



Nuclear
Decommissioning
Authority

Priority Programmes and Major Projects

Performance Report (data as at end
September 2015)

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Introduction

The NDA is the strategic authority responsible for managing the effective and efficient clean-up of the UK's nuclear legacy. This includes the first generation of "Magnox" power stations, various research and fuel facilities, and our largest, most complex site, Sellafield. Our mission is to ensure that these sites are decommissioned safely, securely, cost-effectively and in ways that protect the environment.

We are also tasked with implementing UK government policy on higher activity radioactive waste, and the low-level waste strategy. We also provide advice on the decommissioning plans for current and planned nuclear power stations.

We are the body that secures and allocates funding for nuclear clean-up. We work with various people, organisations and contractors in the UK and overseas to ensure that:

- the right options are considered and chosen in line with government policy
- the right plans are in place for the long-term
- the right delivery models incentivise the safest and most cost-effective clean-up
- the right skills and resources are available
- the right technology is developed
- local communities are supported socially and economically during and after the clean-up mission

Underpinning all we do is a commitment to encourage the highest standards of safety, security and environmental responsibility with an open and transparent approach to secure the support and trust of our stakeholders.

We have introduced private sector skills and experience through a series of competitions. We let contracts to winning bidders to take ownership of our Site Licence Companies (SLCs) in order to improve their performance and delivery. The winning bidders are called a Parent Body Organisation (PBO). A PBO owns the shares in a SLC, or number of SLCs, for the period of the contract. The PBO acts as a parent company, providing additional resource and management expertise.

The majority of the NDA estate is divided up into four Site Licence Companies:

- **Sellafield Limited** – Ownership of Sellafield Ltd transferred in April 2016 from Nuclear Management Partners (the previous Parent Body Organisation) to being a wholly owned subsidiary of the NDA. The new model will, in due course, see Sellafield Ltd appoint a strategic partner or partners, creating a 'market-enhanced SLC', to achieve the best balance of internal and external expertise and capacity.
- **Magnox Limited** – Ownership of Magnox Ltd and Research Sites Restoration Ltd was transferred to Cavendish Fluor Partnership (CFP) in September 2014 under a target cost contract arrangement. CFP merged these two SLCs in April 2015 to create a single SLC, under the name of Magnox Ltd.

- **Dounreay Site Restoration Limited (DSRL)** – Ownership of DSRL was transferred to Babcock Dounreay Partnership (BDP), now Cavendish Dounreay Partnership (CDP), in April 2012 under a target cost contract arrangement.
- **Low Level Waste Repository (LLWR) Limited** – Ownership of LLWR Ltd, which operates the UK's national low level waste repository in West Cumbria, remains with UK Nuclear Waste Management Ltd who are now in their second contractual term.

Priority Programmes and Major Projects

Across the NDA estate there are many projects underway and given the complexity and interdependency of many of these, they are often grouped into distinct delivery programmes. We describe those programmes that are the highest priority in achieving our mission as 'Priority Programmes'.

As a non-departmental public body, we use the UK government's definition of a Major Project as being: 'A central Government funded project or programme that requires HM Treasury approval during its life, as set out in Delegated Authority Letters'. Based on the NDA's delegated authority of £100m, this report therefore includes all inflight projects that have an expected lifetime cost of over £100m and which require HM Treasury approval.

This report provides a high level overview of the performance of our Priority Programmes and Major Projects. The report is structured as follows:

- background and programme objectives
- a description of the programme approach
- overview of the major projects in the programme
- recent progress
- appendix A showing how the lifetime cost and schedule estimates have evolved over time
- appendix B showing how the key hazard reduction milestone dates for the Sellafield legacy ponds and silos programmes have evolved over time

Some of these programmes and projects are at a relatively early stage of development, and as such, their scope and associated cost and schedule estimates are immature. Changes to these estimates are therefore to be expected as the programmes and projects are further developed.

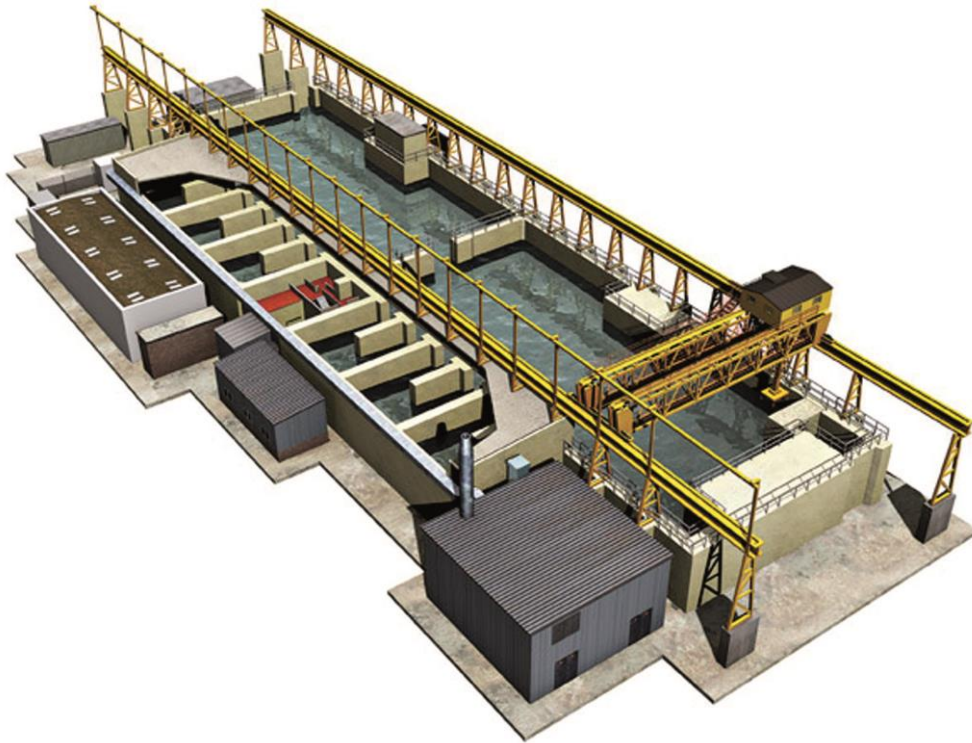
The estimates in this report for Sellafield programmes and projects are on a P80 basis, meaning there is an 80 per cent probability that the programme or project will be delivered within these estimates. For the Magnox, Dounreay and LLWR programmes and projects, the estimates are on a P50 basis (i.e. there is a 50 per cent probability that delivery will be within these estimates) in line with the contractual arrangements in

place for these SLCs. The estimated end dates and costs in the main body of the report are as at end of September 2015 and the costs are in 2015 money values. The historic cost estimates in appendix A are in the money values of the year in which the estimate was prepared (i.e. they have not subsequently been adjusted for inflation). All costs in the report are undiscounted.

Measuring progress

We measure progress against specific targets set out in our annual NDA Business Plan which we publish on our website at the end of March each year. Many of these targets are milestones used to measure the in-year performance of our programmes and projects. Our progress against these targets is reported in our Quarterly Performance Report which is published on our website.

Sellafield Pile Fuel Storage Pond (PFSP)



Background and programme objectives

The Pile Fuel Storage Pond is one of four Legacy Ponds and Silos facilities at Sellafield prioritised for clean up by the NDA.

The PFSP facility is a sub-divided, open-air storage pond which was built in the 1940s and 1950s to store, cool and prepare reactor fuel prior to reprocessing, including fuel from the military project at Windscale. The pond has remained open to the elements for more than sixty years and, alongside skips of irradiated oxide and metal fuel, contains solid waste (including disused machinery and equipment) and radioactive sludge.

| Programme objectives | Key hazard reduction milestone |
|--|---|
| <p>To retrieve and package the waste from the Pile Fuel Storage Pond into a passively safe form ready for disposal, followed by dewatering of the pond and putting the facility into an interim end state for long term management. Final decommissioning of the facility is outside the scope of the current programme and is linked to the overall end state for Sellafield.</p> | <p>All intermediate-level waste removed from the pond and treated in 2024</p> |

Programme approach

The programme has retrieved the canned oxide fuel from the pond and transferred it to the receipt and storage area of the Thermal Oxide Reprocessing Plant. Following this, the metal fuel is being removed from the pond and either transferred to the Fuel Handling Plant, or stored in the PFSP Buffer Store until the Bulk Uranium Final Treatment Plant (or similar capability) is available.

Remotely operated vehicles are being used to consolidate the solid waste in the pond prior to it being removed and transferred for treatment and storage in the PFSP Buffer Store until the Box Encapsulation Plant (or similar capability) is available.

The programme is developing the new equipment needed to remove radioactive sludge from the pond and has built a Local Sludge Treatment Plant to place the sludge into drums. The sludge will then be treated by the existing Waste Encapsulation Plant, following which it will be safely stored at Sellafield. Once the radiological material and waste has been removed from the pond it will be de-watered and decommissioned.

Major Projects in the PFSP Programme

There are currently no Major Projects in the PFSP programme.

Recent progress

Good progress is being made on the critical path activity of consolidating and removing intermediate level waste to enable the pond to be ready to start de-watering of the pond in March 2019. By March 2016 all of the canned oxide fuel and the bulk of the metal fuel had been removed from the pond. This is a significant milestone as it represents removal of approximately 70% of the facility's radioactivity.

Good progress is also being made on the construction of the sludge export facility to allow sludge to be retrieved from the pond and stored at Sellafield. Changes in the physical characteristics of the sludge, caused by the sludge retrieval process, have meant that some modifications have had to be made to the export system, which in turn has delayed the start of sludge exports to summer 2016.

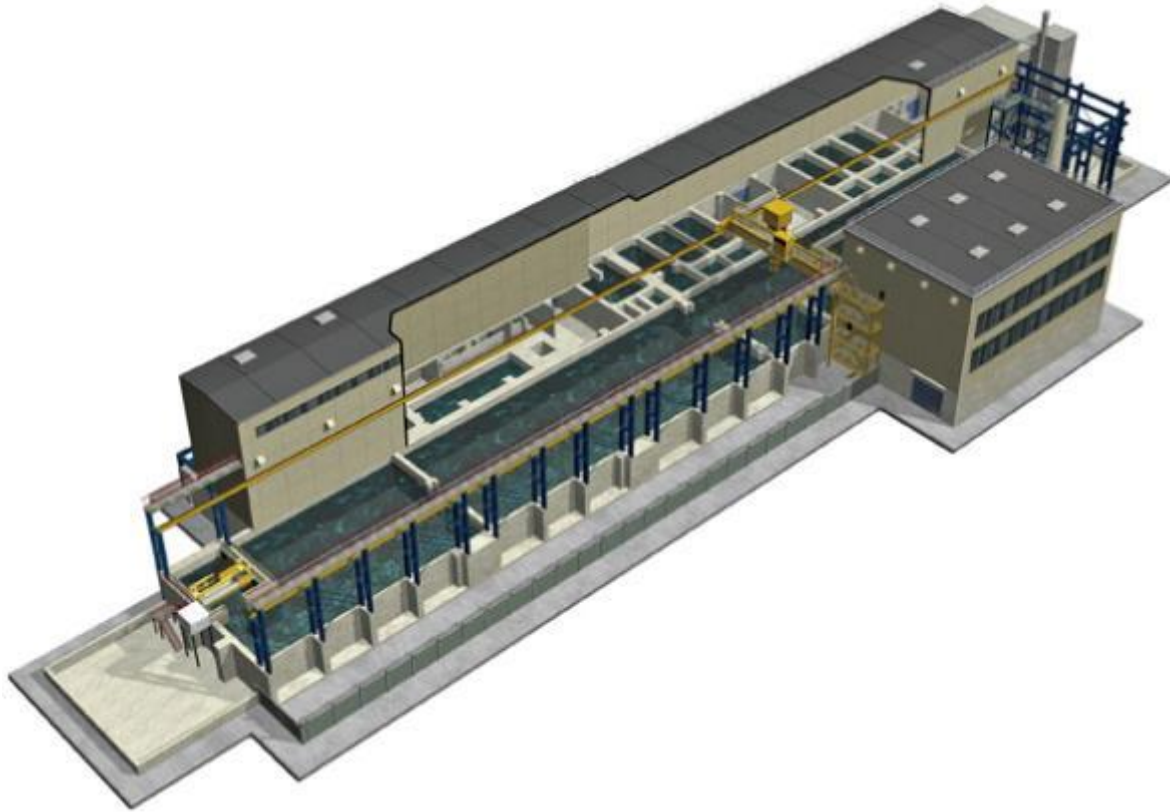


Retrievals from the pond are underway



Local Sludge Treatment Plant – used to hold sludge from the pond prior to its conditioning for final disposal

Sellafield First Generation Magnox Storage Pond (FGMSP)



Background and programme objectives

The First Generation Magnox Storage Pond is one of four Legacy Ponds and Silos facilities at Sellafield prioritised for clean up by the NDA.

The FGMSP facility was constructed in the 1950s and 1960s to store, cool and prepare Magnox fuel for reprocessing. It contains skips of used nuclear fuel which need to be retrieved and transferred for treatment and packaging prior to disposal. This facility presents a significant challenge because alongside the fuel, the pond also contains radioactive sludge, fuel fragments and other debris.

| Programme objectives | Key hazard reduction milestone |
|---|----------------------------------|
| To retrieve and package the waste from the First Generation Magnox Storage Pond into a passively safe form ready for disposal, followed by the decommissioning of the facility. | Completion of retrievals in 2033 |

Programme approach

The programme approach is to install new equipment to recover sludge from the pond and the redundant wet decanner facilities (wet bays) and transfer it to a newly created buffer storage facility, the Sludge Packaging Plant 1 (SPP1) Buffer. The sludge will be safely stored in the tanks for a number of years before being treated for long term storage and disposal using new or existing facilities.

The fuel in the pond will be sorted, segregated, consolidated and conditioned for export using underwater remotely operated vehicles, or by newly installed equipment. It will then be transferred in the existing fuel skips to the original fuel import facility, which will be refurbished as an export facility, and placed into heavily shielded transport containers. The fuel will then be transported in the near term for storage in the existing Fuel Handling Plant or, in the longer term, transported to a new treatment capability facility to enable long term storage and final disposal.

Other non-fuel solids in the pond and wet bays will be recovered and disposed of as low level waste using existing disposal routes or where it does not meet the low level waste criteria, it will be treated in one of the existing facilities or the Box Encapsulation Plant (BEP) which is being built by the MSSS Programme.

Major Projects in the FGMSPP Programme

| Major Project | Project objectives and current status | Estimated costs | Estimated end date |
|--|---|-----------------|--------------------|
| Export | This project entails the design, procurement, stripping out, refurbishing and modifying of the existing inlet building to provide the new facility to enable skips of pond inventory, plus miscellaneous redundant items, to be safely placed inside shielded flasks. The flasks will be exported by means of a flask transporter for onward processing and long-term safe storage. This project is in the delivery phase and will be ready to start operation in April 2016, in line with when the export of pond solids will start. | £121m | Oct 2016 |
| Bulk Sludge and Fuel Retrievals | This project will provide the main capabilities to retrieve sludge, fuel and other solid waste from the pond and highest priority de-canning facilities ('wet bays'). This project is in the delivery phase. Installation of the pond solids and sludge export capabilities is progressing well and should be ready to start exporting material from the pond in April 2016. Work on the wet bays export system is also progressing well, but due to the complex and constrained working environment, this will not start operation until 2018. | £380m | Dec 2018 |

Recent progress

Remotely operated underwater vehicles are being used alongside the skip handler to prepare 15 skips of fuel in readiness for the start of export operations in April 2016.

Ahead of the main sludge retrieval and ponds solids export capabilities coming into operation, sludge exports from the pond have started using an alternative retrieval capability (see picture) and 15m³ of sludge has been exported to the Sludge Packaging Plant (SPP1). This has allowed the SPP1 facility to complete active commissioning ahead of when the main sludge retrieval and ponds solids export capabilities come into operation in April 2016.



The first sludge retrievals from the pond

Additional scope was added to the programme in 2015 to reduce uncertainty and increase delivery confidence. This additional scope includes developing additional capability to retrieve, export and treat waste from the pond and associated de-canning facilities (the 'wet bays') which in turn will reduce the demand on the existing skip handler machine which is used to move fuel skips within the pond.

Sellafield Magnox Swarf Storage Silo (MSSS)



Background and programme objectives

The Magnox Swarf Storage Silo (MSSS) is one of four Legacy Ponds and Silos facilities at Sellafield prioritised for clean up by the NDA.

The MSSS facility is a series of silos into which fuel cladding and other Miscellaneous Beta Gamma Waste (MBGW) from the early Magnox programme was tipped. The exact composition of this waste is uncertain and is in a difficult chemical and physical form. It represents one of the highest hazards on the Sellafield site.

| Programme objectives | Key hazard reduction milestone |
|--|---------------------------------------|
| To retrieve and package the waste from the Magnox Swarf Storage Silos into a passively safe form for long term storage ready for disposal, followed by the decommissioning of the MSSS facility. | Residual retrievals completed in 2052 |

Programme approach

The programme will build and install three new Silo Emptying Plant (SEP) machines in the MSSS facility to remove the waste from the silos and place it into shielded containers. The programme is building a new Box Encapsulation Plant which will package the waste so that it can then be safely stored at Sellafield. Once the silos have been emptied the facility will be decommissioned.

Major Projects in the MSSS Programme

| Major Project | Project objectives and current status | Estimated costs | Estimated end date |
|--|---|-----------------|--------------------|
| Magnox Swarf Storage Silo Retrievals | This project will deliver the capability to mechanically retrieve waste from the MSSS silos and to export it (via shielded packages) to the downstream waste receipt facilities. The first of the three Silo Emptying Plants (SEPs) started installation at Sellafield at the end of 2015 and will be ready to start retrievals towards the end of 2017 (subject to the availability of downstream waste treatment facilities). | £843m | Mar 2023 |
| Box Transfer Facility (BTF) | This project would have supported the transfer of treated and immobilised waste from the SDP facility to a waste product store. As a result of the revised waste handling approach (see below), this project has been put on hold until it is decided if, and when, the facility is required. | On-hold | On-hold |
| Silo Maintenance Facility (SMF) | This project will provide capability to store, decontaminate, maintain and change over retrieval equipment and tool/waste packages used for retrieval from the silos. The project is in the construction phase with commissioning expected to complete in 2019. | £247m | Jul 2019 |
| Silo Direct Encapsulation Plant (SDP) | This facility would have taken the raw waste retrieved from the silo, mixed it with grout and packaged it into boxes creating a passively safe form suitable for storage. Due to the changed approach to waste handling (see below), this project is being brought to a controlled halt. | £350m | Mar 2016 |
| Box Encapsulation Plant (BEP) | This project will deliver the facility that will be used to treat and immobilise waste from MSSS (as well as from the PFSP and FGMSF facilities) to allow the waste to be interim-stored pending final disposal. The project is at the detail design phase. | £869m | Apr 2023 |

Recent progress

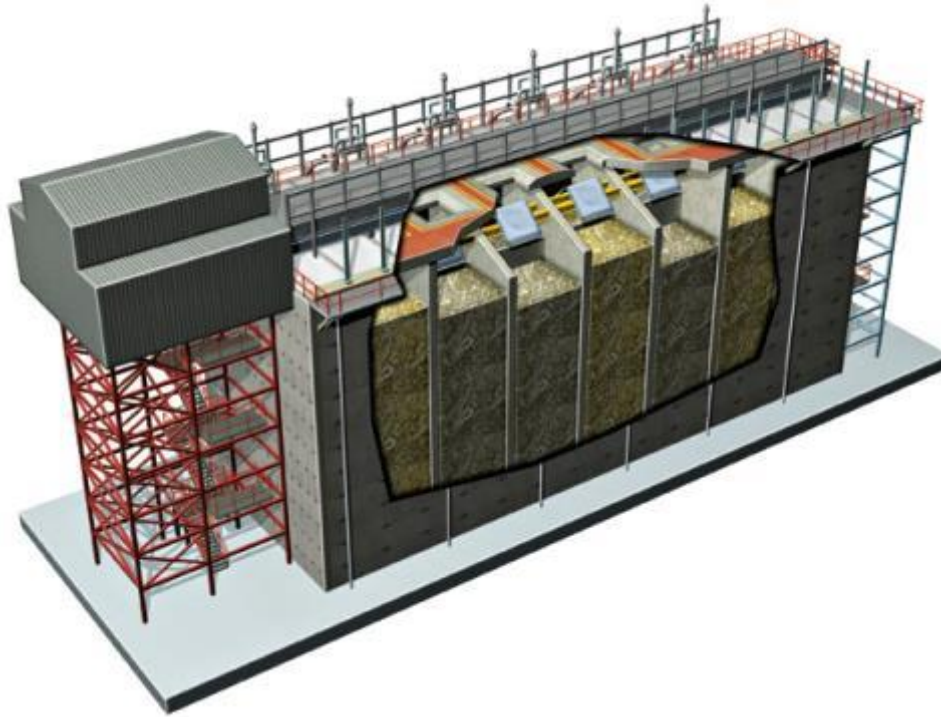
Prior to September 2015, the MSSS programme had been working to an approach that needed two plants to package waste from the silos: the Box Encapsulation Plant (BEP) and the Silos Direct Encapsulation Plant (SDP). The NDA and Sellafield Ltd developed an alternate approach for packaging waste from these silos which removed the need for the SDP facility. This revised approach will allow retrieval of the more hazardous waste to start earlier and at a significantly lower cost than the previous approach.



Waste will be exported from the silo in 3m³ boxes

The current earliest date that retrievals can start is 2023 due to the availability of the BEP. Opportunities are being explored to see whether existing facilities in Sellafield can be used to treat waste prior to the BEP facility becoming available.

Sellafield Pile Fuel Cladding Silo (PFCS)



Background and programme objectives

The Pile Fuel Cladding Silo is one of four Legacy Ponds and Silos facilities at Sellafield prioritised for clean up by the NDA.

The PFCS facility consists of a series of silos built in the 1950s whose primary role was to receive and store intermediate level waste from the military project at Windscale and then later from Calder Hall and Chapelcross. Decommissioning this facility is extremely challenging as it contains high levels of argon gas to prevent possible combustion but which in turn, prevents human access.

| Programme objectives | Key hazard reduction milestone |
|--|---------------------------------------|
| To retrieve and package the waste from the Pile Fuel Cladding Silos into a passively safe form ready for disposal, followed by the decommissioning of the PFCS facility. | Completion of bulk retrievals in 2033 |

Programme approach

The programme is developing the new equipment needed to retrieve the waste from the silos and place it into shielded containers. This presents significant challenges because it required the building of a new superstructure in a small footprint directly adjacent to the PFCS facility.

The programme is building a Box Encapsulated Plant Product Store - Direct Import Facility (BEPPS-DIF) to enable the waste containers to be safely stored at Sellafield. Once the silos have been emptied the facility will be decommissioned.

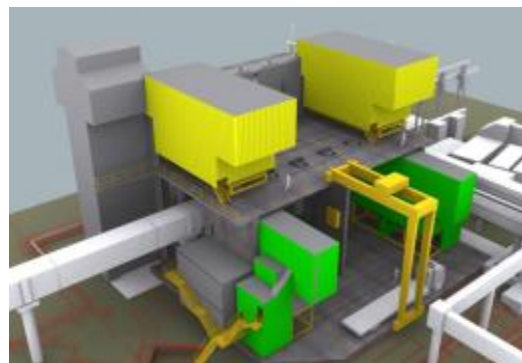
Major Projects in the PFCS Programme

| Major Project | Project objectives and current status | Estimated costs | Estimated end date |
|---|---|-----------------|--------------------|
| Pile Fuel Cladding Silo Retrievals | This project covers the design, installation and commissioning of the integrated systems needed to retrieve the solid wastes from the PFCS. The project is currently in the preliminary design phase with construction of some of the specialist equipment already in progress. | £836m | Apr 2023 |
| Box Encapsulation Plant Product Store - Direct Import Facility (BEPPS-DIF) | This project will provide an interim-storage facility for packaged waste from the PFCS and other Sellafield facilities, most notably MSSS. This project is in the preliminary design phase and is in a period of mobilisation which is taking longer than originally expected. | £291m | Mar 2020 |

Recent progress

The programme has been focussing activity to address the gap between the availability of the Box Encapsulation Plant Product Store and Direct Import Facility (BEPPS-DIF) interim store and the start of silo retrievals capability in 2023.

The programme still has large uncertainty in its plans which will not be significantly reduced until the first half of 2016.



A 'super structure' will be used to retrieve waste

Sellafield Security, Emergency Management and Resilience Programme (SERP)

Background and programme objectives

The programme is delivering enhancements and improvements to three interrelated areas at the Sellafield site: physical security; emergency management procedures; and resilience capability.

| Programme objectives | Estimated costs | Estimated end date |
|---|------------------------|---------------------------|
| To deliver enhancements and improvements to three interrelated areas at the Sellafield site: physical security; emergency management procedures; and resilience capability. | £1,252m | redacted |

Programme approach

The approach has been to take learning from other UK nuclear facilities and critical national infrastructure facilities wherever possible and to consult with key stakeholders, including the Communications Electronic Security Group (CESG), the Atomic Weapons Establishment (AWE) and the Centre for the Protection of National Infrastructure (CPNI) to ensure that the solutions being delivered by the programme are appropriate.

Major Projects in the SERP Programme

| Major Project | Project objectives and current status | Estimated costs | Estimated end date |
|-------------------------------|--|------------------------|---------------------------|
| Fence Civils Cluster 1 | This project is providing additional layers of physical security at the Sellafield site including new fences, rail gates, turnstiles, search areas and vehicle barriers. | redacted | redacted |
| Technology Cluster | This project is providing unified command and control across Sellafield's existing security and emergency response services. | redacted | redacted |
| Site Resilience | This project is improving the Sellafield site's resilience to a loss of power and subsequent site black out. Enhancements to the site's ability to prevent, and where necessary respond to, a range of natural and man-made events are also being delivered. | redacted | redacted |

Recent progress

The Fence Civils Cluster 1 project is nearing completion with all fencing works due to complete in 2016. Within the Technology Cluster project, the Main Site Command Facility is in the detailed design phase and early ground works have started. The associated Site Systems Architecture Upgrade is also in its detail design phase. The Site Resilience project is progressing well and continues to address the areas of required power hardening to prevent the loss of operating power and the procurement of plant and equipment to improve the site's capability to provide emergency response to a beyond design basis or severe event.

In addition to these Major Projects, but still part of the SERP programme, a cyber security initiative is delivering mitigations to further reduce cyber risks and vulnerabilities. The programme is also delivering a new training facility for the Civil Nuclear Constabulary, which is shortly due to start construction.

The Emergency Management workstream is making good progress and, along with the Site Resilience project, is forecasting to complete under the original budget and ahead of schedule.

Sellafield Other Major Projects

Separation Area Ventilation (SAV)

| Project objectives and current status | Estimated costs | Estimated end date |
|--|-----------------|--------------------|
| <p>This 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. It will divert the aerial discharges from the historic Windscale Pile 1 and First Generation Reprocessing Plant chimneys to the new SAV chimney which will enable these older facilities to be demolished. The project is in the process of handing over the facility for operational use.</p> | <p>£249m</p> | <p>Nov 2016</p> |



Recent progress

Construction and commissioning was completed in February 2016 following which the first diversions from the existing stacks were started in March 2016.

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

Evaporator D

| Project objectives and current status | Estimated costs | Estimated end date |
|---|-----------------|--------------------|
| <p>One of the largest projects under way at Sellafield is the construction of a new evaporator (Evaporator D) to support the reprocessing of spent fuel from the Magnox and Advanced Gas Reactor (AGR) fleet of power stations as well as supporting the Post Operational Clean Out (POCO) of Sellafield facilities as part of their decommissioning. Until the Evaporator D project is complete, reprocessing throughput may be limited by the capacity of existing evaporators at Sellafield which are approaching the end of their operational life. The project is in its construction phase.</p> | £740m | Dec 2017 |



Recent progress

Evaporator D is forecast to be available for operational use in 2017. Whilst this is later than the previous plan (summer 2016), a review of the remaining life of the existing evaporators at Sellafield has concluded that they can support reprocessing until Evaporator D is available.

Evaporator D construction on Sellafield site

SIXEP Contingency Plant

| Project objectives and current status | Estimated costs | Estimated end date |
|---|------------------------|---------------------------|
| The Sellafield Ion Exchange Effluent Plant (SIXEP) is an existing facility which removes radioactivity from liquid feeds from a number of plants across the site. SIXEP capability is required at Sellafield until 2050 to support site decommissioning activity, in particular the decommissioning of the Magnox Swarf Storage Silo and the First Generation Magnox Storage Pond. This project will modify the existing SIXEP plant to extend its operating life and, in parallel, will build a new SIXEP facility alongside the existing plant. The project is in its preliminary design phase. | £394m | Nov 2024 |

Recent progress

The project completed concept design in 2015 and is now in its preliminary design phase.

Sellafield Product and Residue Store Retreatment Plant

| Project objectives and current status | Estimated costs | Estimated end date |
|---|------------------------|---------------------------|
| Nuclear material is safely and securely stored on the Sellafield site in a number of facilities. The Sellafield Product and Residue Store (SPRS) Retreatment Plant project will deliver capability to treat, re-package and transfer nuclear material into the existing Sellafield Product and Residue Store for long term safe and secure storage. The project is currently in its concept design phase. | £494m | Nov 2026 |

Recent progress

The project is currently in the concept design phase whilst also progressing a number of 'early start' site-preparation activities. Consideration is also being given to whether the 'exotic' fuels being transferred to Sellafield from Dounreay (see Dounreay section of this report) should be retreated by the SPRS Retreatment Plant, rather than being repackaged.

Magnox Decommissioning



Background and programme objectives

The Magnox estate consists of 12 sites, of which 10 are nuclear power stations (see picture of Dungeness A above) and two are former research sites (Harwell and Winfrith). The last Magnox power station to generate electricity, Wylfa, on Anglesey, closed down at the end of 2015 in line with the NDA's plan.

| Programme objectives | Estimated costs | Estimated end date |
|--|-----------------|--------------------|
| To maximise revenue to the NDA from electricity generation. To complete defueling in line with the Magnox Operating Plan (MOP). To deliver the 12 Magnox sites into their Care and Maintenance (C&M) interim state (note for Winfrith this will be its final end state). | £8,731m* | Mar 2028* |

* A process of 'Consolidation' is taking place following the PBO contract being transferred to Cavendish Fluor Partnership (CFP) and it is anticipated that the programme costs and end date will change based on the up to date information.

Programme approach

The remaining fuel in the Magnox reactors is firstly removed and transported to Sellafield for re-processing. The Magnox sites are then prepared for entering a Care and Maintenance (C&M) state by retrieving, processing and packaging the waste which significantly reduces the maintenance costs and the security needed while any low level residual radioactivity decays naturally. The lead sites for this C&M approach are Bradwell and Trawsfynydd.

Major Projects in the Magnox Decommissioning Programme

| Major Project | Project objectives and current status | Estimated costs | Estimated end date |
|-----------------------------------|---|-----------------|--------------------|
| Berkeley Vaults Retrievals | This project involves the retrieval, processing and packaging of the operational intermediate level waste from the vaults at the Berkeley Power Station to meet the compliance requirements of the disposal authority. This project is being reviewed as part of the overall review being carried out by the new PBO (see below). | £297m | Apr 2020 |

Recent progress

The transition to the new PBO, Cavendish Fluor Partnership (CFP) has been completed. The new PBO has carried out due diligence as part of a 'Consolidation' process to fully understand the status of work across the Magnox sites against their April 2013 bid position. Now that this assessment is complete, a new plan has been developed and agreement is being sought from the NDA to any associated target cost contract changes. These updated plans will form the basis of the revised contract which is expected will represent a significant cost saving over the previous plans.

Electricity generation at Wylfa continued in the lead up to the permanent shutdown of this facility in December 2015.

The Bradwell Fuel Element Debris (FED) Dissolution Plant and Aqueous Discharge Abatement Plant (ADAP) which are on the critical path for Bradwell to enter C&M, continue to operate intermittently and at lower throughput rates than anticipated. The full implications of this on the C&M date for Bradwell will not be known until the new plan is finalised and consistent, reliable operational throughput established. The 2016/17 date previously targeted for accelerated entry into C&M for Bradwell is no longer achievable; a revised date is currently being developed.

The Trawsfynydd Fuel Element Debris Enhanced Recovery (FEDER) project is on the critical path for Trawsfynydd to enter C&M and is many years behind schedule. The full

implications will be better understood once the new plan for the site is finalised, however the current indication is that the C&M date for Trawsfynydd will be significantly later than the previous plan. Both of these C&M dates are still expected to be ahead of the original plans for these sites.

Sizewell received regulator acceptance of fuel free verification in January 2015 and moved to their reduced organisation structure slightly ahead of plan.

Oldbury defueling was completed in January 2016, four months ahead of plan.

Dungeness has completed the demolition of their turbine hall to ground level.

Chapelcross has finished the removal of asbestos from the reactors three months ahead of schedule and under cost (see picture).



Asbestos removal at Chapelcross

Dounreay Decommissioning



Background and programme objectives

Dounreay was established as a research site in the mid-1950s with fuel production and processing facilities. There were three reactors, the last of which ceased operation in 1994.

| Programme objectives | Estimated costs | Estimated end date |
|--|-----------------|--------------------|
| To achieve an interim state for the Dounreay site such that no further work will be required between this Interim End State (IES) and achieving the closure thresholds required (through natural decay) to achieve the site end state. | £2,280m* | Oct 2029* |

* Due to the transfer of 'exotic' fuels from Dounreay to Sellafield (see below), the indicated cost and date are under further review, which it is expected will complete by December 2016.

Programme approach

The approach to decommissioning the Dounreay site is for all nuclear fuel and materials to be removed from the site or suitably disposed of as waste. All buildings will be demolished to floor plinth level and all ancillary metalwork removed. Any significant

radioactive and non-radioactive contamination will be removed, and following natural decay, the site will meet the Health & Safety Executive's 'no danger' threshold.

One shielded and one unshielded Intermediate Level Waste (ILW) store will be retained on the site to comply with current Scottish Government's Higher Activity Radioactive Waste Policy.

Recent progress

The nuclear industry has seen a significant increase in security requirements which has led the NDA to change its strategy for managing the 'exotic' fuels historically held at Dounreay such that these exotic fuels now need to be consolidated at Sellafield. These changes added 30% more scope to the Dounreay contract resulting in an increase to the overall target cost for the contract. Due to the need to keep site spending within annual funding limits, whilst also delivering the additional 'exotics' scope, the IES date for Dounreay has been extended. The target dates to achieve the IES and the associated cost targets are being further reviewed as a consequence of supporting the consolidation of 'exotic' fuels at Sellafield. It is expected that these changes will still deliver a significant reduction in the total lifecycle costs of the site up to its Final End State.

The first two vaults of the new low level waste disposal facility have been built to take waste from Dounreay and the adjacent MOD Vulcan site. Additional vaults will need to be built at a future date.



The first two vaults of the LLW Disposal Facility are now complete

National Low Level Waste (LLW)



Background and programme objectives

The National Low Level Waste programme is a UK-wide initiative led by the Low Level Waste Repository Ltd to deliver the UK Nuclear Industry Solid Low Level Waste Strategy.

| Programme objectives | Estimated costs | Estimated end date |
|--|------------------------|---------------------------|
| To champion the adoption of the Waste Hierarchy (prevention, minimisation, re-use, recycling and disposal) across the NDA estate to significantly reduce the costs of dealing with low level waste and to avoid the need for a second UK low level waste repository. | £1,750m | Dec 2030 |

Programme approach

The approach is to champion the adoption of the Waste Hierarchy (prevention, minimisation, re-use, recycling and disposal) across the UK. This includes both the NDA estate and non-NDA bodies such as the MOD and EDF Energy.

Recent progress

The programme continues to be successful, with 89% of LLW diverted away from the repository for alternative treatment and use for the three month period to March 2016. A particular area of focus is developing increased confidence of long-term forecasting of LLW requirements. This will enable a sustainable supply chain to develop to support waste diversion and disposal.

The five year review of the UK Solid LLW Strategy concluded in late 2015 and was published in December 2015. The Environmental Safety Case and Revised Permit for LLWR were issued by the Environment Agency in October 2015.

LLWR has submitted a Planning Application to Cumbria County Council for the future development of the LLWR site at Drigg in West Cumbria to maintain optimum waste disposal capacity and enable operations to continue until 2050. A decision on this is due in May 2016.

Appendix A – Lifetime cost and schedule data

| Programme | Major Project | Year initiated | Date passed design gate | Estimated cost at initiation (£m) | Estimated cost at design gate (£m) | Estimated cost as at Dec 2014 (£m) | Estimated cost as at Sep 2015 (£m) | Estimated end date at initiation | Estimated end date at design gate | Estimated end date as at Dec 2014 | Estimated end date as at Sep 2015 | Key reasons for changes to cost and/or end date from year initiated to Sep 2015 |
|---|--------------------------------------|----------------|-------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|
| Sellafield - First Generation Magnox Storage Pond | Export | 2006 | Jan 2013 | 43 | 121 | 112 | 121 | Jul 2009 | Oct 2016 | Oct 2016 | Oct 2016 | Project delayed as a result of changes in site strategy and funding priorities which also increased the cost of delivering the project. Other increases in cost and schedule have been associated with the complexity of re-furbishing an existing radioactively contaminated facility on a highly constrained site adjacent to a sensitive nuclear facility as well as project performance issues. |
| | Bulk Sludge and Fuel Retrievals | 2004 | Apr 2014 | 229 | 400 | 400 | 380 | Dec 2012 | Dec 2018 | Dec 2018 | Dec 2018 | Increases in cost and schedule have been associated with the complexity of installing new equipment into an existing radioactively contaminated and sensitive nuclear facility as well as project performance issues. |
| Sellafield - Magnox Swarf Storage Silo | Magnox Swarf Storage Silo Retrievals | - | Mar 2007 | - | 243 | 845 | 843 | - | Apr 2015 | Nov 2025 | Mar 2023 | The plan at design gate was not a robust, deliverable plan as it was constructed to demonstrate compliance against regulatory specifications and did not adequately reflect the technical risks. Specifically, the increase in cost and extension to the schedule are a result of: a) the project having to pause the construction phase and revisit the proposed methods for retrieving swarf; b) the subsequent redesign of the SEP machines and associated retrievals equipment; c) having a more realistic engineering plan; d) the complexity of the final build; and e) having a better understanding of the installation process. |
| | Box Transfer Facility | - | Dec 2011 | - | 148 | 208 | On-hold | - | Nov 2018 | Sep 2022 | On-hold | The increase in cost and schedule are a result of: a) overly optimistic initial estimates; b) scope changes as the design matured; c) change in contract approach through the re-tendering of the fabrication, installation and commissioning of the equipment after completing the building structure; and d) a decision in 2014 to defer project completion to Sep 2022 to align with the commissioning requirements of SDP. The project is currently on-hold pending the outcome of the study considering options for the additional waste transfer capability to support the new MSSS programme approach. |
| | Silo Maintenance Facility | 2006 | Oct 2013 | 180 | 247 | 247 | 247 | Oct 2011 | Jul 2018 | Jul 2019 | Jul 2019 | At the design gate firmer prices from the contractor resulted in cost and schedule estimates greater than initially anticipated. The main reasons for the increase in cost were the additional resources identified by the contractor to deliver the project and an increase in the contingency provision. Project completion moved from Jul 2018 to Jul 2019 as part of an overall portfolio reprioritisation exercise in 2014 and to align with overall MSSS requirement dates. |

Notes

1. The estimates in the table above are 'P80' estimates (meaning there is an 80 per cent probability that the programme or project will be delivered within the estimates shown above).
2. Projects which have not yet passed design gate are either in a planning or design phase, whereas projects which have passed design gate are in either a construction or commissioning phase.
3. The historic cost estimates in the table above are expressed in the money values of the year in which the estimate was prepared (i.e. have not subsequently been adjusted for inflation).

| Programme | Major Project | Year initiated | Date passed design gate | Estimated cost at initiation (£m) | Estimated cost at design gate (£m) | Estimated cost as at Dec 2014 (£m) | Estimated cost as at Sep 2015 (£m) | Estimated end date at initiation | Estimated end date at design gate | Estimated end date as at Dec 2014 | Estimated end date as at Sep 2015 | Key reasons for changes to cost and/or end date from year initiated to Sep 2015 |
|---|--|----------------|-------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|
| Sellafield - Magnox Swarf Storage Silo | Silo Direct Encapsulation Plant | 2010 | - | 669 | - | 3,260 | 350 | Nov 2018 | - | Apr 2027 | Mar 2016 | The increased cost and schedule from initiation to Dec 2014 were primarily due to: a) an over-optimistic view of project scope and costs in the original plan; b) further developments in the technical and delivery solution provided greater certainty but manifested in a later operational date for the facility; and c) in Sep 2013 an extensive competition process was completed, which resulted in significant cost and schedule increases being returned from the supply chain which are reflected in the 2014 estimates. Following a review of the Magnox Swarf Storage Silos waste handling strategy, the project has been stopped, leading to a net saving to the MSSS programme in excess of £600m. |
| | Box Encapsulation Plant | 2014 | - | 615 | - | 615 | 869 | Jan 2021 | - | Jan 2021 | Apr 2023 | It was known that the cost and schedule estimates in 2014 were challenging and that the subsequent estimates from the appointed contractor could be higher. The key reasons for the increase are: a) additional design requirements; b) different commercial arrangements than had been originally envisaged; c) scope changes including the impact of the MSSS waste handling strategy change; and d) prices being higher than had been anticipated for key, long-lead time, machinery and equipment. |
| Sellafield - Pile Fuel Cladding Silo | Pile Fuel Cladding Silo Retrievals | 2005 | - | 495 | - | 836 | 836 | Oct 2019 | - | Apr 2023 | Apr 2023 | In mid-2013 difficulties with the technical complexity of the planned design led to a review of the proposed solution. This resulted in a revised approach which required the redesign of the waste retrievals and handling equipment, increasing the cost and schedule. Additionally, the delay caused by the redesign work has put back project completion and increased the costs. As design work progresses it is expected that the uncertainty will reduce. |
| | Box Encapsulation Plant Product Store Direct Import Facility | 2006 | - | 119 | - | 215 | 291 | Jan 2019 | - | Apr 2021 | Mar 2020 | The project has completed concept design and awarded a design and build contract for the completion of the project. This has improved understanding of the scope to complete the project, and the cost and schedule for the works. The latest cost and schedule reflects the target cost contract value, overall project schedule as well as works provided by Sellafield and other sub-contractors. |
| Sellafield - Security, Emergency Management and Resilience (SERP) | Programme level | 2013 | Redacted | 1,252 | n/a | 1,252 | 1,252 | Redacted | Redacted | Redacted | Redacted | - |
| | Fence Civils Cluster 1 | 2013 | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted |
| | Technology Cluster | 2013 | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted |
| | Site Resilience | 2013 | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted | Redacted |

Notes

1. The estimates in the table above are 'P80' estimates (meaning there is an 80 per cent probability that the programme or project will be delivered within the estimates shown above).
2. Projects which have not yet passed design gate are either in a planning or design phase, whereas projects which have passed design gate are in either a construction or commissioning phase.
3. The historic cost estimates in the table above are expressed in the money values of the year in which the estimate was prepared (i.e. have not subsequently been adjusted for inflation).

| Programme | Major Project | Year initiated | Date passed design gate | Estimated cost at initiation (£m) | Estimated cost at design gate (£m) | Estimated cost as at Dec 2014 (£m) | Estimated cost as at Sep 2015 (£m) | Estimated end date at initiation | Estimated end date at design gate | Estimated end date as at Dec 2014 | Estimated end date as at Sep 2015 | Key reasons for changes to cost and/or end date from year initiated to Sep 2015 |
|-----------------------------------|--|----------------|-------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|---|
| Sellafield – Other Major Projects | Separation Area Ventilation | - | Aug 2008 | - | 144 | 246 | 249 | - | Aug 2011 | Oct 2017 | Nov 2016 | Schedule and cost initially increased due to additional design and construction scope to recover from early design weaknesses including poor ground conditions, cable re-routing and protection to plutonium liquor lines. Re-work was required during design and construction to overcome the immature design and clashes during installation. Underestimation of the duration and logistics associated with working in the Separation area which included design and construction durations, scaffolding and crane requirements as well as resources. |
| | Evaporator D | - | Apr 2009 | - | 409 | 686 | 740 | - | Jul 2014 | Aug 2016 | Dec 2017 | Schedule and cost initially increased due to work undertaken on seismic and stress analysis resulting in amended specification requirements and delays in release of design information. Supply chain performance and quality issues have resulted in subsequent schedule and cost impacts. Transfer of incomplete modules to site, a constrained working environment and industrial action have resulted in ongoing construction and commissioning productivity being below that required to meet the original schedule. |
| | SIXEP Contingency Plant | 2014 | - | 394 | - | 394 | 394 | Nov 2024 | - | Nov 2024 | Nov 2024 | - |
| | Sellafield Product and Residue Store Retreatment Plant | 2015 | - | 494 | - | - | 494 | Nov 2026 | - | - | Nov 2026 | - |

Notes

1. The estimates in the table above are 'P80' estimates (meaning there is an 80 per cent probability that the programme or project will be delivered within the estimates shown above).
2. Projects which have not yet passed design gate are either in a planning or design phase, whereas projects which have passed design gate are in either a construction or commissioning phase.
3. The historic cost estimates in the table above are expressed in the money values of the year in which the estimate was prepared (i.e. have not subsequently been adjusted for inflation).

| Programme | Major Project | Year initiated | Date passed design gate | Estimated cost at initiation (£m) | Estimated cost at design gate (£m) | Estimated cost as at Sep 2014 (£m) | Estimated cost as at Sep 2015 (£m) | Estimated end date at initiation | Estimated end date at design gate | Estimated end date as at Sep 2014 | Estimated end date as at Sep 2015 | Key reasons for changes to cost and/or end date from year initiated to Sep 2015 |
|--------------------------|----------------------------|-------------------|-------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|
| Magnox Decommissioning | Programme level | 2011 ² | n/a | 6,863 | n/a | 8,611 | 8,731* | Mar 2028 | n/a | Mar 2028 | Mar 2028* | The costs have increased for the original scope of the programme due to emergent asbestos issues and a better understanding of the waste retrieval challenges having started work at the lead sites. The addition of the Winfrith and Harwell sites to the programme in Sep 2014, at commencement of the new PBO contract, increased the lifetime costs by £1,031m. *A process of consolidation is taking place following the new PBO contract award and it is anticipated that the costs and schedule end date will change based on the up to date information. |
| | Berkeley Vaults Retrievals | 2011 | May 2013 | 212 | 245 | 297 | 297** | Mar 2015 | Jun 2018 | Feb 2020 | Apr 2020** | Cost and schedule changes to date have been caused by increased learning from early planned waste characterisation and the need for a fundamental change of approach for one aspect of the waste retrieval. **The site is currently part of the consolidation process being carried out by the new PBO. It is anticipated that the costs and schedule end date will change based on up to date information on the equipment supply and the waste. |
| Dounreay Decommissioning | Programme level | 2012 | n/a | 1,552 | n/a | 1,930 | 2,280*** | Jan 2025 | n/a | Sep 2026 | Oct 2029*** | The increases in cost and time are largely due to the change in exotic fuels strategy. In addition, the following items have led to increases in cost and time: a) inflation; b) 'special items' for costs over which the SLC has little control (e.g. Civil Nuclear Constabulary or regulator costs); c) differences from the contracted position at commencement and that found during the contract; and d) security enhancements. *** Due to the transfer of 'exotic' fuels from Dounreay to Sellafield the indicated cost and date are under further review, which it is expected will complete by December 2016. |
| National Low Level Waste | Programme level | 2011 | n/a | 1,750 | n/a | 1,750 | 1,750 | Dec 2030 | n/a | Dec 2030 | Dec 2030 | - |

Notes

1. The estimates in the table above are 'P50' estimates in line with the contractual arrangements in place for these Site Licences Companies.
2. The initiation date of 2011 for the Magnox Decommissioning programme reflects when the original Magnox Optimised Decommissioning Programme was baselined. The costs associated with the additional scope subsequently added to the programme for the Winfrith and Harwell sites have start dates of 2012 and 2013 respectively.
3. Projects which have not yet passed design gate are either in a planning or design phase, whereas projects which have passed design gate are in either a construction or commissioning phase.
4. The historic cost estimates in the table above are expressed in the money values of the year in which the estimate was prepared (i.e. have not subsequently been adjusted for inflation).

Appendix B – Key hazard reduction milestones for legacy ponds and silos programmes

| Programme | Key hazard reduction milestone | Contract baseline 2010 | Performance Plan 2011 | Performance Plan 2014 | Estimate as at Sep 2015 | Key reasons for changes to key hazard reduction milestone date between 2010 and Sep 2015 |
|---|--|------------------------|-----------------------|-----------------------|-------------------------|--|
| Sellafield - Pile Fuel Storage Pond | All intermediate-level waste removed and treated | 2042 | 2024 | 2024 | 2024 | This milestone is currently expected to be achieved 18 years earlier than had been thought achievable in 2010. This is due to a review of the retrievals strategy and greater use being made of existing facilities rather than new build. This has decreased cost and resource requirements and increased affordability and deliverability. |
| Sellafield - First Generation Magnox Storage Pond | Completion of retrievals | 2043 | 2034 | 2033 | 2033 | This milestone is currently expected to be achieved 10 years earlier than had been thought achievable in 2010. This is due to a review of the retrievals strategy and changing to a more pragmatic decommissioning approach with less reliance on fully remote custom made equipment. |
| Sellafield - Magnox Swarf Storage Silo | Residual retrievals complete | 2045 | 2036 | 2050 | 2052 | This milestone is currently expected to be achieved seven years later than had been thought achievable in 2010. This is due to the start date of waste retrieval operations being three years later than originally planned and refinement of the model that predicts how the retrievals capability will perform resulting in the date for when residual retrievals will be complete extending. |
| Sellafield - Pile Fuel Cladding Silo | Bulk retrievals complete | 2026 | 2023 | 2033 | 2033 | This milestone is currently expected to be achieved seven years later than had been thought achievable in 2010. This is due to the retrievals project re-design (see Appendix A) and adoption of a three-stage approach to retrievals. The programme had relied on the retrievals solution being able to remove the waste from all six compartments without modification, but uncertainty over waste characteristics and the operation of the retrievals equipment meant this was not a credible solution. |