to solid uranium trioxide; the plutonium, in the form of plutonium nitrate, is converted to plutonium oxide, and the fission products, in the form of nitric liquor, are stored in Highly Active Storage Tanks before being vitrified. For more information on the vitrification process please see the HAL Workstream section of the Sellafield Plan.

The Magnox Reprocessing Plant at Sellafield is the only one of its kind in the UK. As such the plant has a vital role in supporting risk and hazard reduction operations across the Nuclear Decommissioning Authority's estate by reprocessing fuel which is being retrieved from operating and closed Magnox power stations. This work is co-ordinated through the Magnox Operating Programme.

It will also support risk and hazard reduction at Sellafield by reprocessing the fuel which will be retrieved from the Calder Hall station on site.

Historic photograph showing the Magnox Reprocessing Plant under construction

Historic external view of the Magnox Reprocessing Plant

Spent Magnox Fuel arrives at Sellafield as Magnox Fuel Elements

Spent Fuel Management: Magnox Reprocessing

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Deliver hazard and risk reduction**
- **Progress decommissioning and clean-up**
- **Maximise commercial value from our existing assets and operations**

We will safely reprocess spent Magnox fuel, supporting the defuelling of the Magnox power stations. We will also safely manage the waste generated (above)

Solutions:

In order to safely operate and eventually decommission the Magnox Reprocessing facilities the solution is to:

- Continue to safely store spent fuel from Magnox Stations in line with their operating and defuelling programmes until it is ready to be reprocessed
- Reprocess the spent fuel in line with the Magnox Operating Programme
- Improve reliability and throughput
- Invest in the plant to enable completion of Magnox reprocessing
- Optimise the use of site wide infrastructure
- Deliver flask fleet availability improvement programme to allow optimised reactor defuelling and fuel transport
- Decommission all facilities associated with Magnox reprocessing operations at Sellafield

Key challenges:

- **Magnox reprocessing relies on the availability of a number of plants and support services across Sellafield**
- **Any disruption in the availability of the fuel handling plant, on site rail transport and flask availability have the potential to challenge the Magnox Programme**
- **Magnox reprocessing relies on the availability of the highly active evaporators on site**
- **The programme relies on the availability of the Magnox Encapsulation Plant and the Effluent Management facilities**

The outside of the fuel element – the swarf – is stripped off during reprocessing. This swarf is encapsulated in grout filled drums at Sellafield

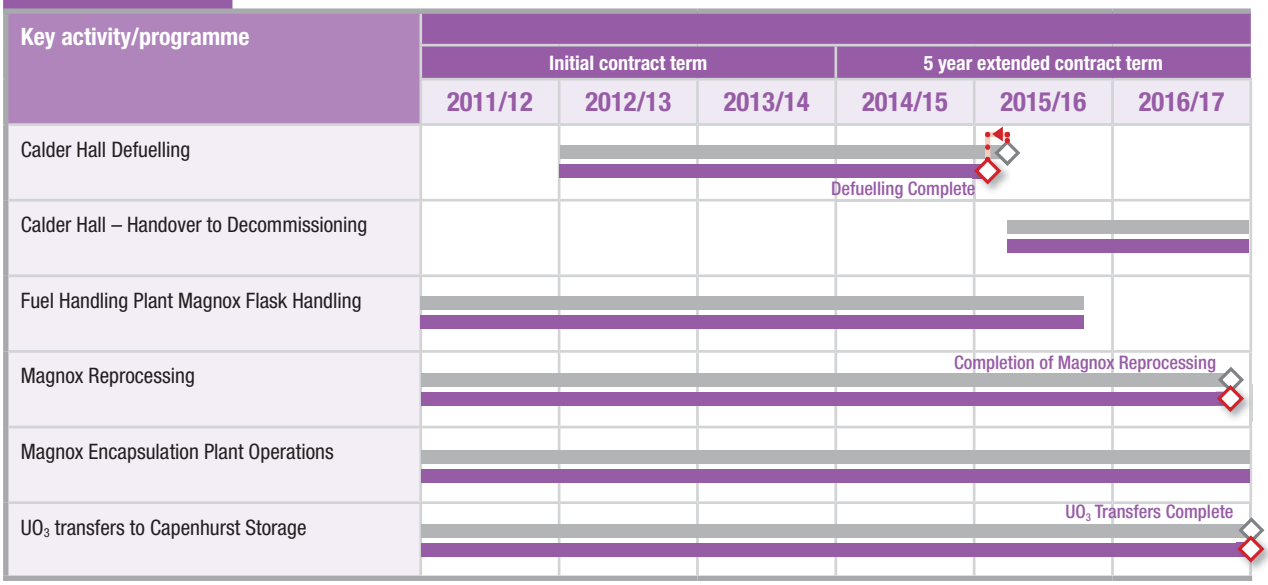
Spent Fuel Management: Magnox Reprocessing

The Plan

Magnox Reprocessing Strategic Objectives

1. Maintain continued safe storage of fuel, products and radioactive material
2. Maintain safe operation of all facilities

Milestones:



The Magnox Reprocessing Programme constitutes the facilities to maintain the receipt of and to reprocess Magnox fuel to support the operation and end-of-life defuelling programmes of the UK Magnox Reactors.

The Magnox Reprocessing Plant will support the defuelling of the Calder Hall station at Sellafield which ceased generation in 2003. The Calder Hall defuelling programme is expected to begin during 2012/13 and is due to be completed at the end of the 2015/16 financial year.

Magnox Reprocessing operations at Sellafield are scheduled for completion in 2017 with operations in the Magnox Encapsulation Plant expected to end during 2021.

UO_3 transfers to Capenhurst for storage will continue until the end of 2016/17 financial year.

The defuelling of Calder Hall is part of the Magnox Reprocessing Programme and is due to be completed during the 2015/16 financial year. Once defuelling has been completed Calder Hall will transfer to the Decommissioning Programme.

Over forty years of operations within Magnox Reprocessing

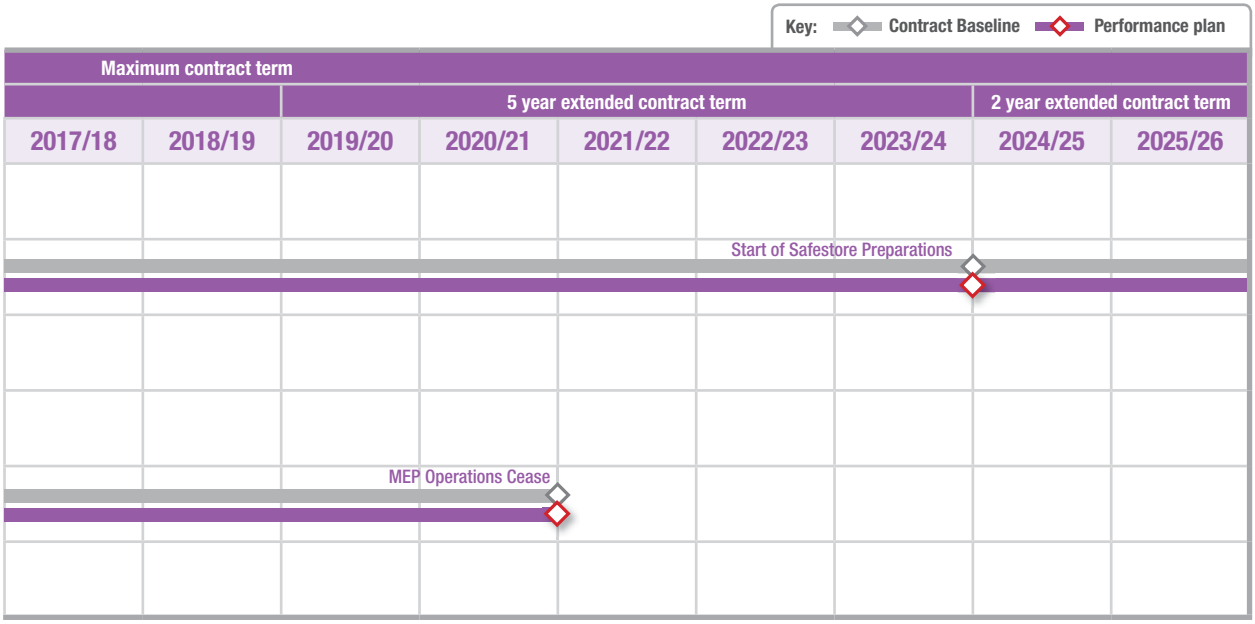
Removal of ducts from the Calder Hall reactors at Sellafield

Magnox Reprocessing will support the defuelling operations at the Calder Hall station at Sellafield

Spent Fuel Management: Magnox Reprocessing

3. Receive, store and reprocess ~4,400te Magnox fuel in line with Magnox Operating Programme

4. Decommission all facilities



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
85,361.1	85,806.9	80,187.7	251,355.8	619,742.8	871,098.6

For more information please see pages 16 and 17 of the overview section

Spent Fuel Management: Magnox Reprocessing

Enablers

Fuel Handling Plant

Covering over 5.3 acres on the Sellafield site, the Fuel Handling Plant (FHP) is responsible for receiving, storing and mechanically processing spent nuclear fuel from Magnox and Advanced Gas-cooled Reactor (AGR) stations from across the UK.

Having undergone a preliminary inspection, Magnox and AGR flasks are transferred to FHP using the site rail system.

The fuel is removed from the transport flask and then transferred into the storage pond where it remains for a predetermined period of time to allow the short lived fission products to decay.

After the storage period is over, the fuel is then transferred into the decanner facility (for Magnox fuel) or alternatively the AGR dismantler for AGR fuel.

In order to be able to reprocess the Magnox fuel rod, its outer cladding must first be stripped off. By using specially designed remote control equipment, the cladding is peeled off into small pieces a few centimetres in length.

The waste itself is made up primarily of the cladding or 'swarf' from fuel elements that have been used in Magnox nuclear power stations.

The Magnox fuel cladding is removed and the uranium metal bar is loaded into a magazine and transferred into a shielded transport flask. It is then taken across the site to the Magnox reprocessing plant.

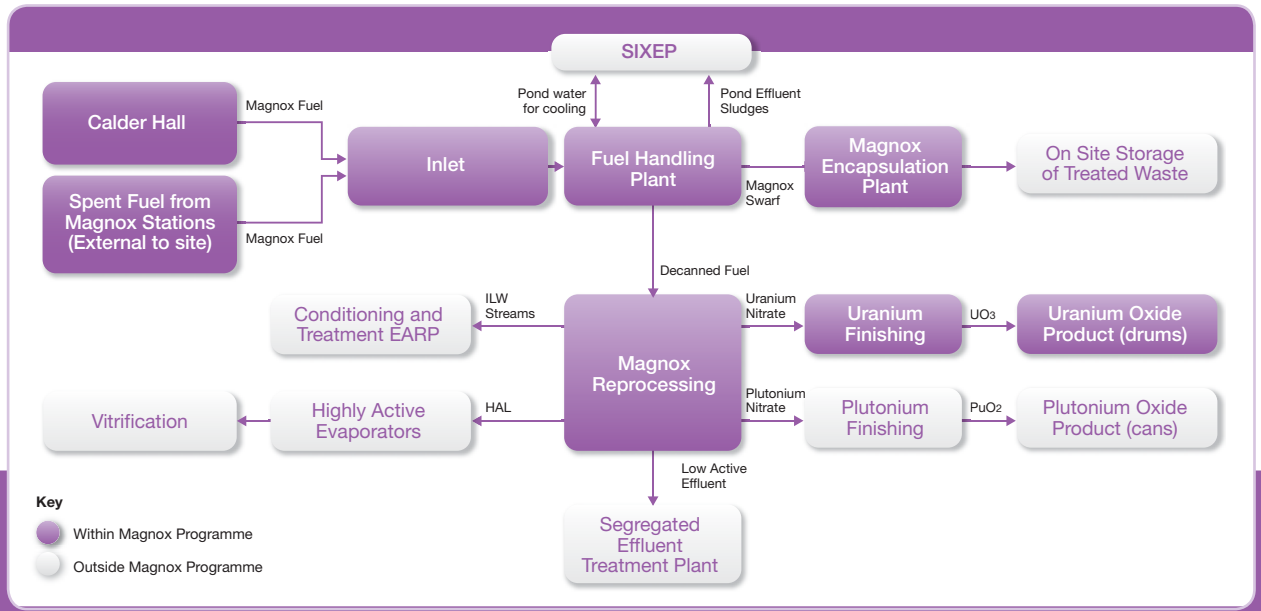
Magnox Encapsulation Plant

The Magnox Encapsulation Plant at Sellafield was designed to process solid, intermediate-level radioactive waste, packaging it into a convenient form which provides for efficient and simple handling, transport and storage.

The encapsulation process takes place inside heavily shielded concrete cells which ensures maximum operator protection from the radioactive swarf.

The Fuel Handling Plant receives spent Magnox fuel and stores it before it is sent across site to the Magnox Reprocessing Plant

Intermediate level waste, in the form of swarf, is processed in the Magnox Encapsulation Plant



The Magnox Reprocessing Programme

Spent Fuel Management

Ongoing Receipt of AGR Fuel

- Advanced Gas-cooled Reactor (AGR) fuel is received into the Fuel Handling Plant at Sellafield
- AGR fuel is dismantled and consolidated to prepare it for interim storage and reprocessing in line with contractual commitments
- AGR fuel that is not reprocessed will be interim stored in the Thorp Receipt and Storage pond pending packaging and disposal to the planned Geological Disposal Facility

Spent Fuel Management: Ongoing Receipt of AGR Fuel

The Plan

Overview

Advanced Gas-cooled Reactor (AGR) fuel is received into the Fuel Handling Plant at Sellafield.

Within the Fuel Handling Plant the fuel is dismantled using the AGR fuel dismantler.

Thorp Receipt and Storage will provide interim storage for fuel that is not reprocessed through Thorp, pending packaging and disposal to the Geological Disposal Facility.

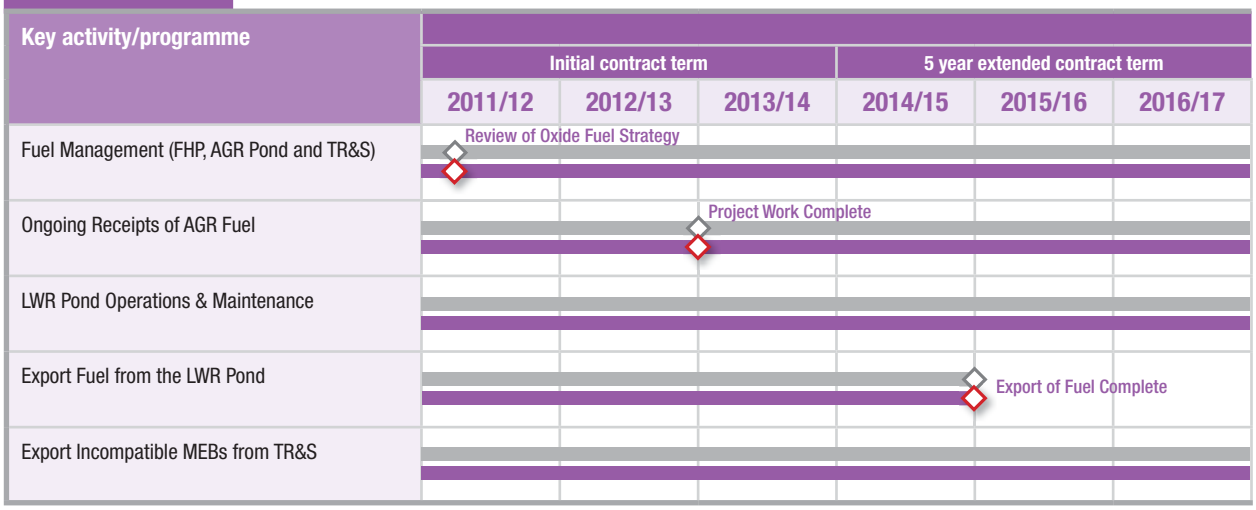
The programme scope includes all of the oxide fuel storage facilities on the Sellafield site:

- Thorp Receipt and Storage
- Fuel Handling Plant receipt and pond storage (shared with the Magnox Reprocessing Programme)
- The light water reactor fuel storage pond
- The AGR fuel storage pond

The programme also includes:

- The AGR fuel dismantler in the fuel handling plant
- The AGR fuel dismantler waste store
- The spent fuel packaging plant (to be built) for the export of AGR fuel and Wet Inlet Facility fuel to the UK Geological Disposal Facility

Milestones:



Ongoing receipts of AGR fuel and LWR pond operations and maintenance will continue throughout this period.

Multi-element bottles (MEBs) incompatible with future closed storage pond conditions will be exported from Thorp Receipt and Storage. This work will be completed during 2018/19 financial year.

Spent nuclear fuel is kept in storage ponds on the Sellafield site for a period of cooling

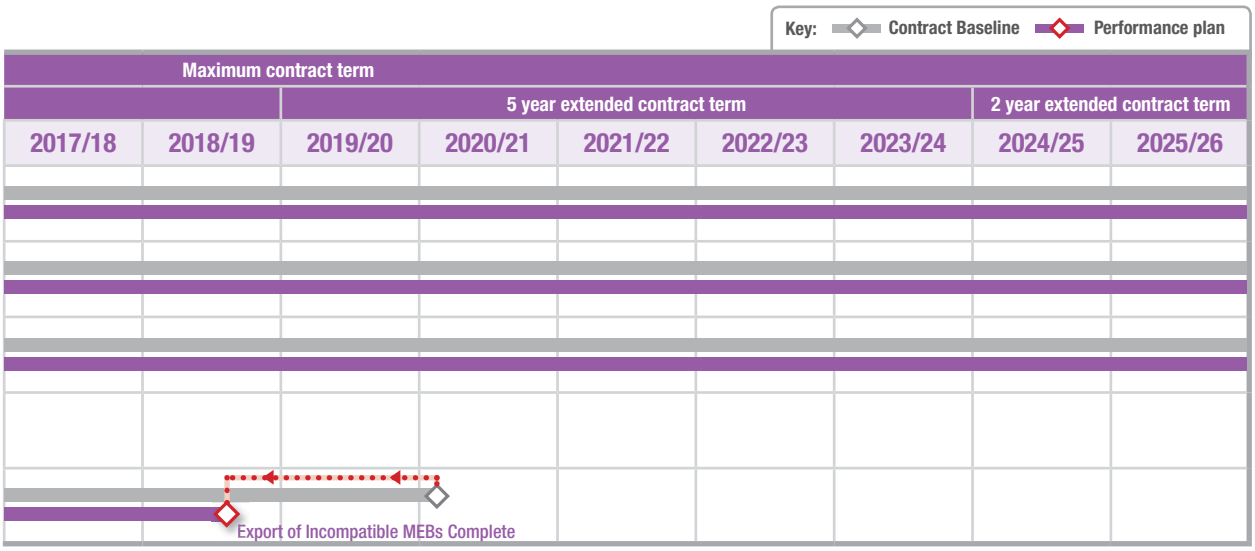
Flasks are maintained on behalf of the customer in the Cuboid Flask Maintenance Facility

Spent Fuel Management: Ongoing Receipt of AGR Fuel

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- Encourage the highest standards in health, safety, security and environmental performance
- Progress decommissioning and clean-up
- Maximise commercial value from our existing assets and operations
- Ensure safe and secure management of radioactive waste and materials

When delivered to the Sellafield site, spent AGR fuel is dismantled in the fuel handling plant



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Spent Fuel Management: **Ongoing Receipt of AGR Fuel**

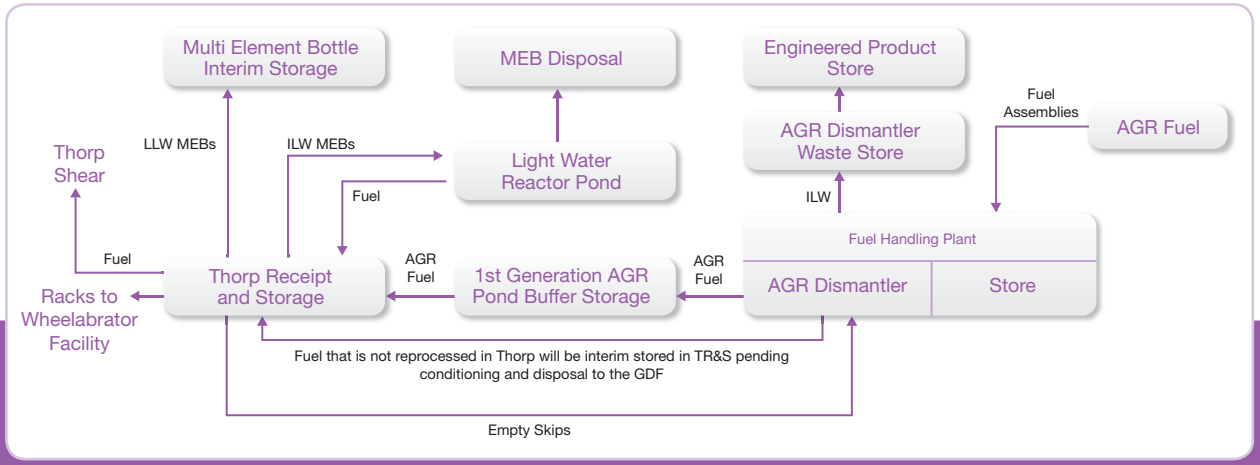
The Plan cont.

Ongoing Receipt of AGR Fuel Strategic Objectives:

1. Maintain safe operation of all facilities
2. Receive and prepare AGR fuel for reprocessing or interim storage in line with contractual commitments
3. Make fuel available to Thorp for reprocessing
4. Provide enough pond storage to allow continued receipt of AGR fuel
5. Provide safe interim storage of AGR fuel pending decision to package for disposal
6. Condition and export fuel to the Geological Disposal Facility when available
7. Decommission all facilities

An internal view of the AGR fuel dismantler

Inside Thorp receipt and storage



The Ongoing Receipt of AGR Fuel Programme

Spent Fuel Management

Thorp Reprocessing

- Thorp was one of the world's most complex civil engineering projects employing up to 5,000 contractors on site and supporting a further 10,000 with suppliers and subcontractors
- Construction began on Thorp Head End and Chemical Separation plants in 1985
- First fuel was sheared in Thorp in 1994
- Thorp Reprocessing is scheduled to end in 2018

Spent Fuel Management: Thorp Reprocessing

Overview

The Thermal Oxide Reprocessing Plant (Thorp) at Sellafield combines all of the facilities needed to reprocess spent oxide fuel under one roof. It reprocesses both UK and foreign spent fuel.

Operations

The Thorp reprocessing plant at Sellafield combines all the facilities necessary for reprocessing spent oxide fuel under one roof.

The construction of Thorp was one of the world's most complex civil engineering projects employing up to 5,000 contractors on site and supporting a further 10,000 with suppliers and subcontractors. Construction began on the Thorp Head End and Chemical Separation plants in 1985 and the first fuel was sheared in 1994.

Thorp's operations are divided into three main areas:

- Fuel Receipt and Storage
- Head End plant operations where spent fuel is chopped up and dissolved in nitric acid
- Chemical Separation where uranium, plutonium and waste products are separated out

After 3 to 4 years in a reactor nuclear fuel becomes less efficient so is removed. 97% of the spent fuel can be recycled to produce new fuel (96% uranium, 1% plutonium). The rest is nuclear waste.

Transport flasks containing spent fuel from the power stations are delivered by rail to the Sellafield site.

On arrival at Sellafield the fuel is removed from the transport flasks underwater and stored in storage ponds to allow the fuel to cool further before reprocessing.

The empty flasks are sent for cleaning and quality checks before being returned to the power station for another consignment.

Once the fuel has cooled sufficiently it is monitored and transferred from the storage pond to the Head End Plant shear cave where the fuel is chopped into sections. The fuel drops into a basket in a dissolver vessel where the fuel is dissolved in nitric acid. The fuel cladding remains in the basket.

The dissolved fuel liquor is forwarded to the chemical separation plant within Thorp, where solvent extraction takes place to separate the 3% wastes from the 96% uranium and 1% plutonium.

The wastes from this process are sent to the High Level Waste plants for concentration, storage and eventual conversion to glass. The uranium and plutonium are converted to oxide powders and stored. Both the uranium and the plutonium can be recycled and manufactured into new uranium oxide or Mixed Oxide (MOX) fuels.

Thorp has dispatched over 1,200 tonnes of uranium for customers to recycle back into new fuel, this will save more than 14 million tonnes of CO_2 from fossil fuel generation.

Spent oxide nuclear fuel is sent to Sellafield by rail and is delivered to the receipt and storage part of Thorp

Once inside Thorp Receipt and Storage the fuel is removed from its transport flask

Spent Fuel Management: Thorp Reprocessing

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Deliver hazard and risk reduction**
- **Progress decommissioning and clean-up**
- **Maximise commercial value from our existing assets and operations**

Our commitment is to safely reprocess fuel through the Thorp facility in line with our contractual arrangements

Solutions:

In order to safely fulfil Thorp Reprocessing Contracts the solution is to:

- Complete the reprocessing of overseas fuel in line with contractual commitments
- Reprocess Advanced Gas-cooled Reactor (AGR) fuel in accordance with contractual commitments
- Reprocess sufficient AGR fuel to allow continued receipt of fuel from the AGR stations
- Provide long term safe storage of UK derived uranium and return overseas uranium back to customers
- Provide long term safe storage of plutonium and return overseas plutonium back to customers (see Nuclear Materials section for more information)
- Improve the reliability and throughput of Thorp
- Decommission all facilities

Key challenges:

- **The Thermal Oxide Reprocessing Plant (Thorp) contains all of the facilities needed to receive and reprocess spent nuclear fuel. However, it relies on a number of downstream waste plants and upstream processing plants**
- **Any disruption in the availability of waste encapsulation plants and effluent management plants has the potential to disrupt the Thorp programme**
- **Thorp relies on the availability of the highly active evaporators and other infrastructure**

The fuel is placed into cooling ponds within Thorp for a period of cooling

Spent Fuel Management: Thorp Reprocessing

The Plan

Thorp Reprocessing Contracts Strategic Objectives:

1. Maintain safe operation of all facilities
2. Reprocess all contracted overseas Oxide fuel
3. Reprocess the contracted amount of AGR fuel

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
THORP Head End and Chemical Plant Reprocessing						
THORP Feed Pond Long Term Operations						
THORP Uranium Product Storage Ops						
THORP LETP New Build						
Waste Encapsulation Plant (WEP) Treatment Operations						
THORP Preparation for Decommissioning (Including Assessment & Implementation Phase)						
THORP POCO						

Oxide fuel is reprocessed in the Thermal Oxide Reprocessing Plant – known as Thorp. The products are stored in the plutonium and uranium stores. Reprocessing residues are encapsulated as intermediate level waste in the Waste Encapsulation Plant and exported to the Encapsulated Product Stores.

Reprocessing operations in Thorp are scheduled to end in 2018, although preparation for the decommissioning of Thorp will begin before this date.

Operations in the associated Waste Encapsulation Plant are expected to end in 2022/23.

The Post Operational Clean Out (POCO) operations in Thorp are scheduled to begin in 2018 once reprocessing has stopped and is scheduled for completion in 2021.

Thorp will continue to shear sufficient Advanced Gas-cooled Reactor (AGR) fuel to maintain capacity to always place into storage fuel that is despatched from AGR reactor stations. Subject to reactor operator lives the precise final lifetime tonnage is variable. Sellafield has included sufficient AGR shearing in its plans to be able to maintain ongoing operational storage capacity for routine receipts. Further information on AGR fuel receipts can be found in the Ongoing Receipt of AGR Fuel section of the Sellafield Plan.

The construction of Thorp was the single largest construction project of its kind in the UK

Thorp received its first fuel into the building in 1994 for shearing

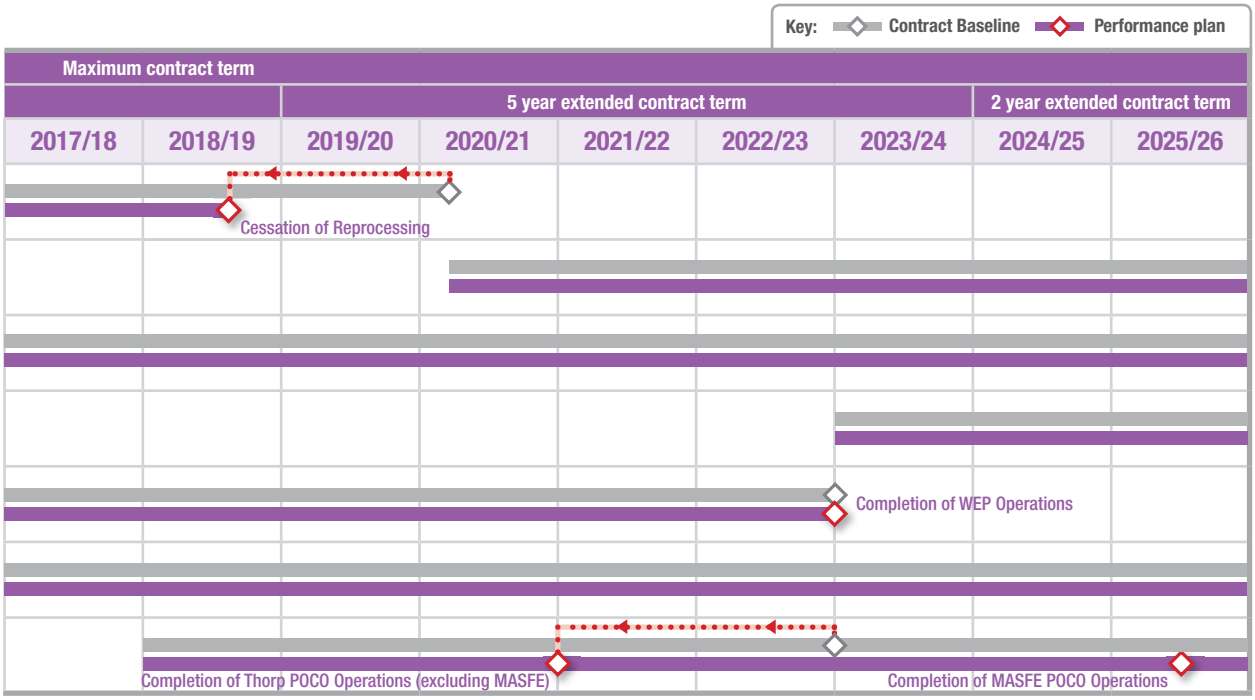
A £20m project was completed to install a replacement Medium Active Salt Free Evaporator (MASFE) into Thorp. This was a predicted activity in the plant design

Spent Fuel Management: Thorp Reprocessing

4. Reprocess sufficient AGR fuel to allow continued receipt of fuel from the AGR stations

5. Long term safe storage of UK-derived uranium and return of overseas uranium to customers

6. Decommission all facilities



Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Thorp recently reprocessed its 6,600th tonne of fuel

Multi-element bottles (MEBs), used to store Light Water Reactor fuel in Thorp, are being removed, creating more room in the pond

Spent Fuel Management: Thorp Reprocessing

Enablers

The Performance Plan shows that Thorp will complete its contractual reprocessing commitments in 2018. However, we are actively pursuing options to meet these requirements as early as possible.

This work includes:

Waste Encapsulation Plant

The Waste Encapsulation Plant is a group of buildings which consists of the Main Process Building, the Services Building and the Silo and Grout Washings Building. The plant encapsulates intermediate level waste and its primary purpose is to support Thorp, however it can also treat other intermediate level waste streams.

Waste Vitrification Plant

One of the key waste streams from reprocessing is the liquid high level waste. This waste is separated out from the reusable uranium and plutonium during reprocessing. The first part of treating this waste is to concentrate it down in evaporators to reduce its volume in preparation for its incorporation into glass – a process known as vitrification, which takes place in the Waste Vitrification Plant.

Evaporator D

One of the largest projects under way at Sellafield is the construction of a new evaporator to support continued reprocessing operations and the Post Operational Clean Out (POCO) of the highly active waste treatment plants. Until this project is complete, reprocessing throughput will be limited by the capacity of existing evaporators.

Vitrified Residue Returns

All overseas reprocessing contracts signed since 1976 contain a return of waste clause. This means that the waste associated with reprocessing overseas customers' spent fuel belongs to the customers and will be returned to them. In 2010 we started returning vitrified high level waste to customers in both Japan and Europe.

Uranium Products Export

UO_3 product from processing overseas customer fuels will be despatched for recycle or storage by the customers. This will be complete by 2024. Remaining UK owned UO_3 product will be retained at Sellafield until a decision on its future management has been made.

Multi-element Bottle Removals

Light Water Reactor (LWR) fuel from overseas came in multi-element bottles (MEBs). These MEBs must be removed from the Thorp pond to prepare it for interim storage of AGR fuel.

There are various options that we are exploring which could enable acceleration of the removal of MEBs to prepare the Thorp pond for AGR interim storage as early as possible. These include:

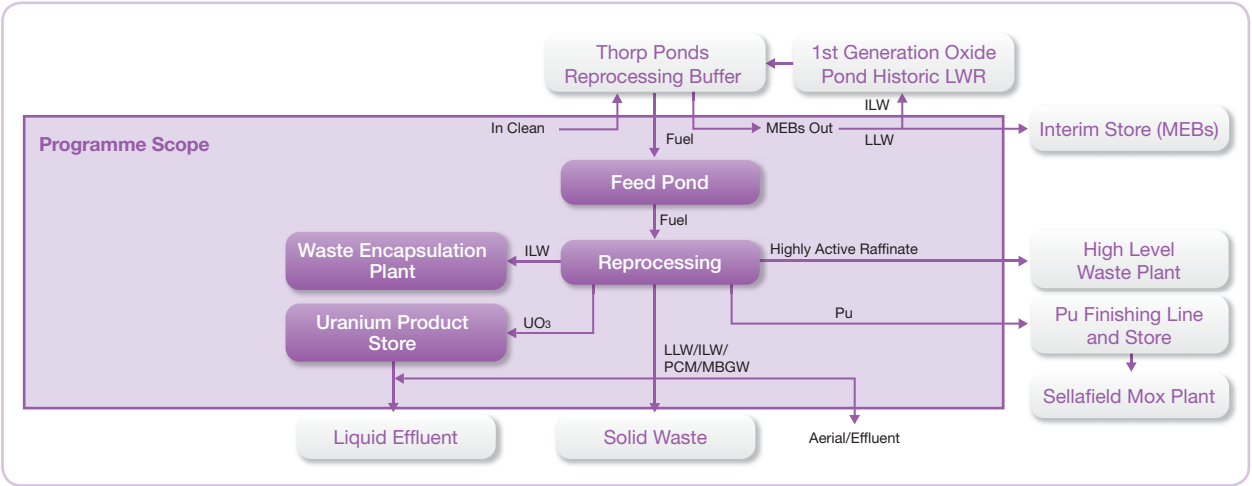
- Internal MEBs decontamination
- Optimising export limits for low level waste despatch to storage facility
- Increasing the low level waste storage capacity by building a further storage facility

Fuel is taken to the Fuel Handling Plant for cooling before being transferred to Thorp for reprocessing

The programme of returning vitrified high level waste started in 2010

The construction of a new evaporator, which is being delivered to Sellafield in modular form by sea, will support reprocessing operations in Thorp

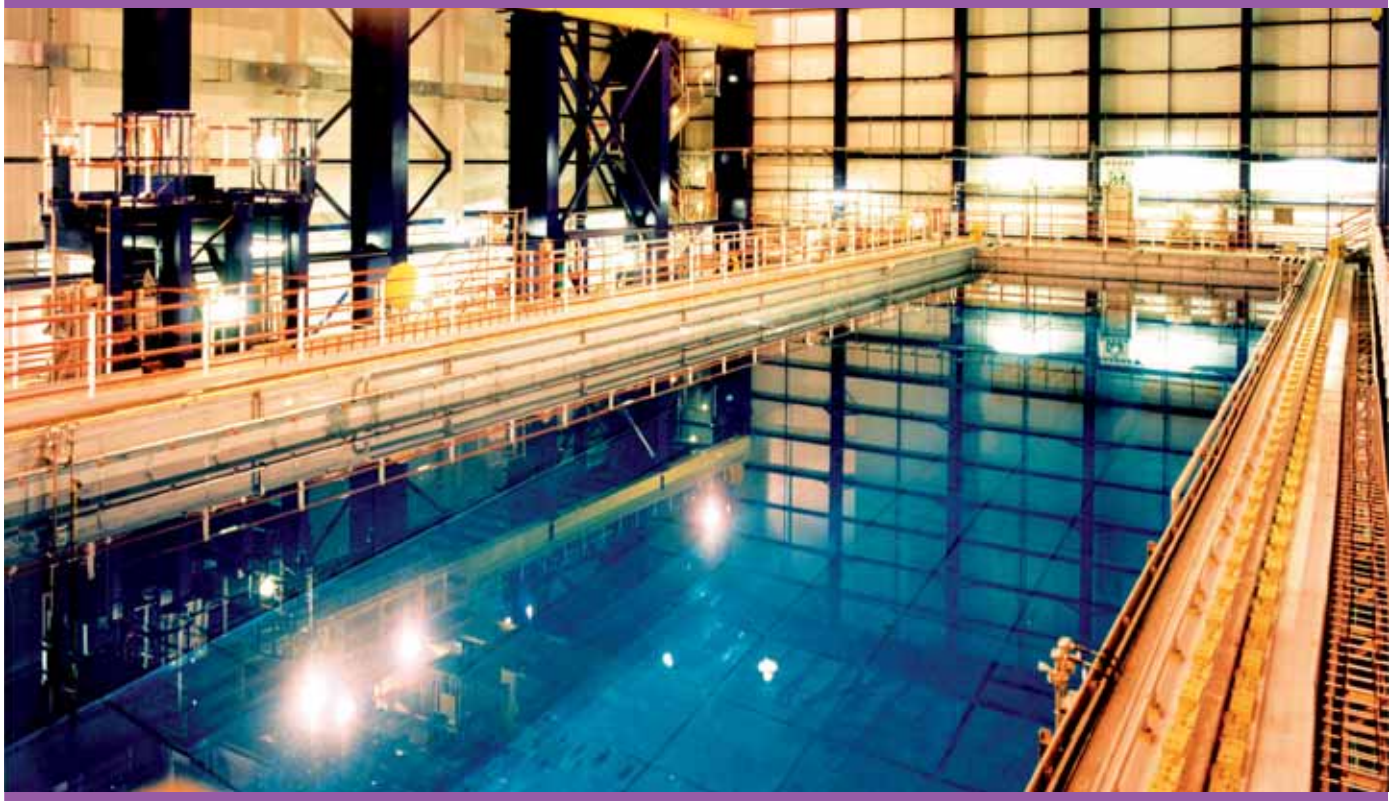
Spent Fuel Management: Thorp Reprocessing



The Thorp Reprocessing Programme

The vitrification plant at Sellafield processes the high level waste produced in Thorp and turns it into a solid stable form

Spent Fuel Management



The Wet Inlet Facility (WIF)

- **Sellafield safely manages used nuclear fuel on behalf of our customers**
- **The Wet Inlet Facility (WIF) is one of our storage ponds on site used to manage our customers' fuel**

Spent Fuel Management: WIF

The Plan

The Wet Inlet Facility (WIF) storage pond is used to store customer fuel

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
WIF Ops & Maintenance						
LWR Pond (Old Side) POCO						

The Wet Inlet Facility (WIF) Programme includes the short to medium term storage of customer fuel and components in the 'old' side of the First Generation Oxide Fuel Storage Pond. It also includes the transfer of fuel and components from the First Generation Oxide Fuel Storage Pond to the WIF, the receipt of fuel from off site to the WIF and the long term storage of fuel within the WIF.

WIF operations and maintenance will continue throughout the reporting period. Post Operational Clean Out (POCO) work on the 'old' side of the First Generation Oxide Fuel Storage Pond will begin after 2022.

Receipts of fuel from customers' facilities are accepted directly into the WIF. Flasks and flasking infrastructure (lifting beams etc) that support customers' flasks are maintained on behalf of our customers in the Flask Maintenance Facility which is operated as an external facility.

An elevated view of the WIF

The WIF storage pond is used to store customer fuel

Flask Maintenance Facility

Spent Fuel Management: WIF

WIF Strategic Objectives:

1. Safely store customer fuel and components
2. Store fuel and components in the First Generation Oxide Fuel Storage Pond
3. Transfer customer fuel and components from the First Generation Oxide Fuel Storage Pond to the WIF
4. Complete specific activities as required by customers to support their strategic objectives
5. Receive into the WIF fuel delivered from off site
6. Maintain customers' external flasks and flask ancillaries in 'ready to deploy state'
7. Export fuel for final treatment and disposal
8. All facilities in the above programme will be decommissioned post-operations

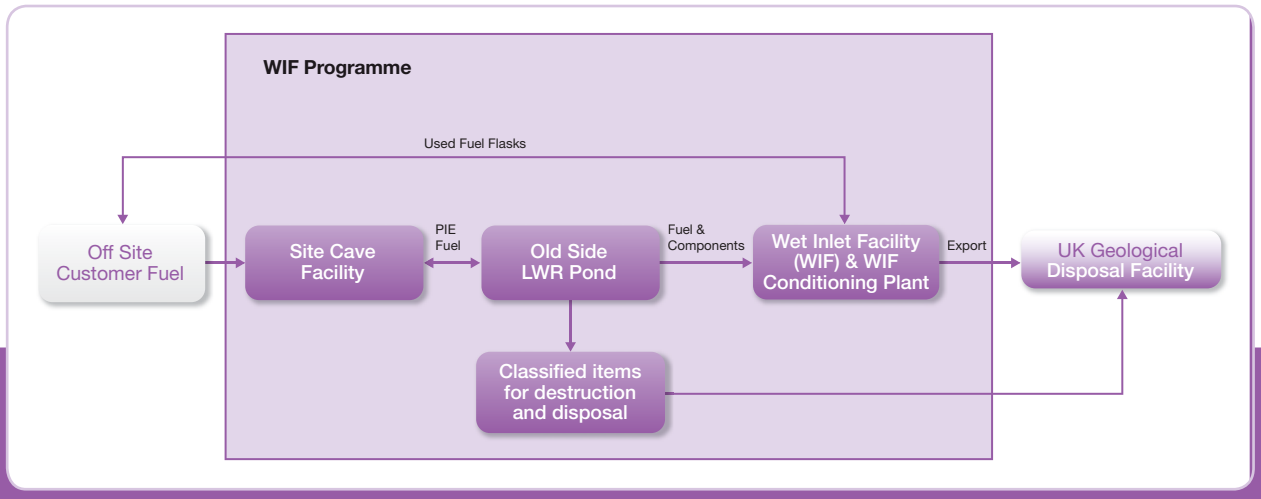
Key: Contract Baseline Performance plan

Maximum contract term								
		5 year extended contract term					2 year extended contract term	
2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section



The WIF Programme

Decommissioning

Decommissioning

Sellafield Site Decommissioning

- The Decommissioning Programme covers a group of facilities across Sellafield where decommissioning is currently being carried out

- The programme includes the strategy and preparation for future decommissioning but excludes the specific decommissioning of:
  - All future facilities
  - Facilities which are currently operational
  - Facilities subject to retrievals operations

Decommissioning: Sellafield Site Decommissioning

Overview

Once buildings are no longer operational they go through a process called decommissioning which includes decontamination and demolition. The Decommissioning Programme at Sellafield completes the decommissioning of some key non operational buildings and uses the learning from this to set the strategy for the future decommissioning for the remaining facilities on the site.

Facilities

The Decommissioning Programme at Sellafield includes the strategy and preparation for decommissioning and future decommissioning. It excludes the specific decommissioning of facilities which are currently operational or subject to retrieval operations, these are covered within the scope of the relevant programme area.

The programme lists the physical decommissioning of:

- Solid Waste Storage Cells
- Pile Chimney
- SEP Purification Plant
- Fuel Fabrication Facilities
- North Group Compound
- Analytical Service Labs
- SEP Product Finishing and Storage Facility*
- LA Effluent Treatment Park*
- LA Effluent Storage Tanks

A range of decommissioning activities need to be carried out in redundant buildings before they can be demolished

A number of redundant facilities at Sellafield have already been decommissioned and demolished, making room for new facilities which will support risk and hazard reduction

*We are only delivering decommissioning in a limited number of areas within SEP PF&S and analytical services, remainder is done in their home programmes once operations and Post Operational Clean Out (POCO) operations are complete

Decommissioning: **Sellafield Site Decommissioning**

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Deliver high hazard and risk reduction**
- **Progress decommissioning and clean-up**

The Windscale pile chimneys will be fully decommissioned and demolished as part of this programme. The associated pile reactors sit in the Windscale Programme.

Solutions:

The strategic objectives are:

- Safe decommissioning of all facilities
- Develop and coordinate long term decommissioning strategy

Solid Waste Storage Cells

We will carry out characterisation and segregation of waste into intermediate level waste and low level waste. Low level waste will be consigned to the Low Level Waste Repository and intermediate level waste will be returned to the cell until the Box Encapsulation Plant is available. When the cells are empty, the facility will be decommissioned and demolished.

Pile Chimney

The remaining Pile Chimney will be decommissioned and demolished down to approximately 35m level. The remaining structure will then be placed under care and maintenance along with the Pile 2 remaining structure. Following final decommissioning of the pile reactors under the Windscale Programme, the remaining pile chimney structures will be demolished.

Separation Purification Plant

Currently in the interim decommissioning phase, focus is on removing the ventilation system, followed by decommissioning and demolition of the building.

Fuel Fabrication Facilities

Facilities will be monitored once operations have finished, followed by a programme of decommissioning and demolition of the building.

North Group Compound

Once the compound is no longer operational we will continue to monitor it before completing interim decommissioning and demolition. The resultant land will be the first to be transferred to the Land and Groundwater Remediation Programme.

Analytical Services Labs

We will continue with interim decommissioning of specific laboratories. The long term decommissioning and demolition sits as part of the Infrastructure Programme.

Separation Product Finishing and Storage Facility

We will decommission and demolish specific zones within the facility. The remaining decommissioning and demolition work is captured as part of the Safe Storage of Plutonium Programme.

Low Active Effluent Treatment Tank

Following the recovery of effluent from the identified tanks, a programme of decontamination and demolition can be completed. The final decommissioning is captured as part of the Effluent Management Programme.

Highly Active Liquor Tank

Removing the intermediate level waste inventory is under way, then the wall will be resealed and the module decontaminated. The remaining decommissioning of the tank is captured as part of the Highly Active Liquor Programme.

A number of buildings have already been safely decommissioned and demolished

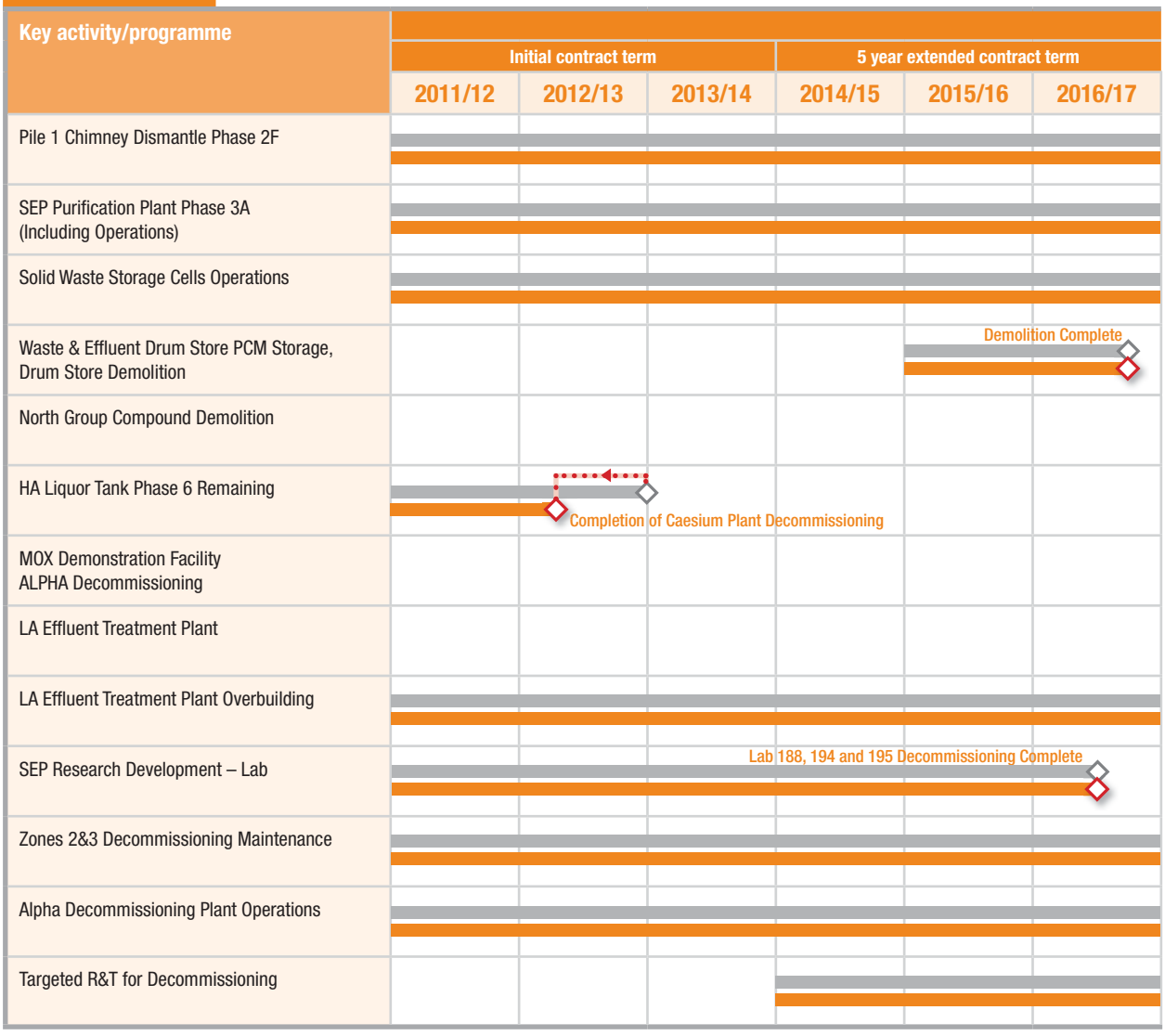
Decommissioning: Sellafield Site Decommissioning

The Plan

Sellafield Site Decommissioning Strategic Objectives:

1. Safe decommissioning of facilities
2. Develop and coordinate long term decommissioning strategy

Milestones:

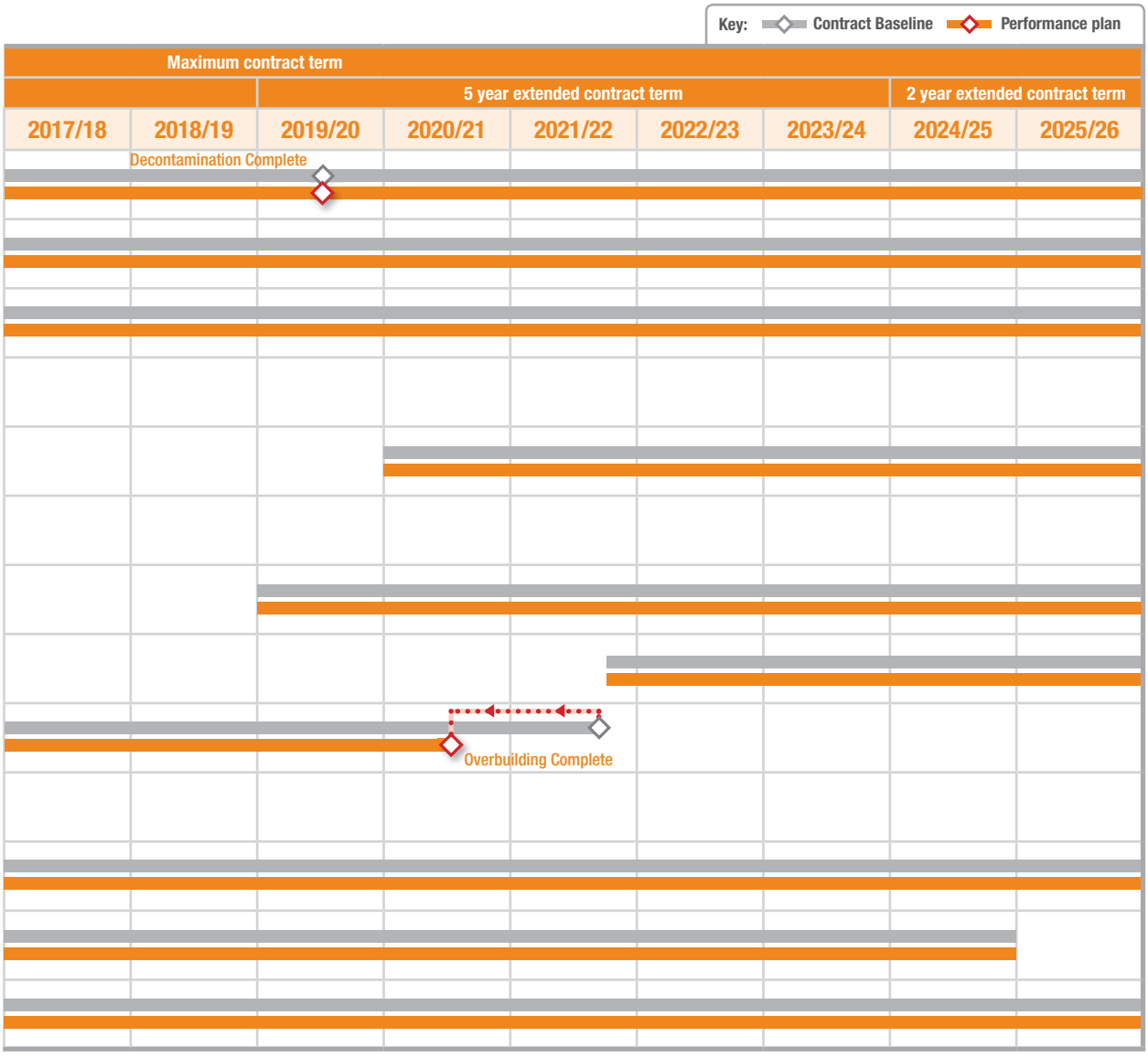


Demolishing redundant buildings frees up vital space on the Sellafield site for new facilities to support our risk and hazard reduction work

The separation area research laboratory forms part of the Decommissioning Programme

The demolition of redundant plutonium contaminated material drum stores (above) will be completed during 2016/17

Decommissioning: Sellafield Site Decommissioning



Decommissioning: Sellafield Site Decommissioning

The Plan cont.

The Sellafield Decommissioning Programme is a group of projects covering facilities across the Sellafield site, where decommissioning is currently being carried out.

The programme includes the strategy and preparation for future decommissioning but excludes the specific decommissioning of all future facilities and all facilities which are currently operational or subject to retrievals operations.

Key highlights of the decommissioning programme include the following:

Pile 1 Chimney dismantling will continue through this reporting period (2010/11 to 2025/26) with decontamination activities scheduled to begin during the 2019/20 financial year.

The demolition of the Waste and Effluent Drum Store, PCM Storage Drum Store was completed in the early part of 2011/12, with the exception of the electrical substation which is still operational. When the substation is taken out of service in 2016, it will be demolished releasing the whole of the footprint for alternative use.

Completion of the Caesium Plant decommissioning is scheduled for the 2012/13 financial year and North Group Compound demolition is scheduled to begin during the 2020/21 financial year.

The construction of an overbuilding for the LA Effluent Treatment Plant is scheduled for completion during the 2021/22 financial year when decommissioning of the LA Effluent Treatment Plant will begin.

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
31,719.8	31,183.0	28,896.2	91,799.0	410,323.3	502,122.3

For more information please see pages 16 and 17 of the overview section

The dismantling of the pile chimney will continue during this period

The decommissioning of the Caesium plant is scheduled for completion in 2012/13

Decommissioning: Sellafield Site Decommissioning

Next Steps

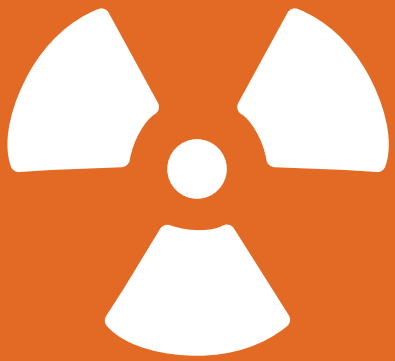
This Programme includes the strategy and preparation for decommissioning and future decommissioning, it excludes the specific decommissioning of facilities which are currently operational or subject to retrieval operations, these are within the scope of the specific Programme Area.

Safety is central to all of our decommissioning activities including the care of our employees and the environment

Sellafield Decommissioning

Solid Waste Storage Cells	Carry out characterisation and segregation of waste into ILW and LLW. LLW will be consigned to the LLWR and ILW will be returned to the cell until the Box Encapsulation Plant is available. When the cells are empty, the facility will be decommissioned and demolished.
Pile Chimney	Following the demolition of Pile 1 chimney to approximately 35m level the remaining structure will be placed under care and maintenance along with the Pile 2 remaining structure. Following final decommissioning of the pile reactors under the Windscale programme, the remaining pile chimney structures will be demolished.
SEP Purification Plant	Currently in the interim decommissioning phase, focus is on removing the ventilation system, followed by decommissioning and demolition of the building.
Fuel Fabrication Facilities	Monitor facilities in a quiescent state, followed by decommissioning and demolition of the building.
North Group Compound	Monitor compound in a quiescent state, followed by completion of interim decommissioning and demolition. The zone will then be one of the first areas to be transferred to the Land and Groundwater Remediation Programme.
Analytical Services Labs	Continue with interim decommissioning of specific laboratories only. The long term decommissioning and demolition is within the Infrastructure Programme.
SEP Product Finishing & Storage facility	Decommissioning and demolition of specific zones, the remaining decommissioning and decontamination is within the Safe Storage of Plutonium Programme.
LA Effluent Treatment Tank	Following recovery of effluent from the identified tanks, decontamination and decommissioning can be completed. The final decommissioning is within the Effluent Management Programme.
HA Liquor Tank	Removing the ILW inventory is under way, then the wall will be resealed and the module decontaminated. The remaining decommissioning is within the HAL Programme, dismantling of the module will be aligned to this.
Functions	The Sellafield Decommissioning Programme carries a provision for functional support for future decommissioning strategy to the wider Sellafield Site; support to both the Programme and wider decommissioning directorate.

Nuclear Materials



Nuclear Materials

Overseas Pu Return

- Plutonium belonging to overseas customers is fabricated into new fuel following reprocessing
- This fuel is fabricated in the Sellafield MOX Plant

Nuclear Materials: Overseas Pu Return

The Plan

The fabrication of Mixed Oxide (MOX) fuel in the Sellafield MOX Plant allows the return of plutonium to overseas customers following reprocessing.

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
MOX Operations						End of MOX Operations
MOX Post-Operative Clean-Out						
MOX Surveillance and Maintenance						

NDA Objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Progress decommissioning and clean-up**
- **Maximise commercial value from our existing assets and operations**

The overseas return of plutonium scope comprises the Sellafield MOX Plant which converts overseas plutonium derived from reprocessing into new fuel for export to customers.

Current contracted business in the Sellafield MOX Plant is due to be completed in 2016 after which time the plant will go into a phase of Post Operational Clean Out (POCO), unless further contracts are agreed.

International Nuclear Services is in discussions with all customers about how they wish to have their plutonium managed.

The Sellafield MOX plant converts overseas plutonium derived from reprocessing into new fuel for export to customers

The control room inside the Sellafield MOX plant

A dry laboratory inside the Sellafield MOX plant

Nuclear Materials: Overseas Pu Return

Overseas Pu Return Strategic Objectives:

1. Maintain safe operation of the Sellafield MOX Plant
2. Convert overseas plutonium into MOX for export
3. Decommission facilities

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

A powder blender inside the Sellafield MOX Plant

Dry lab pellet end inspection equipment inside the Sellafield MOX Plant

Pellet press inside the Sellafield MOX plant

Nuclear Materials: Overseas Pu Return

Enablers

The Sellafield MOX Plant (SMP) uses plutonium separated from used nuclear fuel during reprocessing and recycles it into new MOX fuel. MOX fuel is a valuable source of energy and one tonne of plutonium, when recycled as MOX, can generate the same energy as well over 2 million tonnes of coal.

Customers send their used nuclear fuel to Sellafield to be reprocessed. Reprocessing involves the chemical separation of the 1% plutonium and 96% uranium, from the 3% waste products. Reprocessing customers retain ownership of these materials and recycling the plutonium into MOX fuel allows customers to unlock the energy by making new fuel from old fuel.

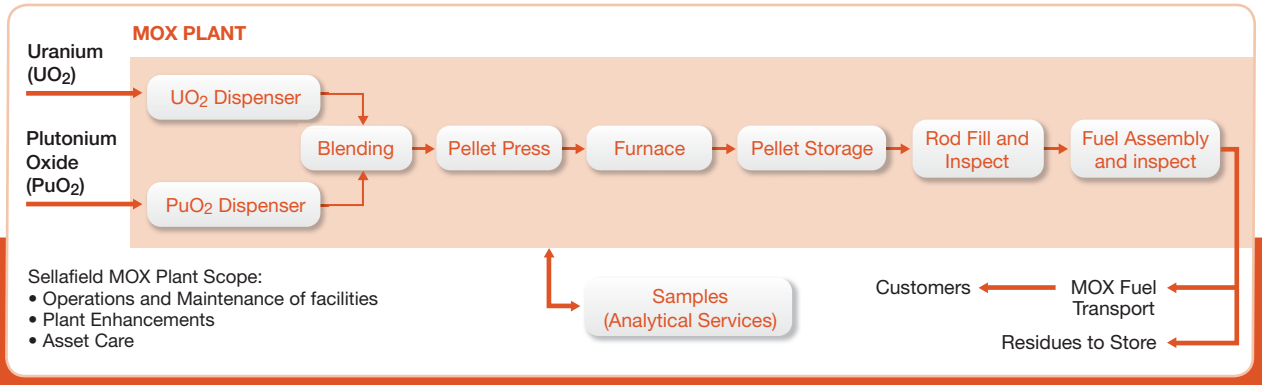
MOX fuel contains uranium and plutonium oxide powders which are milled and mixed together in the correct proportions for the particular MOX fuel design required. The MOX powder is then pressed into MOX fuel pellets which range in size and contain approximately 5% plutonium.

These pellets are sintered in high temperature furnaces which turns the MOX into a hard ceramic material. Following grinding to the exact size and numerous inspections, MOX pellets are then loaded into MOX fuel rods. Finally, fuel rods are built into MOX fuel assemblies or bundles in the correct array to fit the particular customer's reactor.

The whole process requires a huge amount of precision and quality control inspections to ensure a high quality product that performs optimally in the customers' reactors. Typically, reactor operators load up to one third a reactor core with MOX fuel in place of uranium fuel.

A large amount of work in the Sellafield MOX plant is done using gloveboxes

Once manufactured the mixed-oxide fuel is transported to customers



The Overseas Return of Plutonium Programme

Nuclear Materials

Safe Storage of Pu

- Plutonium is safely and securely managed and stored on the Sellafield site
- The UK owned plutonium will be stored pending the outcome of any government review of the policy on plutonium management

Nuclear Materials: Safe Storage of Pu

Overview

The safe storage of plutonium programme consists of the facilities and activities that produce plutonium dioxide and all of the associated facilities. It also includes those facilities and activities that are and will be required to treat and/or repackage plutonium product and residues to facilitate the safe ongoing storage of the stock of civil plutonium at Sellafield.

We are safely storing over 100 tonnes of material at Sellafield.

The Sellafield Product and Residue Store (SPRS) is now operational and will remain so for the duration of this reporting period. Work on the SPRS retreatment construction project will be complete during the 2023/24 financial year.

Plutonium containers

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

Our primary strategic objective for this programme is the continued safe and secure storage of the inventory

The Plan

NDA Objectives:

- Encourage the highest standards in health, safety, security and environmental performance
- Deliver hazard and risk reduction
- Ensure safe and secure management of radioactive waste and materials
- Progress decommissioning and clean-up
- Maximise commercial value from our existing assets and operations

Safe Storage of Pu Strategic Objectives:

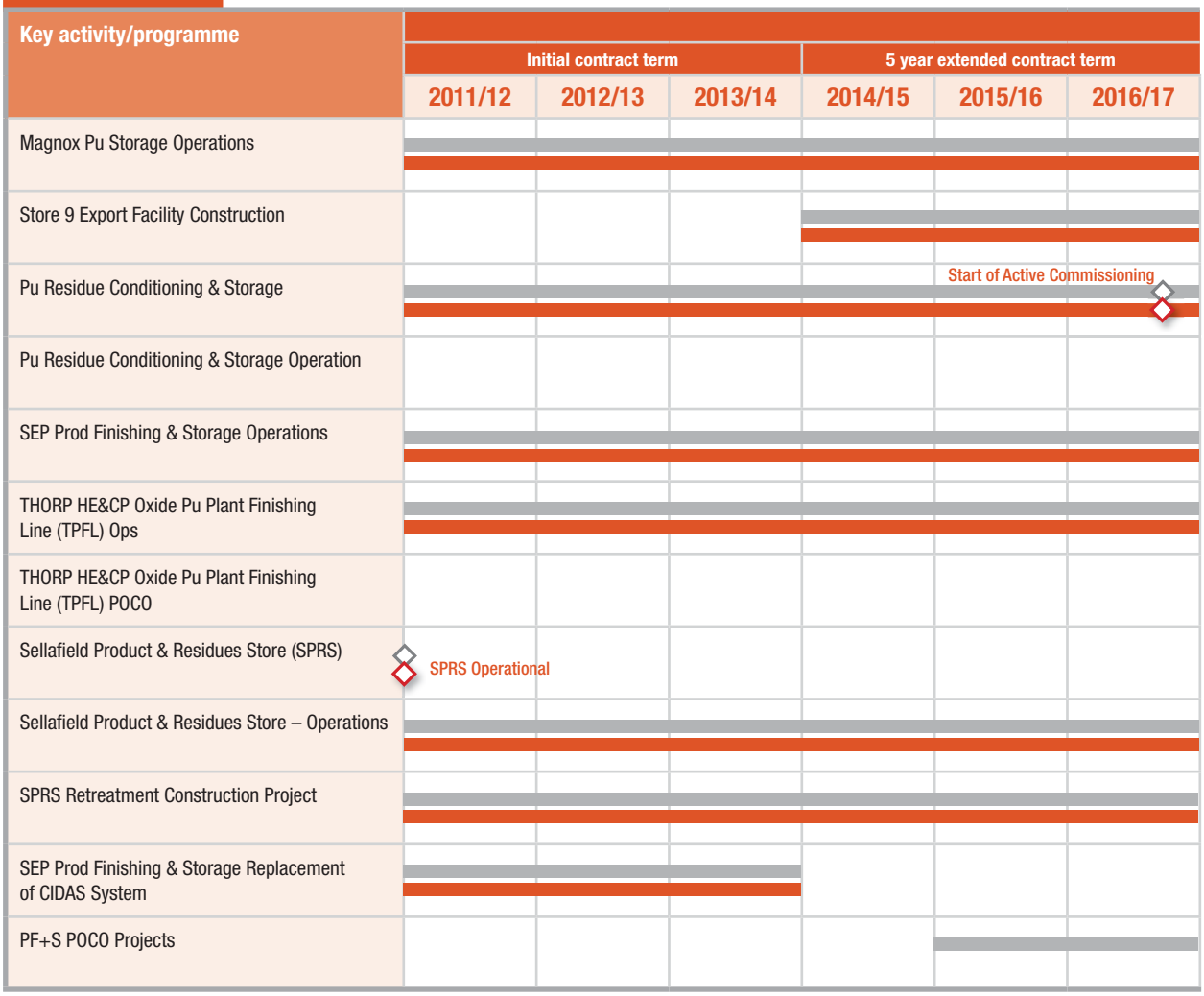
1. Maintain continued safe and secure storage of the inventory
2. Safely commission and operate the Sellafield product and residue store and reduce risk by consolidating plutonium and residues into the store and build and operate extensions to the store
3. Operate finishing lines to enable completion of reprocessing programmes
4. Transport material to meet commercial requirements
5. Design, construct and operate a retreatment facility to enable storage of all material in the Sellafield product and residue store
6. Design, construct and operate an immobilisation facility to enable safe storage of plutonium residues

Nuclear Materials: Safe Storage of Pu

The Plan cont.

Plutonium is safely and securely managed and stored on the Sellafield site in a number of facilities. UK and commercial customer owned plutonium will be moved to a long term storage facility. The UK owned plutonium will be stored to enable decisions from the outcome of the government review of plutonium strategy.

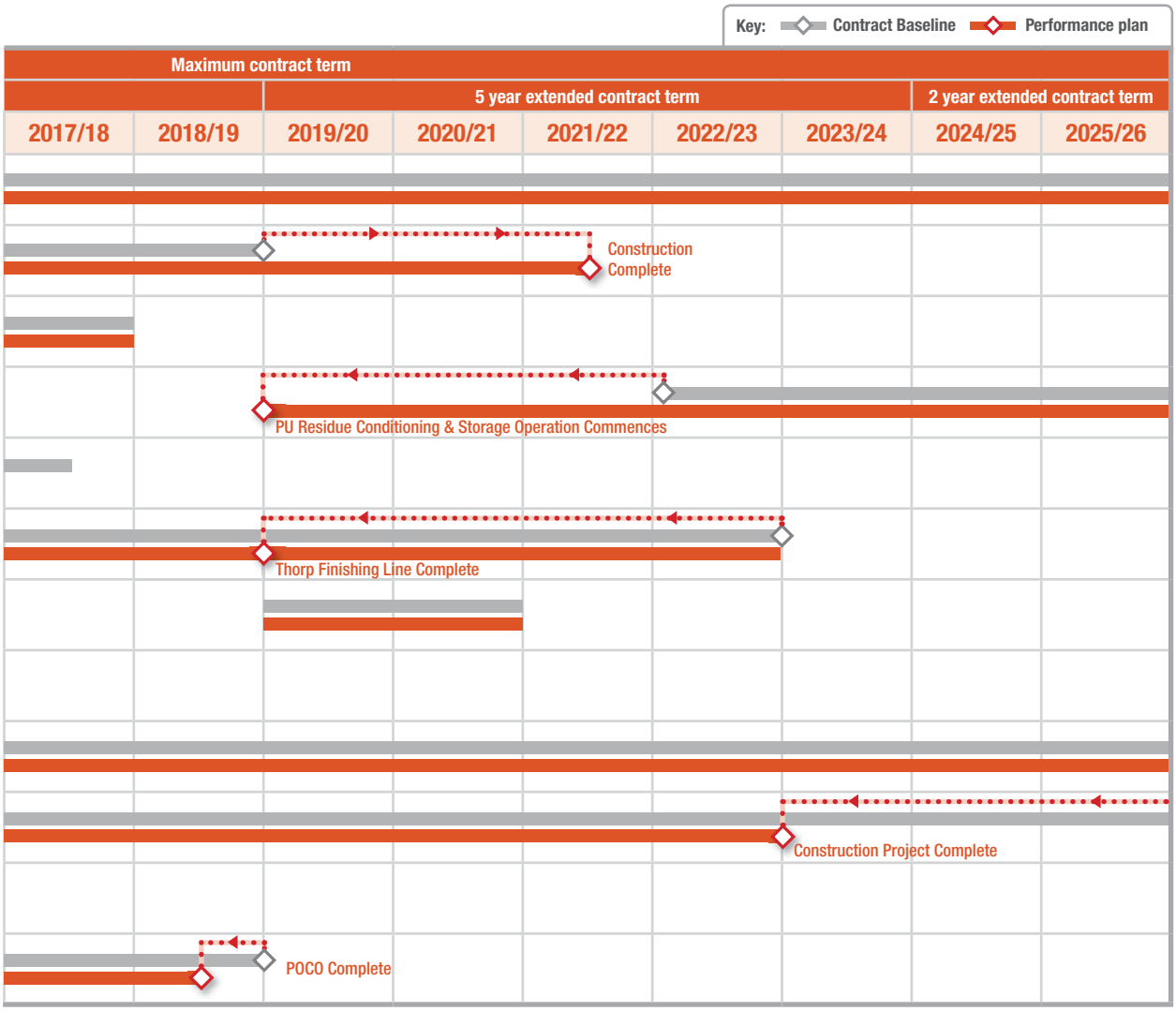
Milestones:



Nuclear Materials: Safe Storage of Pu

Solutions:

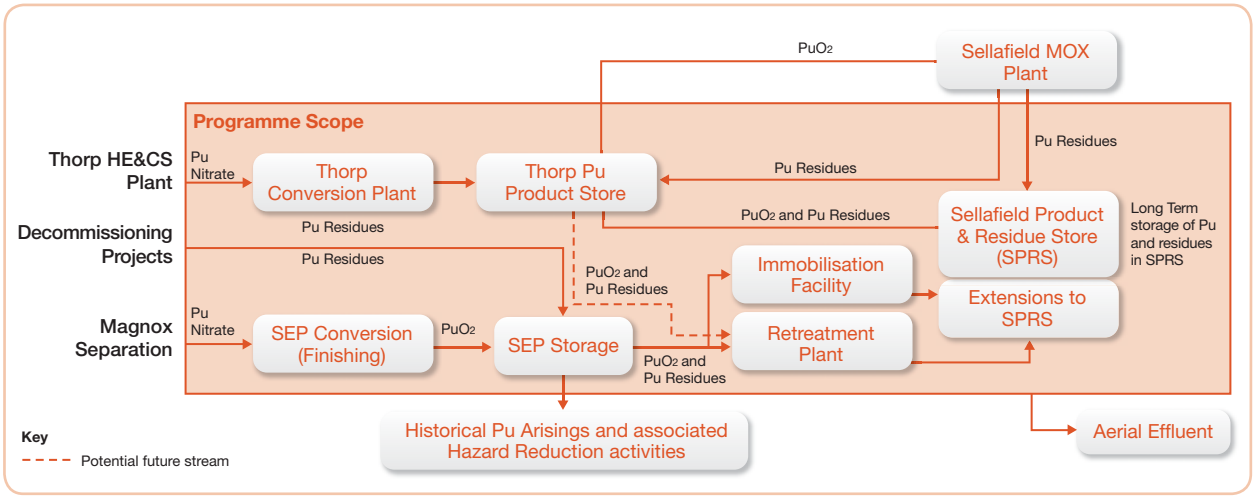
- Operate facilities to support reprocessing programmes
- Safely store the product
- Consolidate legacy product into state-of-the-art Sellafield Product and Residue Store and subsequent extensions
- Transport Pu at customer request for manufacture into MOX fuel



Nuclear Materials: Safe Storage of Pu

Enablers

- Commission National Nuclear Laboratory phase two laboratory research and development
- Complete active commissioning of Sellafield Product and Residues Store (SPRS)
- Construct extensions to SPRS to allow consolidation of the site inventory



The Safe Storage of Plutonium Programme

Waste Management

Waste Management

Effluent Management

- Effluent includes liquid and some solvent waste arising from Sellafield operations
- The primary operations that result in effluent waste are reprocessing and decommissioning
- Effluent is managed at Sellafield in two sets of plants – the Low Active Effluent Plants and the Site Ion Exchange Plant

Waste Management: Effluent Management

Overview

At Sellafield an integrated nuclear waste management programme is in place which seeks to reduce waste volumes arising as part of current activities as well as historic operations. It ensures that waste is stored safely, minimising the risk to the public and the environment.

Facilities

Effluent management at Sellafield is carried out in two groups of plants. The first is the low active effluent plants and includes; the Enhanced Actinide Removal Plant (EARP), the Solvent Treatment Plant (STP), the Salt Evaporator Plant (SEP), the Separation Area Lagoon, the Medium Active Liquor Tank Farm and the Segregated Effluent Treatment Plant.

The second is the Site Ion Exchange Plant, also known as SIXEP.

Site Ion Exchange Plant

This facility was designed to remove solids and soluble radioactive caesium and strontium from pond water purges prior to discharge, store waste solids from this process and to help maintain the thermal conditions of the pond water in the Fuel Handling Plant.

Medium Active Liquor Tank Farm

This facility provides buffer capacity for day-to-day plant operations in both Thorp and Magnox reprocessing plants. It also provides an interim storage facility for solvent and aqueous liquors before they are processed in the Enhanced Actinide Removal Plant and the Solvent Treatment Plant.

Enhanced Actinide Removal Plant

This facility supports plants associated with both Thorp and Magnox reprocessing. It provides the means for the removal of radioactive components from liquid waste streams.

Salt Evaporator Plant

This building supports the operation of the Thorp and Magnox reprocessing plants. Its function is to evaporate high 'salt' liquors that would otherwise limit the evaporation factors achieved in other on-site evaporators.

Solvent Treatment Plant

This facility is used for the treatment of waste solvent from Thorp, Magnox and historic solvent in storage. It is the only UK facility which can process radioactive solvent.

Segregated Effluent Treatment Plant

The Segregated Effluent Treatment Plant receives, neutralises and buffer-stores low active effluents to facilitate sampling and analysis prior to discharge to the Break Pressure Tank and to sea.

Separation Area Lagoon

This lagoon provides a collection and discharge facility for surface water drainage and pumped groundwater from the Separation Area – which is home to some of the oldest buildings on the Sellafield site.

The Enhanced Actinide Removal Plant removes radioactive components from radioactive waste streams

The lagoon provides a collection and discharge facility for surface water drainage and pumped groundwater from the separation area of site

The Site Ion Exchange Plant helps to maintain thermal conditions of the fuel handling plant (above)

Waste Management: **Effluent Management**

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Progress decommissioning and clean-up**
- **Ensure safe and secure management of radioactive waste and materials**

Effluent will continue to be safely managed in two groups of plants; the low active effluent plants and the Site Ion Exchange Plant

Solutions:

- Provide adequate low and medium active effluent management capability and solvent management capability
- Ensure continuous provision of effluent management capability to support hazard reduction activities
- Provision of adequate solid waste storage capacity to support ongoing effluent abatement arisings from risk and hazard reduction activities
- Develop a process to retrieve and export sludge and sand/ clinoptilolite from the Site Ion Exchange Plant bulk storage tanks
- Retrieve and export sludge and sand/clinoptilolite from the Site Ion Exchange Plant bulk storage tanks
- Maintain the assets and ensure the continued safe storage of the radioactive waste inventory
- Remove residual and potentially mobile activity using existing installed equipment and operations staff, or by making small modifications, typically including deployment of small new tools to remove liquor heels and solids and some decontamination activities
- Safely decommission the effluent facilities after Post Operational Clean Out (POCO) to an agreed end-state

Key challenges:

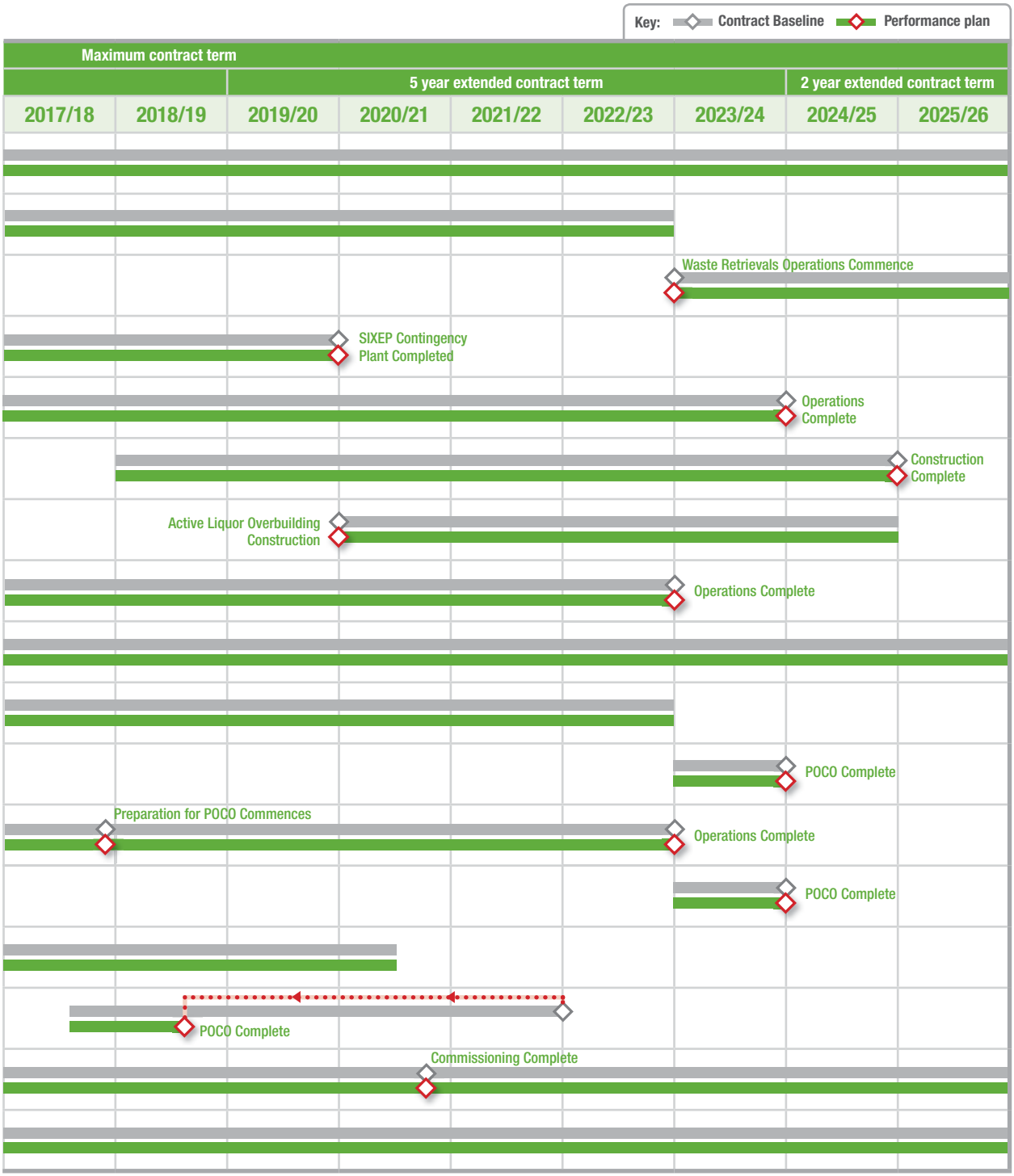
- **A key challenge to this programme is the availability of the plants used at Sellafield to safely manage effluent – some of which are over thirty years old**
- **A wide range of operational facilities at Sellafield produce effluent which then must be safely managed as part of this programme. Any change to the work schedules in these operational facilities has the potential to impact the effluent management programme**

Waste Management: Effluent Management

The Plan

Milestones:

Waste Management: Effluent Management



Waste Management: **Effluent Management**

The Plan cont.

Effluent Management Strategic Objectives:

1. Maintain safe operations
2. Provision of adequate low and medium active effluent management capability
3. Provision of adequate solvent management capability
4. Ensure continuous provision of effluent management capability to support hazard reduction activities
5. Provision of adequate solid waste storage capacity to support ongoing effluent abatement arisings from risk and hazard reduction activities
6. Develop a process to retrieve and export sludge and sand/clinoptilolite from the Site Ion Exchange Plant bulk storage tanks
7. Retrieve and export sludge and sand/clinoptilolite from the Site Ion Exchange Plant bulk storage tanks
8. Maintain the assets and ensure the continued safe storage of the radioactive waste inventory
9. The removal of residual and potentially mobile activity using existing installed equipment and operations staff, or by making small modifications, typically including deployment of small new tools to remove liquor heels and solids and some decontamination activities
10. To safely decommission the effluent facilities after Post Operational Clean Out (POCO) to an agreed end-state
11. Monitor effluent management performance against the guidelines of UK Government policy and the UK Regulatory Framework

Waste Management: Effluent Management

The Effluent Management programme consists of two distinct groups of plants; the Low Active Effluent Plants and the Site Ion Exchange Plant.

The primary objective of the Site Ion Exchange Plant at this time is to support the Fuel Handling Plant in the delivery of the Magnox Operating Programme. In the future, the Site Ion Exchange Plant will play a key role in the Legacy Ponds and Silos remediation strategy. Consequently the plant is being enhanced by a number of improvements including a waste retrievals project which will retrieve sludge and spent sand/ clinoptilolite for encapsulation in the Sellafield Direct Encapsulation Plant. These sludge and clinoptilolite retrievals are scheduled to begin in 2023/24.

Storage of medium active (MA) liquid effluent in the Medium Active Effluent Tank Farm was originally scheduled to be completed at the end of the 2023/24 financial year. The performance plan completion date shows an acceleration of twelve months with an improved completion date of the end of the 2022/23 financial year. Active Tank Farm operations will also end at this time.

Post Operational Clean Out (POCO) operations will be completed in the Salt Evaporation Plant and the Solvent Treatment Plant in 2023/24; and in the Low Active Effluent Plant during 2018/19.

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
37,648.3	39,763.8	48,761.0	126,173.1	1,242,912.1	1,369,085.2

For more information please see pages 16 and 17 of the overview section

Clinoptilolite is a sand product used in the Site Ion Exchange Plant. In the coming years this material will be retrieved from the plant and transferred to bulk storage tanks

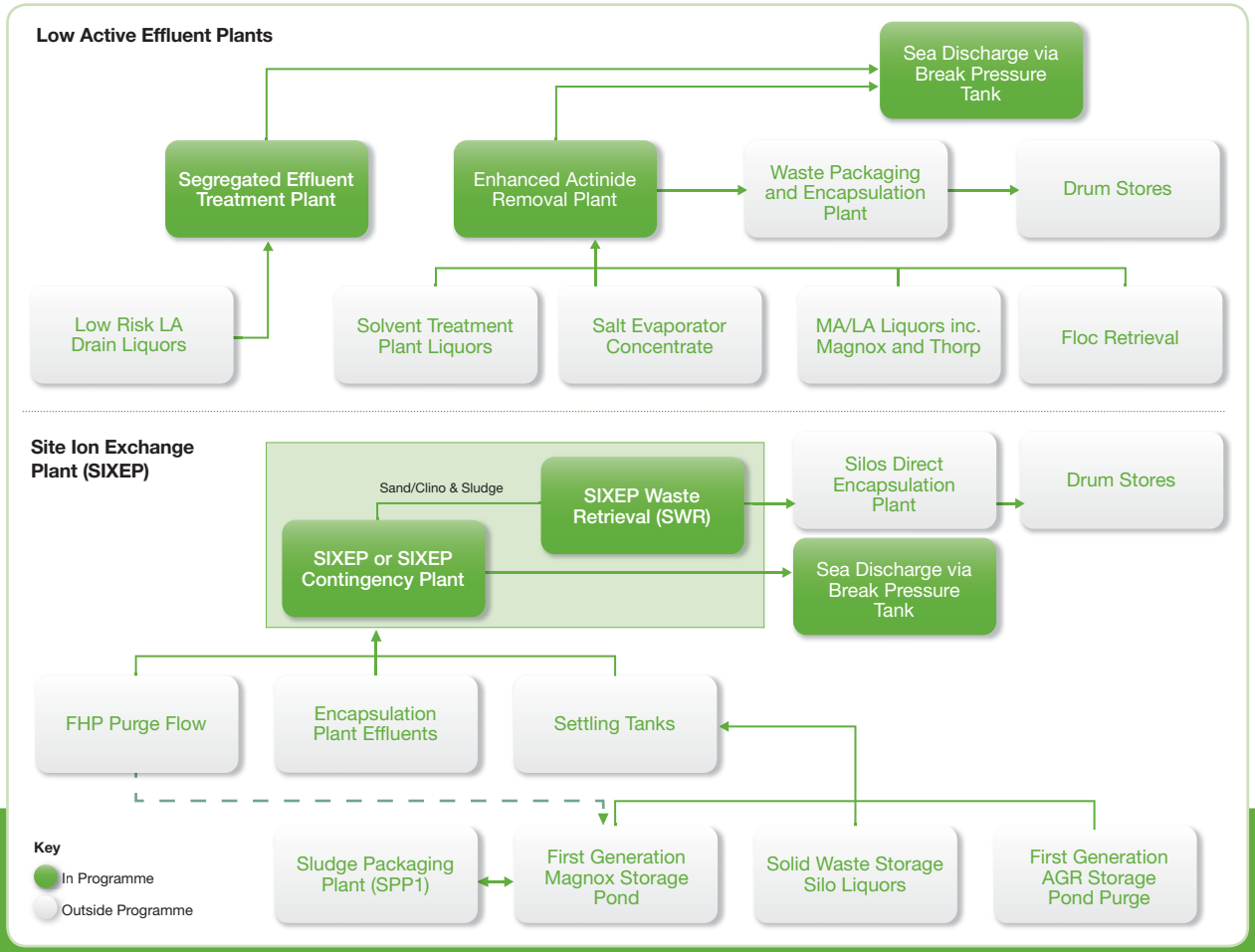
The Solvent Treatment Plant at Sellafield is the only UK facility which can process radioactive solvent

Waste Management: Effluent Management

Enablers

The Effluent Management programme as a whole is an essential enabling programme. The diagram below illustrates its relationship with other operational and decommissioning facilities.

The Site Ion Exchange Plant will continue to play a role in supporting the safe management of effluent at Sellafield



The Effluent Programme

Waste Management

ILW Treatment and Storage

- Intermediate level waste (ILW) includes material such as fuel element cladding, contaminated equipment and radioactive sludge
- ILW comes from current commercial activities as well as historical operations and risk and hazard reduction work
- A number of new construction projects are under way to ensure that Sellafield has the necessary buildings to process and provide interim storage for ILW

Waste Management: ILW Treatment and Storage

Overview

There are three types of nuclear waste; low level, intermediate level and high level waste. This programme covers the treatment and storage of intermediate level nuclear waste at Sellafield.

Legacy

An integrated nuclear waste management programme is in place at Sellafield which seeks to reduce waste volumes arising as part of current commercial activities as well as historical operations, ensuring that waste is stored safely, minimising the risk to the public and environment.

Early waste management activities involved the storage of untreated waste from the first generation reprocessing operations associated with the military programme which took place at Sellafield during the 1950s. Waste arising from the programme was historically held in ponds and silos with no plans for future treatment and disposal.

Intermediate level waste (ILW) includes materials such as fuel element cladding, contaminated equipment, radioactive sludge and plutonium contaminated material that arises from both historical and current operations.

At Sellafield, ILW is put into stainless steel drums, which are then filled with cement grouting before being placed into a special above-ground storage facility on the site.

The task today is to retrieve and process this material as well as manage the arisings produced as part of the ongoing decommissioning of historical and redundant plants at Sellafield and Capenhurst alongside waste produced from current reprocessing activities.

Waste management at Sellafield started in the 1950s in support of the military programme at the time

ILW includes the cladding which is removed from the outside of spent fuel elements as part of our reprocessing

Waste Management: ILW Treatment and Storage

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- Encourage the highest standards in health, safety, security, and environmental performance
- Deliver hazard and risk reduction
- Progress decommissioning and clean-up
- Ensure safe and secure management of radioactive waste and materials

An artist's impression of the planned Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1

Solutions:

In order to continue to safely manage intermediate level waste (ILW) at Sellafield, the solution is to:

- Ensure that Sellafield has safe storage and treatment capability to support hazard reduction and clean-up
- Ensure delivery of key projects within programme to support hazard reduction and clean-up (eg the Combined Import and Export Facility and the 3m^3 Box Project)
- Ensure that waste will be suitable for disposal to the Geological Disposal Facility
- Decommission all associated facilities
- Post Operational Clean Out (POCO) operations

ILW is grouted in steel drums making it suitable for long term storage

Key challenges:

- ILW contains radioactivity and as such the material must be managed safely
- The programme relies on the availability of a number of existing ILW facilities, including encapsulation plants which are over thirty years old. Any disruption to the availability of these facilities presents a challenge to this programme
- The programme relies on the availability of a number of new facilities, including new stores and the Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1 when needed
- The programme also relies on the new 3m^3 ILW boxes being available on schedule

Waste Management: ILW Treatment and Storage

The Plan

ILW Treatment and Storage Strategic Objectives:

1. Provide safe storage capability to support hazard reduction and clean-up
2. Provide adequate treatment capability to support hazard reduction and clean-up

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Design, Prototype Manufacture & Development of 3m³ ILW Container						
BEPPS & CIEF Construction						
BEPPS 1 & CIEF Storage Operations Commence						
Construction of Class II Decommissioning Store						
Operation of Class II Decommissioning Store						
Encapsulated Product Store 3		EPS 3 Construction Complete				
Encapsulated Product Store Storage Operations						
Waste Packaging & Encapsulation Plant Storage and Treatment Operations						
Miscellaneous Beta Gamma Waste Store Storage Operations						
Decomm ILW Encap Plant (DILWEP) New Construction						
Decom ILW Encap Plant (DILWEP) Operations						

The contract for the Early Contractor Engagement Phase of the Box Encapsulation Plant Product Store (BEPPS) and Comprehensive Import/Export Facility (CIEF) Project has been awarded

The team working on the Encapsulated Product Store 3 project has safely conducted three major lifts, one of which involved the lifting of a huge 102-tonne shield door into the plant

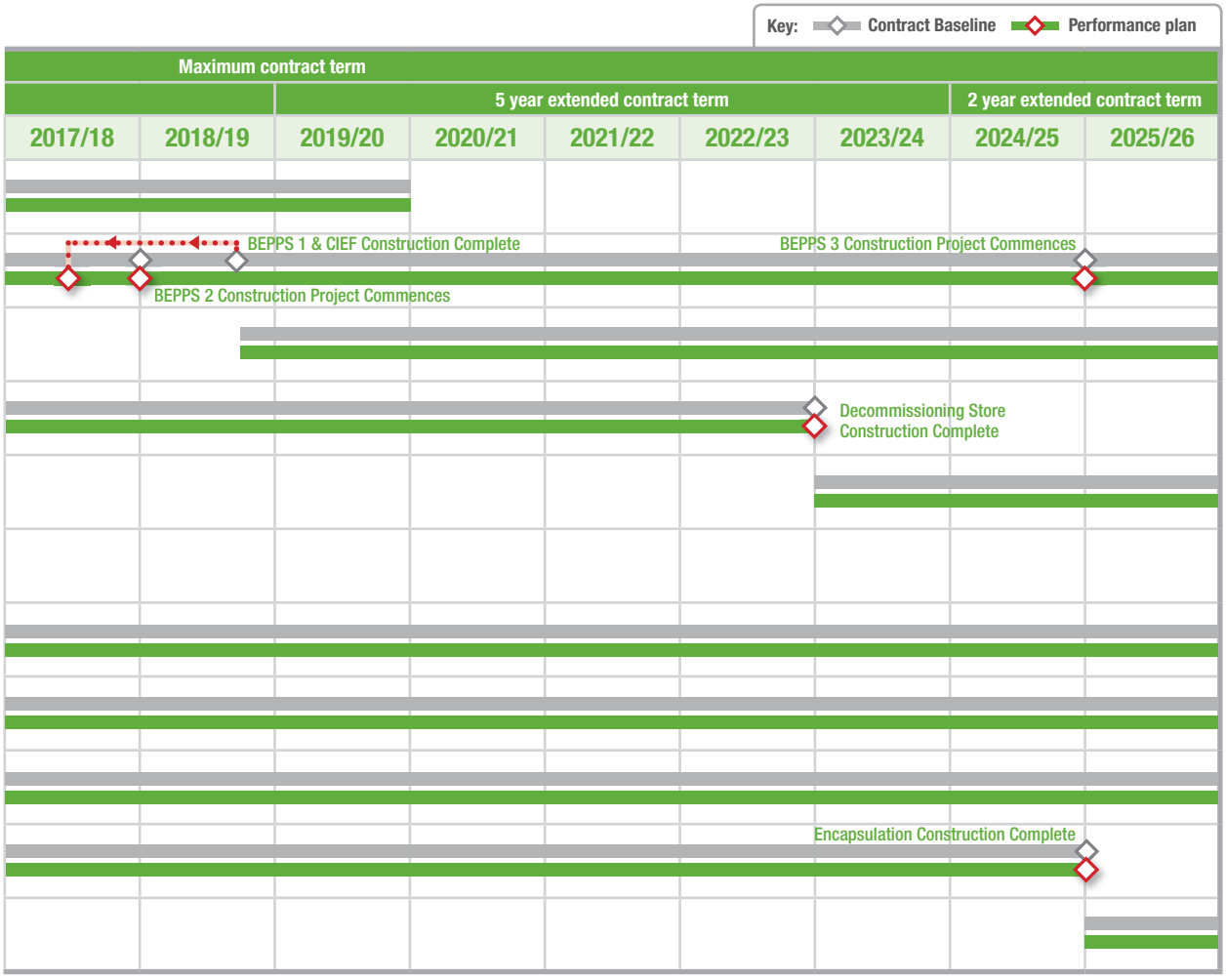
Inside a store at Sellafield

Waste Management: ILW Treatment and Storage

3. Ensure delivery of key projects within programme to support hazard reduction and clean-up (eg the Combined Import and Export Facility and the 3m³ Box Project)

4. Ensure that waste will be suitable for disposal to the Geological Disposal Facility

5. Decommission facilities



External view of Encapsulated Product Store 3 during construction

Operations under way inside the Waste Encapsulation Plant

Waste Management: ILW Treatment and Storage

The Plan cont.

The intermediate level waste (ILW) programme is an essential enabling programme for Sellafield. It immobilises ILW streams and puts Miscellaneous Beta Gamma Waste into interim safe storage.

One of the largest construction projects within the ILW programme is the Box Encapsulation Plant Product Store 1 and Comprehensive Import/Export Facility. Construction is scheduled for completion during the 2018 financial year which will be immediately followed by the start of operations in that facility.

Another construction project, Encapsulated Product Store 3, is due for completion during the 2012/13 financial year. The operations of all of the encapsulated product stores at Sellafield will continue throughout this reporting period.

The construction of a new facility, the Decommissioning Intermediate Level Waste Encapsulation Plant, which will support hazard and risk reduction work at Sellafield, is due to start in 2015. It is scheduled for completion in 2025.

A key project within this programme will be the design, prototype manufacture and development of 3m^3 ILW containers. These containers are an essential part of much of the work that we are planning in the risk and hazard reduction programme.

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
Financial information withheld due to commercial confidentiality					

For more information please see pages 16 and 17 of the overview section

A cross section view of ILW which has been grouted in cement for long term storage

Waste Management: ILW Treatment and Storage

Enablers

Comprehensive Import/Export Facility and Box Encapsulation Plant Product Store 1

The BEPPS1 and CIEF project will incorporate the completion and expansion of a purpose built above ground nuclear waste store and the construction of a new import/export facility to handle radioactive waste, arising from the ongoing nuclear decommissioning and high hazard reduction operations at Sellafield.

Encapsulated Product Store 3

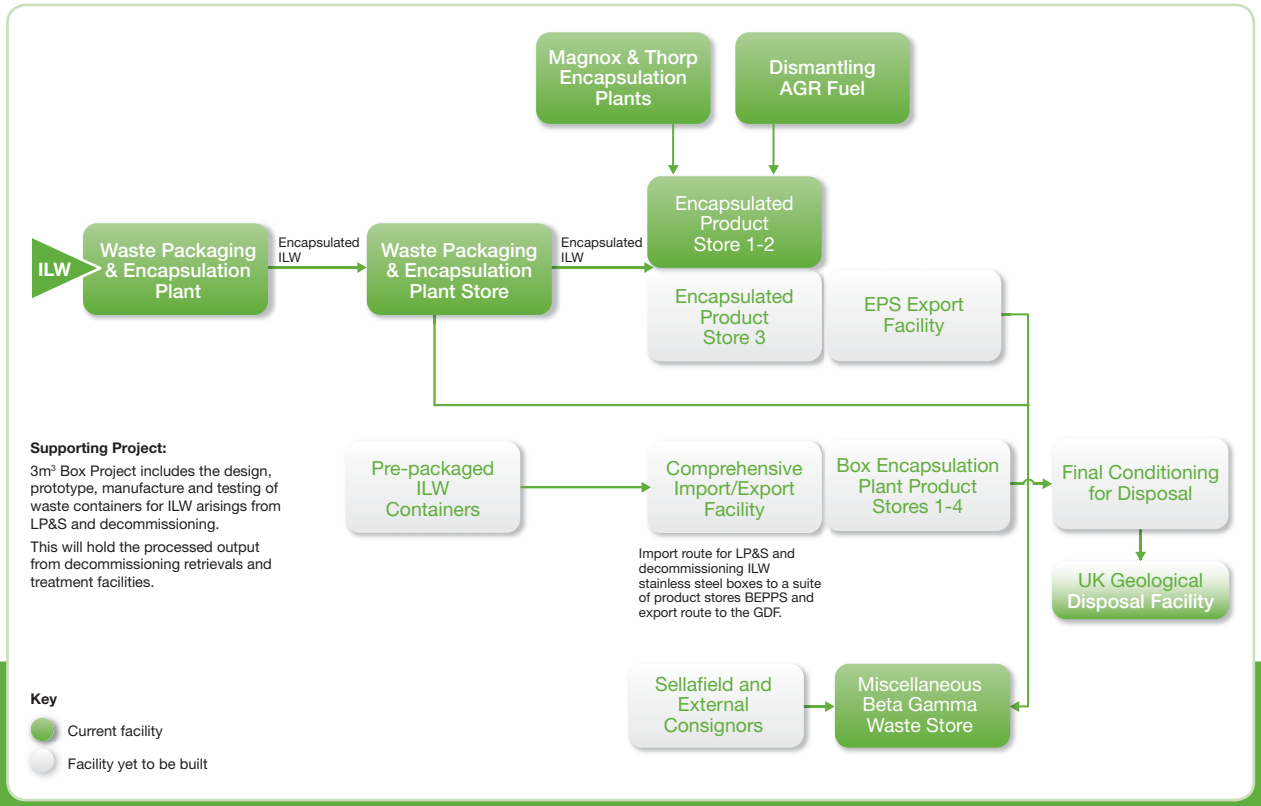
When completed in late 2012 the Encapsulated Product Store 3 will be the new intermediate level waste (ILW) store for the Sellafield site, providing additional capacity to support the two existing stores.

The store will receive ILW arising from the sites reprocessing operations and ILW from the work being undertaken to maximize the reduction of risk to the public and the environment as part of the site's high hazard clean-up operations.

3m³ Intermediate Level Waste Boxes

A key project within the ILW treatment and storage programme is the design, prototype and development of 3m³ ILW containers. These containers are an essential part of the work that we are planning in the risk and hazard reduction programme.

When completed in 2012 the Encapsulated Product Store 3 will provide storage for ILW



The Intermediate Level Waste Programme

Waste Management

LLW and Sub LLW Treatment

- Low level waste (LLW) makes up the largest physical volume of radioactive waste and is only slightly radioactive
- The material includes things like protective clothing, paper towels, gloves, building fabric, metal and concrete
- Where possible, LLW is treated to remove surface contamination and allow the remaining clean material to be reused
- Remaining waste is either compacted or packed as efficiently as possible and then sent to Low Level Waste Repository (LLWR) for disposal

Waste Management: LLW and Sub LLW Treatment

Overview

Low level waste (LLW) makes up the largest physical volume of radioactive waste and is only slightly radioactive. We are committed to safely managing low level waste and processing it to reduce the volume of waste which needs to be disposed of at the Low Level Waste Repository (LLWR).

Legacy

At Sellafield an integrated nuclear waste management programme is in place which seeks to reduce waste volumes arising as part of current activities as well as historic operations, ensuring that waste is stored safely, minimising the risk to the public and the environment.

LLW, which forms 80% of all nuclear waste, is only slightly radioactive and includes things like protective clothing, laboratory equipment, paper towels and gloves etc, items that have been used in the controlled areas of a nuclear site, or in hospitals and nuclear research centres.

The waste is treated at Sellafield at the Waste Monitoring and Compaction Plant. At the Waste Monitoring and Compaction Plant the waste is placed inside boxes which are monitored and then compacted down to a quarter of their original size using a high force compactor.

The facility also processes waste from other waste producers. The material is received in drums which are monitored and compacted.

These drums and boxes are then placed inside an ISO freight container and transported mainly by rail to the Low Level Waste Repository in West Cumbria. Non compactable waste is placed in ISO containers and sent to the Low Level Waste Repository by rail.

Only 50% of the solid low level radioactive waste disposed of at LLWR is from Sellafield. The rest comes from hospitals, universities, research establishments and industries, including the nuclear industry, around the UK.

Wherever possible, work will be undertaken to minimise the future generation of all nuclear waste. At Sellafield today there are a number of workstreams under way concerned with the treatment and storage of LLW, including waste sorting, segregation and size reduction techniques and using the supply chain for optimum disposal routes.

Metallic waste is treated via the Metals Recycling Facility and where possible exempted for re-use, volume reduced to minimise the volume of waste sent to the Low Level Waste Repository or sent to the supply chain for treatment.

Low level waste is made up of things like paper towels and laboratory equipment which has been used in the controlled areas of a nuclear site or in hospitals

Low level waste at Sellafield also includes personal protective clothing which has been used in controlled areas of the site

Waste sorting operations inside the Waste Monitoring and Compaction Plant at Sellafield

Waste Management: LLW and Sub LLW Treatment

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security, and environmental performance**
- **Ensure safe and secure management of radioactive waste and materials**

Our focus is on safely managing low level nuclear waste while implementing new technology (such as the wheelabrator seen here) to reduce the volumes of waste which needs to be disposed of

Solutions:

- Optimise the use of the planned UK low level waste (LLW) disposal capacity
- Where practicable, avoid the generation of waste
- Characterise, sort and segregate LLW, where possible maximise the use of exemption orders and enhance in-house capability for sorting and segregation
- Continue to use existing authorised waste routes including specified landfill
- Open up new treatment routes via the supply chain
- Post Operational Clean Out (POCO) operations

Key challenges:

- **LLW contains the least amount of radioactivity of the three waste streams (low, intermediate and high level waste) but does still contain radioactive material and as such presents a challenge**
- **The programme relies on the availability of a number of existing LLW facilities, primarily contained within the Waste Monitoring and Compaction Plant which treats the LLW before it is transported to the Low Level Waste Repository. Any disruption to the availability of this facility – or future alternative facilities – presents a challenge to this programme and other programmes on the Sellafield site which produce LLW**
- **Minimise volumes of waste disposed to the Low Level Waste Repository**

Waste Management: LLW and Sub LLW Treatment

The Plan

LLW and Sub LLW Treatment Strategic Objectives:

1. Maintain safe operations
2. Support delivery of UK Nuclear Industry LLW Strategy
3. Optimise the use of the planned UK LLW disposal capacity
4. Where practicable, avoid the generation of waste

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Waste Monitoring & Compaction (WAMAC) Plant Treatment Operations						
WAMAC – POCO						
WAMAC – Decommissioning						
Metals Recycling Treatment Operations						
New LLW Metals Recycling & Treatment Facility						
Current Metals Recycling Facility – POCO						
LLW Sort/Segregate/Size Reduction Facility						
LLW/Sort/Segregate/Size Reduction Facility – Operations						
CLESA Operations						
Off Site Disposal LLWR – Waste Operations Tasks						

LLW is placed into containers which are then compacted to reduce their size

The site's wheelabrator facilities remove surface contamination

Elevated view of CLESA Disposal Facility

Waste Management: LLW and Sub LLW Treatment

5. Characterise, sort and segregate LLW and where possible maximise the use of exemption orders and enhance in-house capability for sorting and segregation

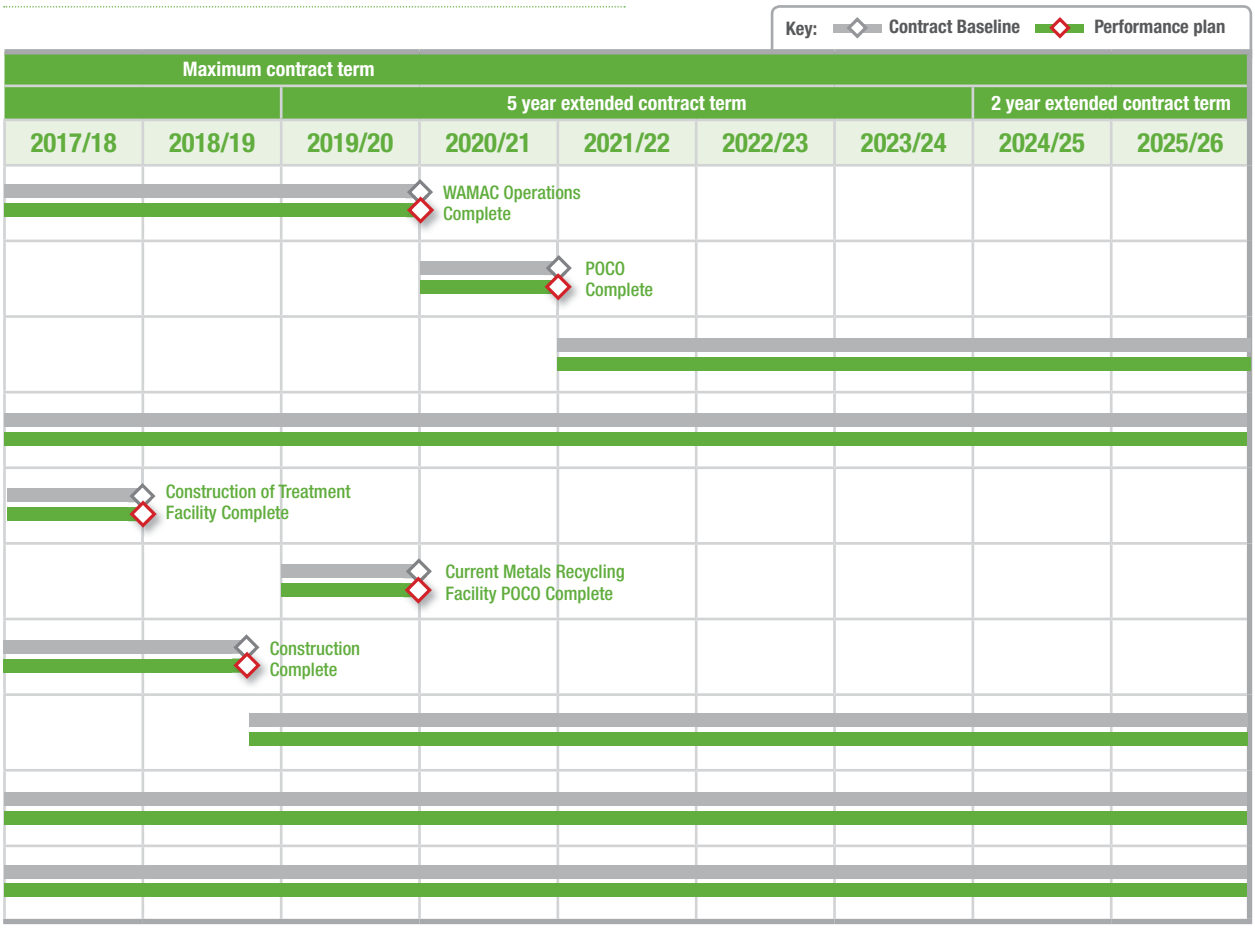
6. Continue to use existing authorised waste routes including specified landfill

7. Continue to operate existing waste infrastructure efficiently and effectively

8. Explore opportunities and make best use of the supply chain (both nationally and internationally) for waste treatment and disposal

9. Work with the national low level waste contractor at the Low Level Waste Repository to integrate solutions, develop business cases and ensure strategic fit with UK Nuclear Industry LLW strategy

10. Decommission all facilities



Low level waste is sent to the Low Level Waste Repository for disposal

Waste Management: LLW and Sub LLW Treatment

The Plan cont.

The low level waste (LLW) and sub-low level waste programme is a key enabler in supporting ongoing hazard reduction and decommissioning activities.

It includes the facilities to process and export LLW to the Low Level Waste Repository or to an alternative future disposal facility.

The schedule will see the completion of activities at the Waste Monitoring and Compaction Facility at Sellafield in 2020. The Waste Monitoring and Compaction Facility will then go through a twelve month Post Operational Clean Out (POCO) period before decommissioning work starts in 2021.

Metals Recycling Treatment operations will continue throughout this reporting period. A new LLW metals recycling facility to support these operations is due for completion in 2018. The original treatment facility will undergo POCO work during the 2019/20 financial year.

Construction of a new LLW sort/ segregate/size reduction facility will begin in 2012 and will start its operations during 2018/19.

The programme will aim to identify combustible materials and metallic material suitable for treatment via the supply chain to minimise volumes of waste being disposed of at the Low Level Waste Repository.

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
23,790.1	29,874.9	28,909.5	79,735.7	405,599.2	485,334.9

For more information please see pages 16 and 17 of the overview section

Waste Management: LLW and Sub LLW Treatment

Enablers

Waste Monitoring and Compaction Plant

Low level waste (LLW) at Sellafield is treated at the Waste Monitoring and Compaction Plant. At the Waste Monitoring and Compaction Plant the waste is monitored and then compacted down to a quarter of its original size using a high force compactor.

These drums are then placed inside an ISO freight container and transported mainly by rail to the Low Level Waste Repository in West Cumbria. Non compactable waste is packaged as efficiently as possible and sent to the Low Level Waste Repository.

Metal Decontamination Facility

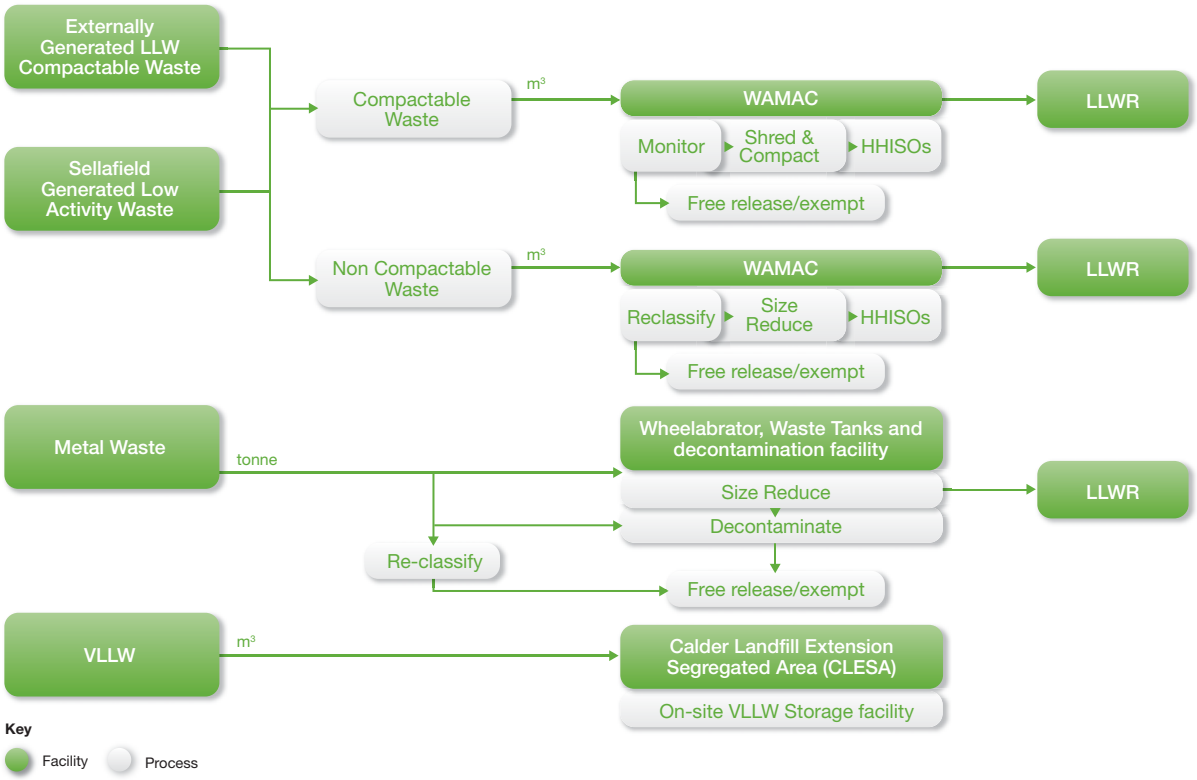
We have a metal decontamination facility on the Sellafield site which is used to mechanically remove the outer surface of contaminated steel to clean metal for recycling.

Low Level Waste Repository

Once LLW has been compacted at Sellafield it is transported for disposal at the UK's national Low Level Waste Repository, approximately seven miles south of the Sellafield site.

Supply Chain

We will continue to work with the Low Level Waste Repository to identify suitable supply chain options for the treatment of waste.



New Generations of Waste Treatment Plants:

- Sort, Segregate and Size Reduction Facility
- Metals Recycling Facility
- CLESA 2
- New decontamination facility

Acronyms

HHISO: Half Height ISO containers
FHISO: Full Height ISO containers
LLWR: Low Level Waste Repository
VLLW: Very Low Level Waste

Infrastructure

Infrastructure

- **Infrastructure is a combination of service delivery units and separately licensed nuclear sites involved in a wide variety of activities, from site emergency response teams to operation of the high active laundry**

- **Many of these services are critical to the continued day to day operation of the Sellafield site and are strategically important, such as our work on the fuel flasks, which support the UK nuclear fuel cycle**

Infrastructure

Scope of Services Provided

The infrastructure programme provides a range of diverse services and facilities ranging from cleaning services to analysis of radioactive samples. These services/facilities are essential to the ongoing operation of other programmes at Sellafield

- Site Maintenance & Engineering
- Programme Support Roles
- Operations
- Security, Safeguards, Emergency Management
- Infrastructure Projects
- Information Services & Technology

Infrastructure

Deliverables

This programme of work aligns with the Nuclear Decommissioning Authority (NDA) objectives.

Principal objectives:

- Encourage the highest standards in health, safety, security and environmental performance.
- Deliver hazard and risk reduction.
- Progress decommissioning and clean-up.
- Maximise commercial value from our existing assets and operations.
- Ensure safe and secure management of radioactive waste and materials.
- Determine the scope of the liabilities and identify opportunities for their reduction.

Key Infrastructure Objectives	Meeting Customer Requirements
Implement security enhancement programme	Reduce security risks, increase security awareness and improve emergency response
Improve asset management capability	Material condition improvement plan
Develop an integrated information services vision and consolidated delivery program	IT security enhancement programme
Implement infrastructure strategic alliance	To improve delivery and cost performance
Enhance site wide outage capability	Integrated planning of outages
Reduce energy consumption	Site energy reduction programme
Improve infrastructure long term asset/service delivery strategies	Strategies in place for analytical sampling, energy and land and site development
Improve our contract management to reduce our supply chain cost	Provide cost-effective facilities, changerooms and workwear

The infrastructure programme manages the rail service provision at Sellafield – a vital service that supports a number of operating plants

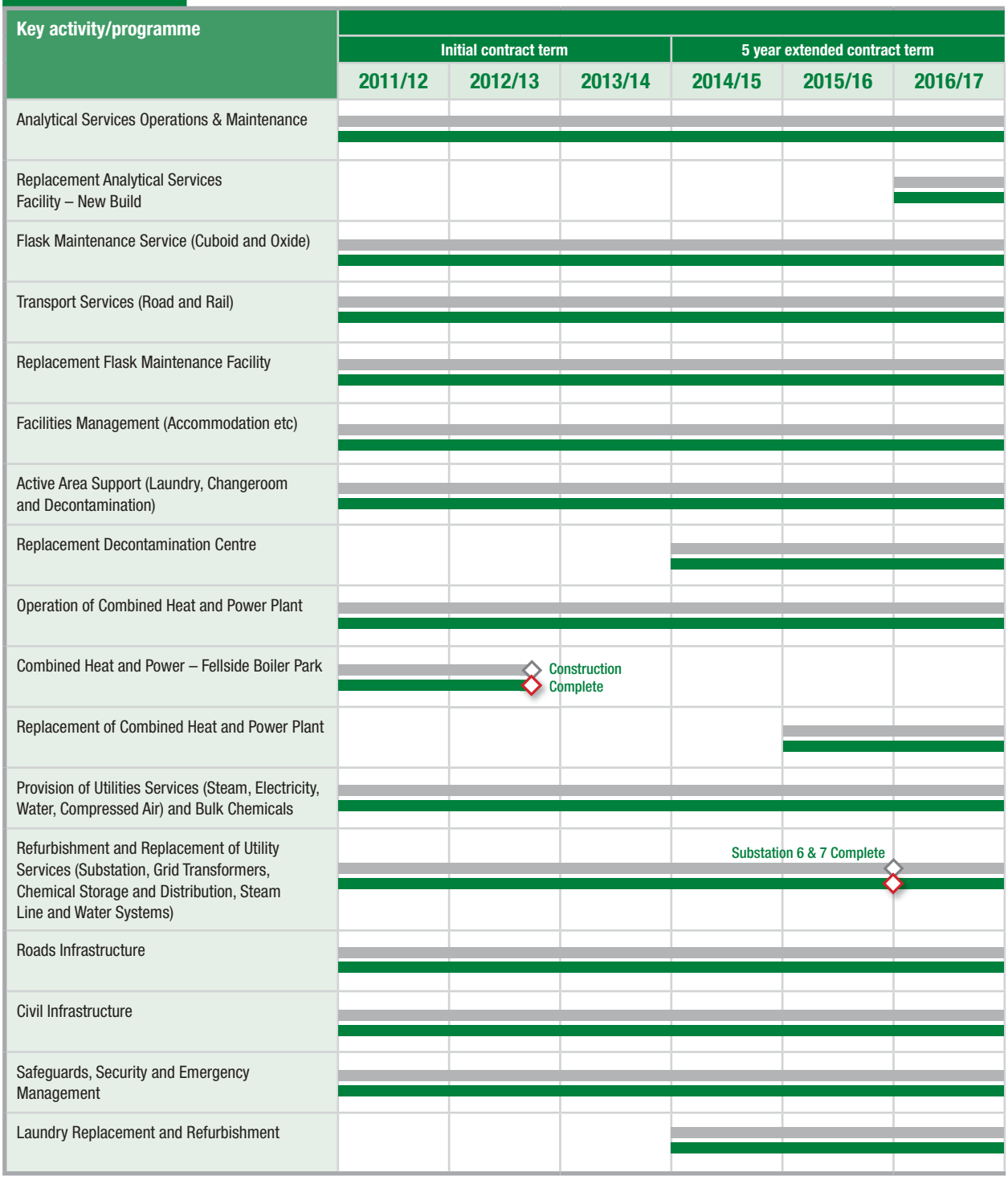
There are thousands of metres of pipework across the Sellafield site which provides essential services to our buildings, all of which must be maintained

The Sellafield site has its own fire and rescue service which includes fire response, ambulance and paramedics and search and rescue teams

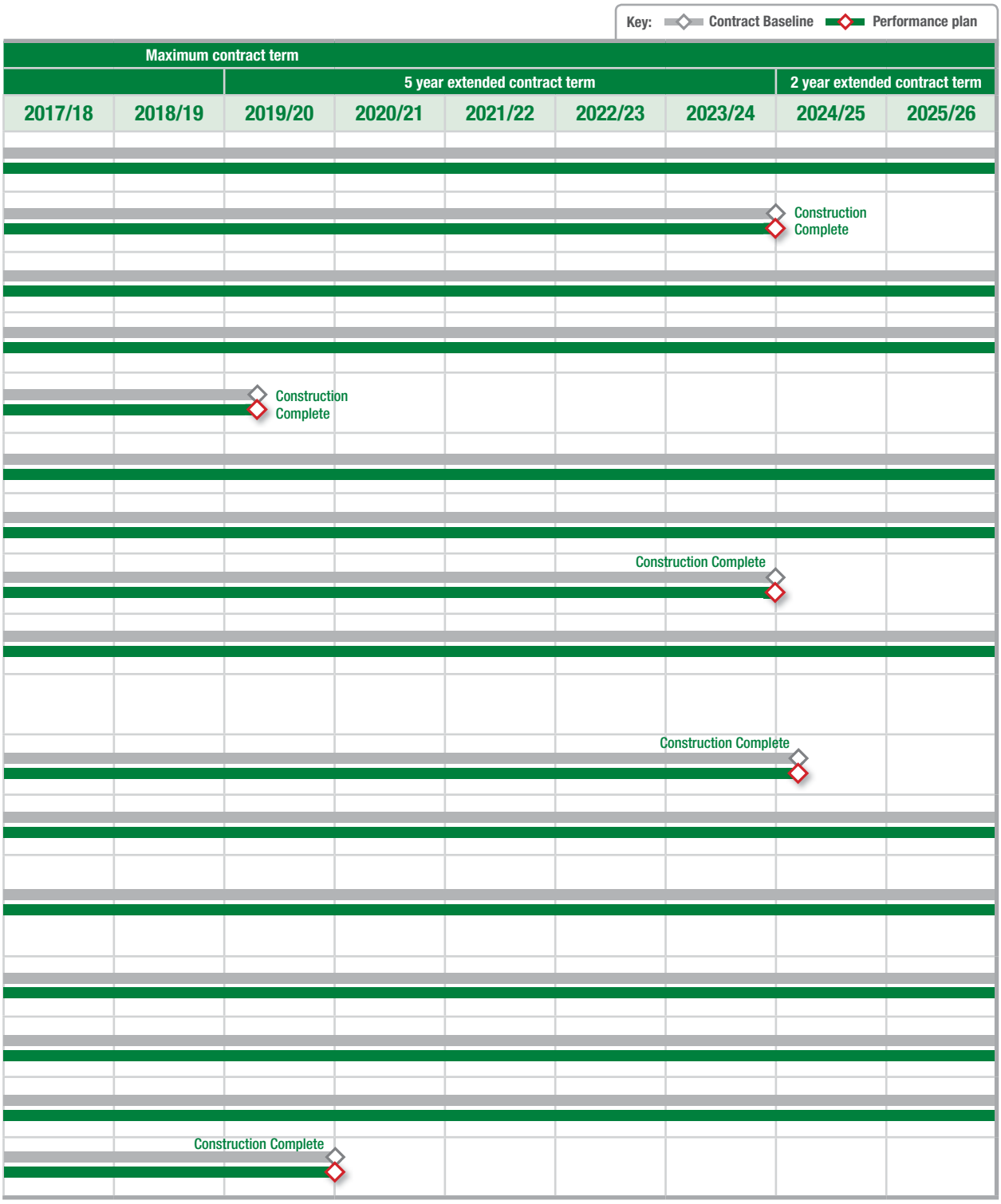
Infrastructure

The Plan

Milestones:



Infrastructure



Infrastructure

The Plan cont.

Infrastructure Strategic Objectives:

1. Provide and maintain reliable essential site services and utility systems to support other programmes
2. Provide safe and reliable transport consignment and flask maintenance services to support other programmes
3. Provide infrastructure governance and asset management planning
4. Establish and manage support facilities and enabling services
5. Provide analytical, changeroom and decontamination services to nuclear facilities
6. Simplify/rationalise infrastructure services as demand levels allow
7. Decommissioning of all associated facilities

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
300,855.6	303,087.4	269,467.2	873,410.2	2,968,125.0	3,841,535.2

For more information please see pages 16 and 17 of the overview section

Maintenance work being carried out at Calder Hall.

Our employees use changerooms to access radiological areas. The provision of these services is essential in getting our employees to their plant

Infrastructure

Measurement and Reporting

Measurement and reporting of performance within Infrastructure is aligned with the Sellafield Ltd Strategic imperatives.

- **Operational Excellence and Nuclear Safety**
- **Asset Management**
- **Commercial Excellence Meet Production and Financial Commitments**
- **Workforce Safety and Effectiveness**
- **Environmental Stewardship**

Risk Management

Key to the infrastructure mission is the continuity and effectiveness of services provided to the other programmes on the Sellafield site. To that end managing the risk of interruptions to services and support is an important part of our work.

Examples of investment in risk management activities include:

- Security Enhancements Programme to improve physical, personal and information security
- Upgrading of obsolete transformers and substations to protect the electricity supply to significant facilities
- Enhancing the security of the steam supply to the site in support of nuclear safety
- Replacement of the ageing water pipelines that supply the site
- Reducing the levels of historical waste from sampling and analysis activities

The portfolio also has strong links with national infrastructure through the provision of services to other nuclear sites within the Nuclear Decommissioning Authority's estate. Such provisions include analytical services and support for the reprocessing of spent fuels from power stations by receiving fuels to Sellafield and the subsequent transportation around the site. The programme of work is essential to the consignment and transportation of wastes to external repositories or treatment facilities, for example low level waste to the Low Level Waste Repository.

Flask maintenance and transport services (road and rail) will continue along with the following essential services to Sellafield Site:

- Facilities management
- Active area support
- Provision of utilities services
- Roads and civil infrastructure
- Safeguards, security and emergency management

Across the full portfolio of work we will aim to provide safe, secure infrastructure service delivery at the lowest cost.

Flask maintenance is an essential part of the infrastructure programme and supports both Magnox and Thorp reprocessing as well as the defuelling of Magnox stations

Steamline maintenance work under way at Sellafield. Steam is provided to the site by the Combined Heat and Power Plant

A number of employees at Sellafield are required to wear personal protective clothing when carrying out their work. The on site laundry ensures that this clothing is available when needed

Infrastructure

Summary

Infrastructure has optimised organisational structure in order to improve our service delivery and effectiveness. We are committed to delivering our performance plan and have started to develop strategic opportunities.

Going forward our Strategic Opportunities

Transport and Logistics

Ensuring that transportation, flask maintenance assets and service levels are efficiently managed to meet future site requirements.

Land and Site Development Strategy Steering Group

Considering the many interactions necessary to determine how the limited site space is best utilised.

Non-Active Utilities

Ensuring that assets and service levels are efficiently managed to meet future site requirements for utility systems.

Active Utilities

Ensuring that assets and service levels are efficiently managed to meet future site requirements for active sample analysis, equipment decontamination, active liquid transfers and discharge and active gaseous discharge.

General Support Services

Ensuring that assets and service levels are efficiently managed to meet future site requirements for radiological PPE and laundry, accommodation and changerooms, security, safeguards and emergency response and telecommunications, IT, IS and Programmable Electronic Systems.

Functions

Functions

- Functions include those areas which support the operational and clean-up work at Sellafield
- They include support services such as environment, health and safety (EHS&Q), human resources, finance and communications
- Services within finance, engineering and design capability also provide services to other sites in the NDA's estate
- The strategic objective for all functions is to provide effective functional support in the most cost-efficient manner

Functions

The Plan

The Functional Portfolio provides support to the site mission, ensuring that site activities meet legal and customer requirements. The application of efficient and effective strategies, policies and processes provide a framework for maintaining a safe nuclear site.

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Functional Support						
Corporate Responsibility						
Stakeholder Relations						

The portfolio includes functional areas that support the operation of Sellafield Ltd. Services within the portfolio such as Finance, Engineering and Design Capability, are also provided to other NDA sites. The key strategic objective for Functions is to provide effective functional support to Sellafield Ltd operations in the most cost-efficient manner.

General scope of work

- Engineering & Design Capability
- Site Management
- Procurement Commercial & Contract
- Business Support
- Production Operations Support
- Strategy & Programmes
- Environmental Health & Safety
- Quality
- Programme Management
- Finance
- Human Resources
- Regulatory Liaison
- Sellafield Communication
- INS Relations

The portfolio includes functional areas that support the operation of Sellafield Ltd

Functions

Safe working in our functional areas is as important as safe working in our operational areas

The functional programme includes our work with the supply chain

The functional areas of Sellafield provide support to the operational areas including services such as employee training and development

Key: Contract Baseline Performance plan

Maximum contract term								
		5 year extended contract term					2 year extended contract term	
2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
185,805.9	175,474.9	167,433.0	528,713.8	1,856,077.8	2,384,791.5

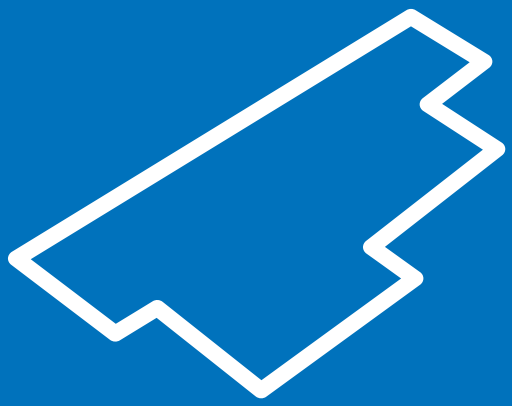
For more information please see pages 16 and 17 of the overview section

Safe management of the environment is a vital role within the functional programme

Our occupational health department provides 24/7 health care to our employees while working on site

Our engagement with the local community includes an extensive educational programme which takes science and engineering ambassadors into local schools

End States



End States

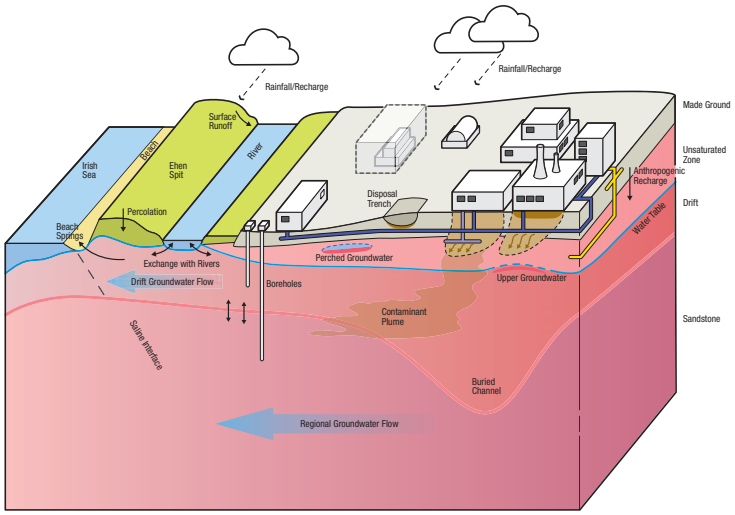
Land and Groundwater Remediation

- The land and groundwater remediation programme is an extensive piece of work which stretches out over the next 110 years.
- Ultimately the programme will deliver the clean-up of the Sellafield site to the agreed end-state as stated in the Nuclear Decommissioning Authority (NDA) Strategy

End States: Land and Groundwater Remediation

Overview

Our land and groundwater remediation programme will deliver clean-up of the Sellafield site to the agreed end-state of partial remediation, followed by indefinite institutional control.



Activities

The objectives of the Land Quality Programme are to understand, control, manage and remediate the legacy of contaminated land and groundwater at Sellafield in order to ensure protection of the work force, the public and the environment.

To meet these objectives the Land Quality Programme integrates programme management, characterisation, assessment and remediation management, groundwater management, and data management.

During the short to medium term the main objectives of the Land Quality Programme are to minimise any increase in contaminated land inventory and to limit expansion of the volume of contaminated land.

The longer term objective for the Land Quality Programme is to work towards the Nuclear Decommissioning Authority's (NDA) agreed end-state as stated in the NDA strategy.

The Land and Groundwater Programme includes a groundwater monitoring programme which characterises, assesses and monitors the groundwater quality underlying the Sellafield site through groundwater sample acquisition and analysis.

Sampling the groundwater monitoring wells and evaluating the sample analysis data provides an understanding of the nature and extent of groundwater contamination beneath the Sellafield site.

Sampling boreholes at Sellafield help us to understand, control, manage and remediate the legacy of contaminated land and groundwater

There are more than 140 boreholes across the Sellafield site

Managing land contamination in situ requires a comprehensive understanding of the groundwater under the site

End States: Land and Groundwater Remediation

Solution

This programme of work aligns with the following Nuclear Decommissioning Authority (NDA) objectives:

- **Encourage the highest standards in health, safety, security and environmental performance**
- **Deliver hazard and risk reduction**
- **Progress decommissioning and clean-up**
- **Ensure safe and secure management of radioactive waste and materials**

Borehole drilling operations on the site

Solutions:

- Demonstrate compliance with authorisations, consents and permits through monitoring and assessment
- Develop conceptual models for land and groundwater remediation on the site
- Treat contaminated land and groundwater
- Provide a land characterisation service for projects at Sellafield

Key challenges:

- **The length of the programme – this programme is an extensive piece of work which stretches out over the next 110 years**
- **Remediation of land and groundwater, which could include in-situ management**

The groundwater sample schedule provides time-series data to track the movement of contaminants

End States: Land and Groundwater Remediation

The Plan

Land and Groundwater Remediation Strategic Objectives:

1. **Demonstrate compliance with authorisations, consents and permits through monitoring and assessment**
2. **Develop conceptual models for land and groundwater remediation on the site**

Milestones:

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Land Quality Delivery						
Production of an Annual Environment Agency Report						

The objective of the land and groundwater remediation programme is to deliver clean-up of the Sellafield site to the agreed end-state of partial remediation, followed by indefinite institutional control.

This is an extensive piece of work which stretches out over the next 110 years.

Land and groundwater monitoring is done on and off the Sellafield site

Monitoring activities under way outside of the Sellafield site

Every year we publish a groundwater monitoring report which is available on the Sellafield Ltd website

End States: Land and Groundwater Remediation

3. Mitigate leaks to ground by providing a 'line of control' around the separation area

4. Remediate contaminated land and groundwater

5. Provide a land characterisation service for projects at Sellafield

Key: Contract Baseline Performance plan

Maximum contract term								
		5 year extended contract term					2 year extended contract term	
2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26

Summary of costs:

Initial contract term			Total (£k) 2011/12 -2013/14	Total (£k) 2014/15 -2025/26	Total (£k) 2011/12 -2025/26
2011/12	2012/13	2013/14			
3,302.9	3,254.2	3,266.0	9,823.1	38,954.2	48,777.3

For more information please see pages 16 and 17 of the overview section

End States: Land and Groundwater Remediation

Next Steps

Sampling

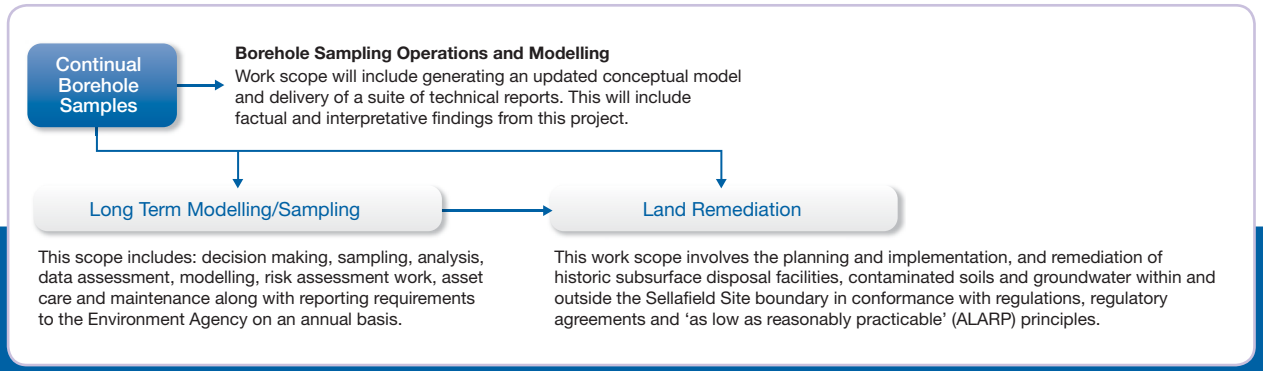
Managing the contamination in situ requires a comprehensive understanding of the groundwater under the site including estimates of the extent of contamination and how it moves with time. A way to achieve this understanding is through the collection, analysis and evaluation of groundwater samples from an appropriate network of monitoring wells.

In 2010 the groundwater monitoring network increased to 142 individual monitoring wells and 208 piezometers. Piezometers are individual pipes that access a screened interval in the pipe that allows sampling of groundwater from a selected depth interval within the monitoring well.

Implementation of the Land Quality Programme also requires an integrated approach that combines the following activities:

- compliance with all applicable regulations and site-specific regulatory requirements
- characterisation and definition of physical, chemical, and radiochemical trends in the ground and groundwater
- assessment of the current contaminant distribution in the ground and groundwater by maintenance and optimisation of the monitoring well programme
- improve understanding of the contaminant transport attenuation and provide time series data monitoring well maintenance, redevelopment and decommissioning
- calculation of contaminant transport in groundwater and risks to relevant receptors
- management of associated data and information including: databases, reports, numerical models and parameters
- identification, planning and implementation of contaminated land management, remediation options and clean-up activities in line with the Sellafield waste management hierarchy
- maintenance of the Contaminated Land Safety Case to ensure any risks to human health (both the workforce and the public) and environmental receptors (including groundwater) are as low as reasonably practicable (ALARP)
- Leak Management and Detection Programme to prevent, as far as reasonably practicable, further leaks to ground from the Sellafield Site in order to ensure a minimal increase in the subsurface inventory
- development of the Land Quality Programme infrastructure (build and maintain a suitably qualified and experienced staff; maintenance of the intelligent customer base; acquisition and utilisation of hydrogeologic data analysis tools such as GIS and numerical models; and data/records management including environmental data management)
- formulation and maintenance of internal and external stakeholder engagement plans

The safety of our employees and the environment remains our number one priority



The Land & Groundwater Remediation Programme

Socio-economic

Socio-economic

- Two important strategies provide the roadmap for achieving a better future for West Cumbria – Britain's Energy Coast Masterplan and Communities that Work
- Developed by experts in the fields of economic development and social planning, these strategies will deliver a positive future for West Cumbria
- Sellafield Ltd, together with its socio-economic partners Nuclear Management Partners and the Nuclear Decommissioning Authority, is committed to supporting the West Cumbrian economic development agencies and local authorities in delivering their vision

Socio-economic

Overview

The Sellafield site has evolved over the past eight decades. It has served many purposes, from supporting the war effort to helping keep the lights on throughout the UK.

Over the years the site has supported thousands of well-paid jobs. But as the main focus of activity began to change from reprocessing to decommissioning, it was feared that thousands of jobs would be lost in the West Cumbrian economy.

However, the 2011 Performance Plan provides crucial new information to the economic development of West Cumbria. Acceleration of the decommissioning programme at Sellafield provides higher employment levels for a longer period of time than would otherwise have been the case. This allows us to invest time and resource to retraining and reskilling our workforce to adapt to the future challenges on the site.

Today, the site employs over 10,000 people and offers opportunities for the local supply chain and increased prospects of inward investment.

However, we recognise that, despite the prosperity offered to West Cumbria through employment in the nuclear industry, some sections of the community still suffer from high levels of worklessness and deprivation. We will continue to support the organisations and agencies that are addressing this issue.

Together with Nuclear Management Partners and the Nuclear Decommissioning Authority, Sellafield is funding Britain's Energy Coast West Cumbria (BECWC), the body charged with delivering economic development for the area.

Successful delivery of the Performance Plan, combined with the work of our economic development partners, provides a win-win outcome for all involved – value for money for Government and the taxpayer, accelerated progress in the NDA's mission, a positive future for our workforce and the prospects of economic development for the local community.

Understanding the meaning of success is an important part of our socio-economic programme. We will work with our Local Authority partners using independent advice to develop an objective perspective of how success will be defined, measured and tracked. A detailed, agreed set of relevant performance indicators will provide an effective process against which socio-economic performance can be measured.

Together as the Nuclear Funding Partners, Sellafield Ltd, Nuclear Management Partners and the Nuclear Decommissioning Authority will continue to provide financial support through an annual investment in the area of approximately £10 million.

Our employees are very much part of the community, undertaking key roles such as councillors, school governors and rescue volunteers

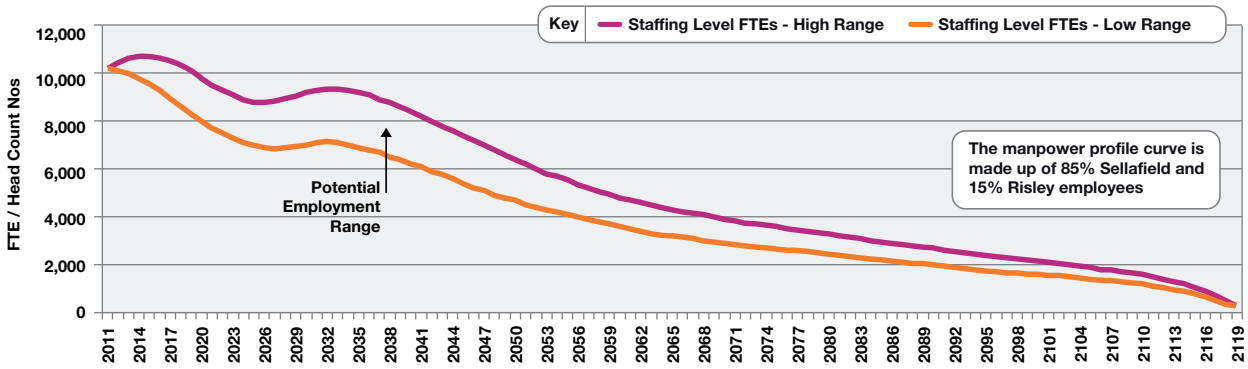
The large work programme at Sellafield will continue to provide opportunities for the supply chain

The West Cumbria Development Agency is supported solely by nuclear investment

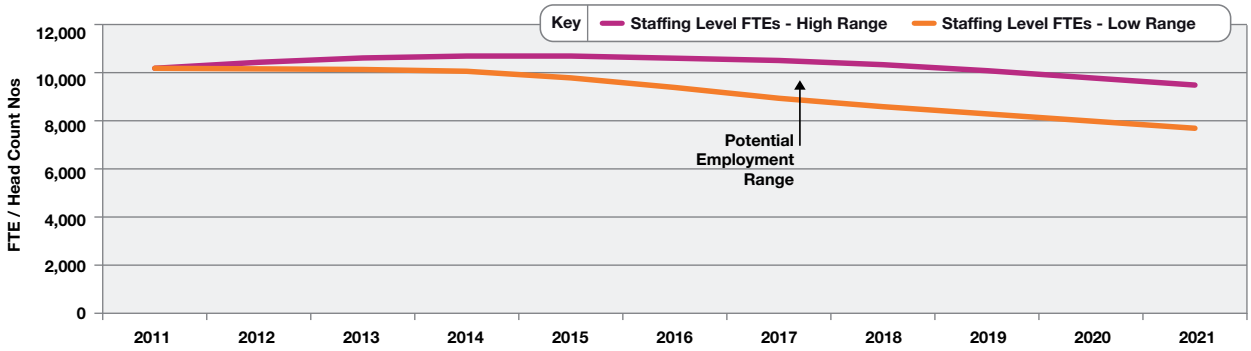
Socio-economic

Manpower profile

Long term manpower profile



Short term manpower profile



The manpower profile above is shown as a range, due to the complexities inherent in such long term planning. The upper boundary assumes acceleration of our workscope and increased efficiencies in how we deliver our work. The lower boundary represents increased efficiency with limited acceleration. In reality, funding levels will determine where within this range our employment levels will be.

The information provided here allows for an update of the West Cumbria socio-economic study undertaken by consultants ERM in 2001. This work is currently being undertaken funded by Britain's Energy Coast and is due to report in late 2011.

The manpower profile shown above is of course based on our current plans and forecasts and is obviously subject to change, whether that be changes in policy, resource allocation or other events that could impinge on our industry.

Breakdown of Sellafield Ltd employment by area:

Location	Proportion of Sellafield Ltd workforce:
Allerdale	21.5%
Copeland	58.4%
Carlisle (Area)	0.6%
Barrow (Area)	3.7%
Risley	7%
Risley (Area)	1.3%
Other	7.5%

Source: Sellafield Ltd

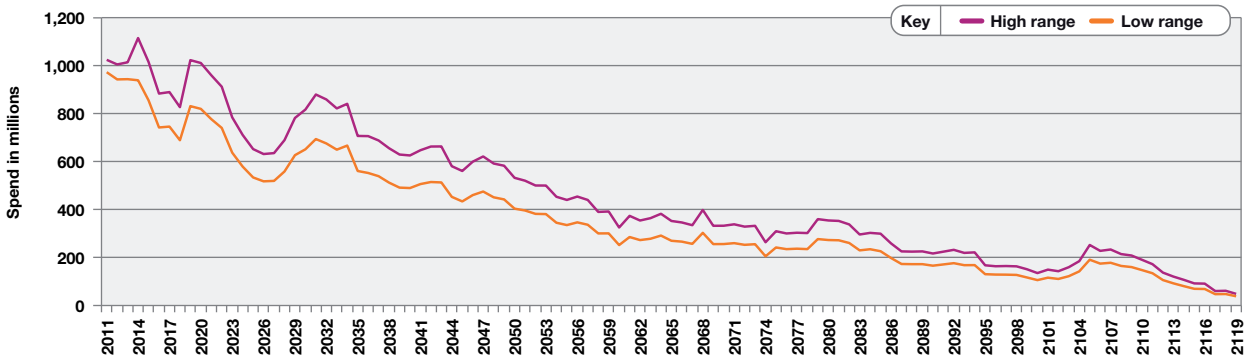
The work within the Sellafield Plan will be delivered using a combination of Sellafield Ltd, reachback and supply chain employees

Our employees have the skills and experience to safely manage all categories of nuclear waste

Socio-economic

Supply chain spend

Supply chain spend



At Sellafield more than £800 million a year is spent in the supply chain. This in itself is a significant benefit to the UK economy, and, with almost 30% of this expenditure being retained within West Cumbrian business, a vital part of the local economy.

Historically Sellafield Ltd procurement activities were seen as operating at arms length, on a short term contracting basis which detracted from adding value and building relationships. This type of arrangement produced little gain for either Sellafield Ltd or the supply chain, both being in a constant state of flux due to the short term nature of the contracts awarded.

The external environment is also changing and is increasingly presenting real threats to Sellafield Ltd access to skills and resources. We are looking to align procurement activities to industry best practice and follow the example set by international and national leading companies.

The new Acquisition Strategy is underpinned and focused on long term collaborative relationships with the supply chain organisations. The awarding of longer term contracts, so called 'Anchor Tenants', provides better security for the supply chain which drives knowledge forward and provides incentives for investment in education, skills, technology and infrastructure.

Collaborative working using this 'Anchor Tenants' approach is a way to build a nuclear knowledge economy in West Cumbria, which aligns with the vision for the area to become Britain's Energy Coast. It is expected that a more integrated supply base associated with Sellafield Ltd would provide enhanced opportunities and attract other service companies to West Cumbria.

Long term contracts allow for long term leases and make local infrastructure development more economically viable. They also help employment in West Cumbria to become more diverse and robust, encouraging further participation and opportunity.

Sellafield Ltd is working with the NDA and major Tier 2 suppliers to help improve the visibility of opportunities for smaller suppliers.

Our supply chain supports our commercial operations as well as construction and risk and hazard reduction work

We are committed to regular engagement with our supply chain

We have the greatest concentration of nuclear workers in Europe at Sellafield supporting risk and hazard reduction

Socio-economic

Solution

Sellafield Ltd is committed to supporting the local community in helping West Cumbria to be a wonderful place to live and work with a vibrant, sustainable economy and opportunities for all.

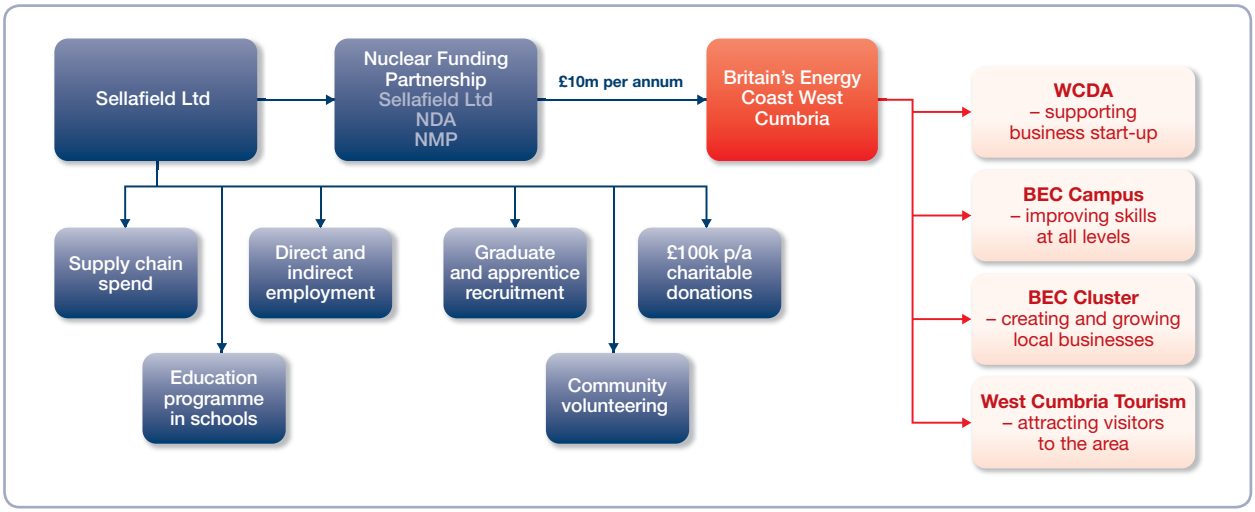
BRITAIN'S ENERGY COAST™
PEOPLE, PLACES & PROSPERITY

The Nuclear Partners are funders of Britain's Energy Coast to a sum of approximately £10m per annum

Together with Nuclear Management Partners and the Nuclear Decommissioning Authority, Sellafield Ltd is supporting Britain's Energy Coast West Cumbria (BECWC), the body charged with delivering economic development for the area.

BECWC is made up of Local Authority and public and private sector partners, together with the nuclear partners' financial and human resource input. The combined expertise of these partners will deliver real transformational change in West Cumbria.

Sellafield's socio-economic commitment also includes support for skills development and charitable projects.



Nuclear Funding Partners – Funding Overview

Whitehaven Festival

Through our involvement with Britain's Energy Coast we have provided significant investment to the regeneration of the port of Workington

Socio-economic

The Plan

Socio-economic Strategic Objectives:

1. Act as a responsible employer aligning staffing levels and skills to the future work programme of the site
2. Align NDA, NMP and Sellafield Ltd socio-economic investment

Milestones:

Funding of Britain's Energy Coast

Key activity/programme	Initial contract term			5 year extended contract term		
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Socio-economic investment – Sellafield Ltd £3.1 million annually	◇	◇	◇	◇	◇	◇
Socio-economic investment – NMP	◇	◇	◇	◇	◇	◇

Education programme in schools

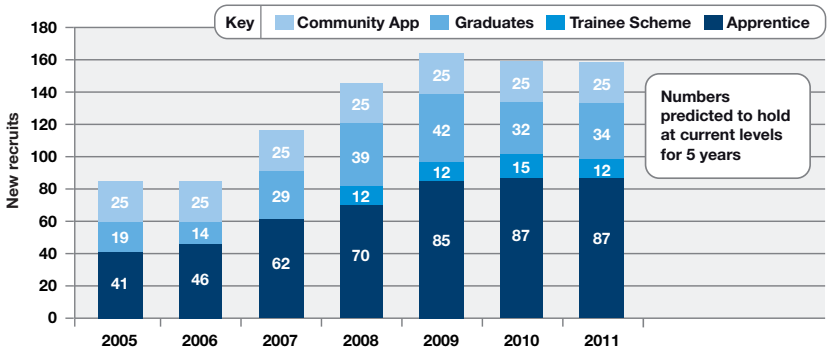
Our work with local schools will continue to focus on the provision of teaching materials aimed at achieving an early interest in science and engineering related topics and involving teachers throughout the production of teaching materials and in researching what is required in schools. This ensures that our material meets the national curriculum.

Sellafield Ltd's dedicated team of Science, Technology, Engineering and Maths (STEM) ambassadors will continue to provide an ongoing varied programme of educational events to those schools in our travel to work area.

There are around 200 ambassadors at Sellafield and Risley. They are employees from STEM backgrounds who volunteer as inspiring role models for young people.

STEM ambassadors enable teachers to make links from the curriculum to how science, technology, engineering and maths is practised in the world of work.

Skills at Sellafield – Schemes Intake Trend



We will continue to work with local schools to support science and engineering related topics

Our work with local schools includes a varied programme of educational events such as robotics days

Our STEM ambassadors are inspiring role models for school children

Socio-economic

3. Channel the majority of socio-economic investment through Britain's Energy Coast

4. Through Britain's Energy Coast we will support local regeneration and development projects

5. Maintain our role as corporate partners to the West Cumbrian community – supporting local authorities as they deliver their vision for the area

Opportunities for Graduates, Apprentices and School Leavers

Since Nuclear Management Partners took over at Sellafield in 2008, the number of graduates, apprentices and technical trainees recruited directly into the company has increased significantly. The total intake for 2011 is almost double that for 2005 and the plan is to continue to recruit at this level for the foreseeable future.

In addition to training apprentices for direct recruitment to Sellafield, we also fund the training of Community Apprentices through GEN II. Since this scheme began in 2004, over 165 young men and women have successfully completed their apprenticeships and have attained full time employment with businesses across Cumbria and the supply chain. As a result of funding received from Sellafield Ltd, GEN II has managed to leverage in a further £1.3m of government funding to support the programme.

Community volunteering

As part of Sellafield Ltd's Community Involvement Policy, we will support Executives and employees who volunteer to support a range of local community activities, which help to leverage sustainable benefits.

These activities range from community secondments, school activities, such as mock interviews, industry days, STEM Ambassador activities, elected Government duties, school governors, Justice of the Peace, Territorial Army, Mountain Rescue, RNLI, etc.

£100k p/a charitable donations

As in previous years a budget of £100k will be retained for making small charitable donations and to provide match funding for staff charitable activities. Sellafield Ltd aims to provide incentives that encourage community groups and staff to engage in activities that align with the West Cumbria Communities that Work Strategy.

Our employees complete a number of community regeneration events every year including the refurbishment and decoration of community buildings

We invest a significant amount of money on the training and development of our employees

Our employees undertake a wide range of events in order to raise money for local charities and we are proud to support their achievements through match funding

Socio-economic

Enablers

Supporting Britain's Energy Coast

- Continued annual investment of £3m
- Part of formal funding partnership with NDA and Nuclear Management Partners
- Support via senior project manager
- Representation on Board and operational executive
- Input to revised socio-economic impact assessment giving Local Authorities information to support economic development and service delivery planning

Supporting Communities that Work

- Continued support of Cumbria Community Foundation
- Employee volunteering
- Encouraging participation, eg via match funding

Supply chain

- Encourage the supply chain to invest in West Cumbria
- Support local supply chain strategies to maximise their ability to benefit from contracts
- Fund and assist economic development organisations responsible for optimising the local supply chain
- Fund and provide information for annual review of supply chain spend in West Cumbria

Reporting Sellafield Ltd socio-economic performance

- Quarterly update to stakeholders (via WCSSG, Local Authority nuclear issues groups and on website)

Measuring delivery

- Working with Britain's Energy Coast to develop and agree partnership performance measures and reporting processes
- A detailed set of relevant socio-economic performance indicators will be published identifying targets and measures against partner organisation accountabilities

PORT OF WORKINGTON

Port of Workington

Artist impression of Albion Square