



2017/18

Introduction



We can all be extremely proud of the achievements that the Magnox and Cavendish Fluor Partnership team have made in the safe and secure decommissioning of Magnox sites.

During the past 12 months we have made further significant progress and there is much to celebrate, not least: forging ahead with the closure of Bradwell Site in 2018; continued defuelling at Wylfa; nuclear material transfers from Harwell Site to Sellafield and making significant advances in hazard reduction across all our sites as follows:

- **Asbestos removal** – major asbestos removal projects being undertaken on four sites
- **Waste retrievals and packaging** – no fewer than five new waste retrieval/packaging plants going into operation during the year
- **Decommissioning** – good progress in ponds across four sites and considerable demolition and plant removal works being undertaken on five sites with work about to commence on two further sites

The selection of case studies you can read about here is only the tip of the iceberg. There is so much more to

acknowledge and this booklet cannot do it justice but at least it will give you a flavour of the work that is being done across Magnox that might not be visible to all.

We recognise and appreciate all the good work that is being done by our staff, suppliers and contractors; working together as one team to make things happen and make a difference.

We will continue to strive to build on the good work that has been achieved and maintain a One Team ethos to continue to drive the decommissioning of the Magnox sites into the future.

It's been a privilege to see some real value work and innovative decommissioning which is of immense interest to the outside world. Next year promises to be just as exciting as the last as we continue on our journey to move all our sites to closure.

Thank you for your continued support.

A Moore
Tony Moore,
Managing Director

Magnox Socio-Economic Scheme

	Funding awarded 2017/18: £739,398		51 employment opportunities
	to 143 projects		4126 training opportunities
	Match funding: £2,391,759		

Bradwell Site takes another critical step towards care and maintenance, as the end of intermediate level waste (ILW) operations is set to complete.

This includes the successful and safe management of sludges, which accumulated during the 40 years of Bradwell's operation.

In a programme spanning more than seven years, several separate projects covering waste retrieval, packaging and conditioning have contributed to the site's ILW being transferred into the interim storage facility.

Of the packages placed for interim storage to date, more than 40 contain dried resin and more than 60 contain dried sludge.

This achievement follows a significant 12 months for the site, which also saw the completion of fuel element debris dissolution in June 2017 and the reclassification of some of this ILW as low level waste, enabling it to be sent to the Low Level Waste Repository.



Bradwell



Wylfa

Retrievals of corroded fuel element debris from Wylfa Site's dry fuel store started this year, with one of three planned storage containers already filled with intermediate level waste.

The complex remote recovery project began in 2014 and involved the creation of bespoke tooling and a hoist by local manufacturers to enable the retrievals to start from 37 separate skip tubes.

The irradiated fuel store was never designed to be accessed in this way, making the project even more complex. The engineering challenges are huge as six different recovery tools are needed to remove the debris, operating seven metres down and within one millimetre tolerances.

Tool supplier BICO Engineering was presented with the 'Minister's Award' at the Nuclear Decommissioning Authority Supply Chain Event in November 2017 in recognition of the great value, flexibility and innovation they delivered throughout the project.



Berkeley Site's Higher Activity Waste team has retrieved more than 100 tonnes of fuel element debris (FED) from vault two, filling more than 60 storage containers in the process.

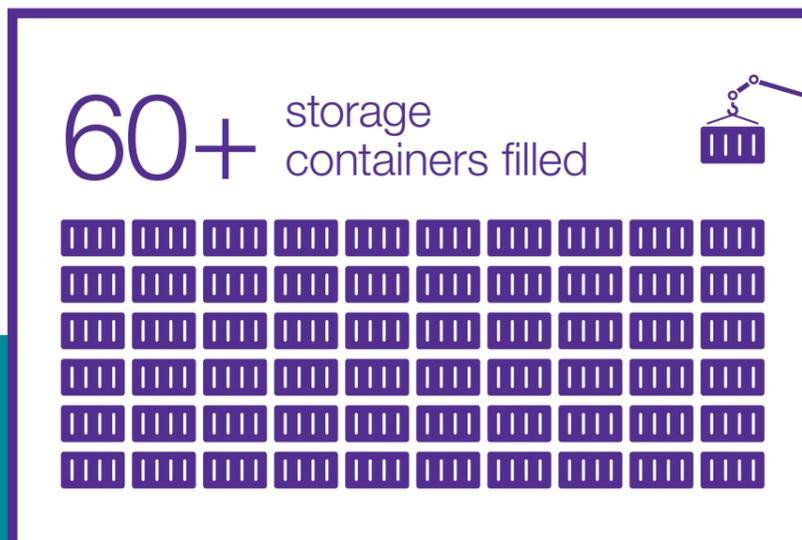
Once filled the containers are conditioned and then safely stored in the on-site interim storage facility, where they will remain until a long-term storage solution is identified for the UK.

The team has overcome several operational issues during the year and the site is proud of its achievement.

In total, there are around 620 tonnes of FED in vaults one and two plus over 6,500 containers

and 1,450 sludge cans across all three vaults, so there is still a long way to go.

The team has faced a series of unexpected operational issues and worked hard to overcome them to continue retrieving waste, which is testament to their tenacity and work ethic. Considering the complexity of the waste and the number of attempts over the years to retrieve it, the team should be hugely proud of what they have and continue to achieve.



Berkeley



Wylfa Site's defuelling programme, removing the highest hazard from site, made good progress this year and overcame many gruelling fuel route equipment breakdowns, a testament to the dedication of the site staff.

Despite challenges, a record 254 fuel elements were harvested in one day and seven flasks shipped in a week – both of which are outstanding achievements.

The 50 per cent defuelled landmark was achieved this year, and the site ended 2017/18 at 59.55 per cent defuelled with 50,580 fuel elements to be removed from site.



14,907 fuel elements removed from reactor one



Harwell

Significant progress has been made with both decommissioning and construction at Harwell Site this year.

One of the site's major facilities, the solid waste complex, which treats, stores and disposes of radioactive wastes, celebrated retrieving the 10,000th can of remote handled material from the site's tube store in August 2017.

Much of the waste in the tube stores has deteriorated over the years presenting some difficult and unique recovery challenges.

This year has also seen construction of the new intermediate level waste box store.

Built to accommodate waste produced during the decommissioning of facilities at Harwell, Winfrith and Culham sites, waste will be packaged into 6m³ boxes prior to consignment to the store, which will hold them until a national geological disposal facility is available.

The 0.5m thick base slab for the building used 1,000m³ of concrete, with 325 foundation piles underneath. The steel frame is now complete, walls and roof clad and the 55-tonne overhead crane has been installed ready for inactive commissioning to commence.



Harwell Site's store will be roughly the size of a **football pitch** and will hold around **2,300** drums




The waste complex's 240-tonne retrieval machine 2 has been dismantled and rebuilt **67** times



Two major projects to accelerate demolition work at Sizewell A Site have been successfully completed.

Signs of deterioration and degradation were identified on both the cooling water (CW) crane and the two off-shore structures. Following meticulous planning and collaborative team work between the site and contractors KDC Lifting Project UK, a huge mobile 500 tonne crane was delivered to site to remove the old CW crane.

The mobile crane took two days to construct and needed 320 tonnes of ballast before work could begin, with the CW crane being removed in one day during a single lift over the site. More than 600 tonnes of metal were sent off-site for recycling.

The site worked with contractors ACN Offshore to remove the top decks and boat landing decks from the off-shore structures to make them completely inaccessible.

During the work 13 tonnes of wood and 30 tonnes of guano were removed and disposed of. More than 30 tonnes of metal was sent off-site for recycling and the project was finished three months ahead of schedule.

The CW crane had a 40m span and weighed 51 tonnes

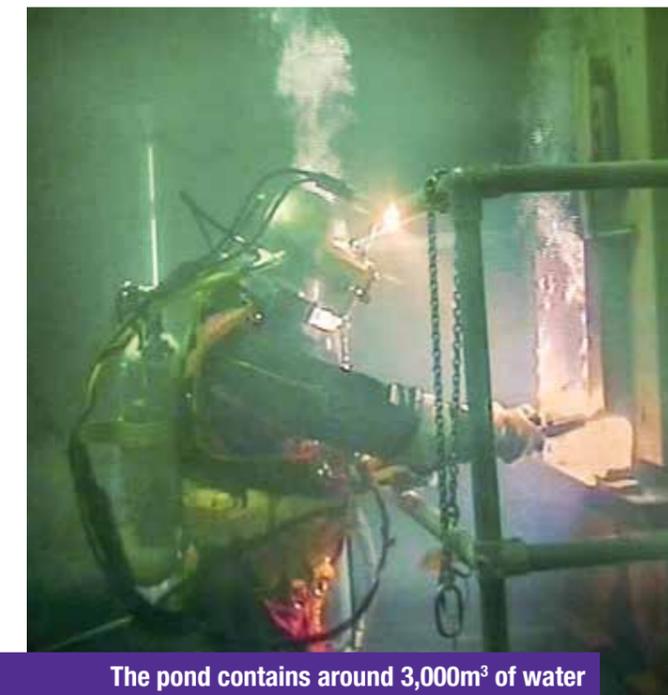
Sizewell A

Nuclear divers are cleaning-up Sizewell A Site's cooling pond, following the successful transfer of learning from a previous Magnox project.

Preparations began in the autumn of 2017, after a significant effort to prepare the ponds for decommissioning, with dives starting in mid-December. At the end of the year the nuclear divers had cut up and sized-reduced all 35 intermediate level waste skips ready for storage.

The team, which took the experience from Dungeness A Site, will also be tackling the clean-up of about 4m³ of sludge, the consolidation of miscellaneous contaminated items and miscellaneous activated components and the removal of about 200 tonnes of pond furniture.

The project is set to run until summer 2018 with an expected total of around 600 dives.



The pond contains around 3,000m³ of water

Winfrith



Significant progress has been made on decommissioning the two reactors at Winfrith Site this year.

A total of 25 tonnes of bulk asbestos has been removed from the primary containment of the Steam Generating Heavy Water Reactor.

The work took 1,500 man hours to complete in a harsh and highly regulated environment, and often at height.

The majority of the asbestos came from the lagging boxes which previously provided thermal insulation to the primary circuit feeders and risers. Located close to the reactor core, there was an added hazard of contamination meaning some materials were removed using remote and semi-remote techniques.

The main shield plug was removed from the Dragon reactor during the year, which enabled further decommissioning to begin.

The plug originally provided the shielding above the reactor core and filled the neck of the reactor pressure vessel. Before removal, internal pipe cutters and clam-shell cutters were used to separate the plug from the pressure vessel, with the final cut being made by hand.

The 21-tonne plug and pressure vessel neck have now been sized-reduced and packaged for disposal.



Hunterston A

The largest in the Magnox fleet, the former used fuel pond at Hunterston A Site has been emptied of bulk sludge that arose during operation.

The water depth in the pond had already been reduced down to one metre following a sustained period of work, but the final clearance attempts were hampered by equipment failures and the challenges of the radiological conditions.

The site worked tirelessly to resolve the issues, installing new pumps alongside manual working practices to process around 30m³ of residual sludges plus debris from the pond, removing a significant radiological hazard.

Surface decontamination is now underway using concrete shaving and ultra-high pressure water jetting, with more than 950m² completed so far.

Waste retrievals at the site also marked several significant milestones this year with the emptying of the third of five legacy storage bunkers ahead of schedule, with the fourth now well underway.

Half of the site's solid active waste has now been retrieved as result, with 750 boxes of waste having been placed inside the site's interim storage facility.

Throughout the process the site has searched for efficiencies, including improving waste packaging resulting in a reduction in the number of 3m³ storage boxes needed. This represents a significant cost saving both in terms of box purchasing and the operational time needed to process them.



Over 1,400 tonnes of higher activity waste recovered so far

Preparatory work on Hinkley Point A Site's interim storage facility (ISF) began in the summer of 2017 and is now well into its construction phase.

Standing at 14 metres tall, 68 metres long and 25 metres wide, and with a design life of 120 years, the ISF will have capacity to safely store over 1,000 packages of intermediate level waste until a national repository is available.

Three types of package will be accepted in the store, representing the varied and unique requirements of Magnox waste: concrete boxes, MOSAIK®s and Tru Shields.

Inactive commissioning is due to complete in the summer of 2019.

Hinkley Point A



Chapelcross

The £23m project to dismantle 3,000 tonnes of degrading steelwork from the 16 external heat exchangers at Chapelcross Site is almost complete, removing the biggest conventional safety hazard on the way to care and maintenance.

More than 1,450 tonnes of clean metal has been sent for recycling through a local merchant and the redundant scaffold materials are being transferred across the Nuclear Decommissioning Authority estate for re-use.

The removal of the top duct sections alone involved individuals working on scaffolding, 90 feet from the ground, in contaminated conditions and exposed to the ever-changing and, at times, unforgiving weather.

At the same time construction of a new interim storage facility (ISF) is nearing completion.

Designed to store packaged intermediate level waste in a compliant condition in line with Scottish government policy, the ISF will allow around 420 waste packages to be managed for up to 300 years.

The project has used 2,100m³ of concrete and 130 tonnes of steel reinforcing, as well as 1,400 tonnes of structural and secondary steelwork. When complete, 10,000m² of cladding and 6,000m² of insulation will cover the building to protect it from the elements.

1,454 tonnes
of metal recycled, the equivalent of
242 African Elephants



A 1,200-tonne crane was used for the heaviest lifts from the heat exchangers



The team at Oldbury Site has been busy stripping over five tonnes of redundant fuel flask retrieval equipment to enable the installation of IONSIV and MOSAIK® retrieval handling equipment in the pond.

This will ensure the safe removal and packaging of 34 IONSIVs, used as a filtration system during operations, some of which were previously transferred from Sizewell A and Dungeness A sites for temporary storage.

This allowed just one set of retrieval equipment to be designed and installed rather than three, saving time

and money. A mock-up of Oldbury's flask corridor has been constructed to enable testing of the equipment before installation.

Retrievals are due to start in summer 2018 with packages being sent to Berkeley Site's interim storage facility.

Oldbury



Several projects have taken leaps forward at Dungeness A Site this year.

In a UK first, waste packages have been successfully transported by rail to Bradwell Site's interim storage facility, after active commissioning of the advanced vacuum drying system and resin retrieval equipment took place on site.

Following completion of 271 separate nuclear dives in the ponds to remove 30 tonnes of pond furniture, segregation and removal of other intermediate level waste (ILW), low level waste and fuel element debris has been completed with more than 20 drums of ILW retrieved to a temporary storage facility. This has allowed decontamination of the pond walls and bulk draining to commence with Reactor 2 pond now 50 per cent drained.

Dealing with asbestos has remained a high priority with around 100 contracted staff working in challenging conditions to complete 65 per cent of the bulk removal across the site. And work to rationalise and reduce the site's electrical system has been completed, allowing 583 aged electrical boards to be removed from service, significantly reducing potential electrical and fire hazards.

In addition 19 asset care projects, totalling nearly £1.4 million worth of work, were safely delivered to address degradation issues.



Dungeness A



Trawsfynydd

The final retrieval of sludge and resin has been completed at Trawsfynydd Site, in the campaign to empty the vault that was filled between 1960 and 2010.

Over 27m³ of sludge and resin, produced as part of routine operations on site, was extracted using a vacuum system, conditioned to achieve the correct density and pumped to the transportable solidification plant. The waste was then encapsulated in cement powders in a 3m³ stainless steel liner, capped in grout and transferred to the site's intermediate level waste store.

This significant achievement challenged the operations team to develop additional tools and new processes to retrieve significant quantities of volatile material from the vault.

An extensive remedial project to strengthen structural deficiencies in the boiler box and interspace areas below Trawsfynydd Site's reactor safe store capping roof has also been successfully completed.

The degraded, legacy scaffold structures and materials from the boiler end areas below the capping roof were removed and the in-situ reinforced concrete boiler box exterior walls and interspace pre-cast panels were strengthened.

The work is a major contribution to locking down both reactor safe stores in preparation for care and maintenance and took 17,000 man-hours to complete.



83,200
litres of waste removed during the sludge and resins project

Enough legacy scaffold board to cover **25** tennis courts removed

Supporting staff remained critical to business delivery, as demonstrated by a year-long campaign to raise awareness of mental health issues.

So far 90 mental health first aiders have been trained across the company, to offer assistance and a source of information for colleagues.

A programme of respect and inclusion work was also delivered, with 158 training sessions run across the company, as well as the establishment of a Women's Network.

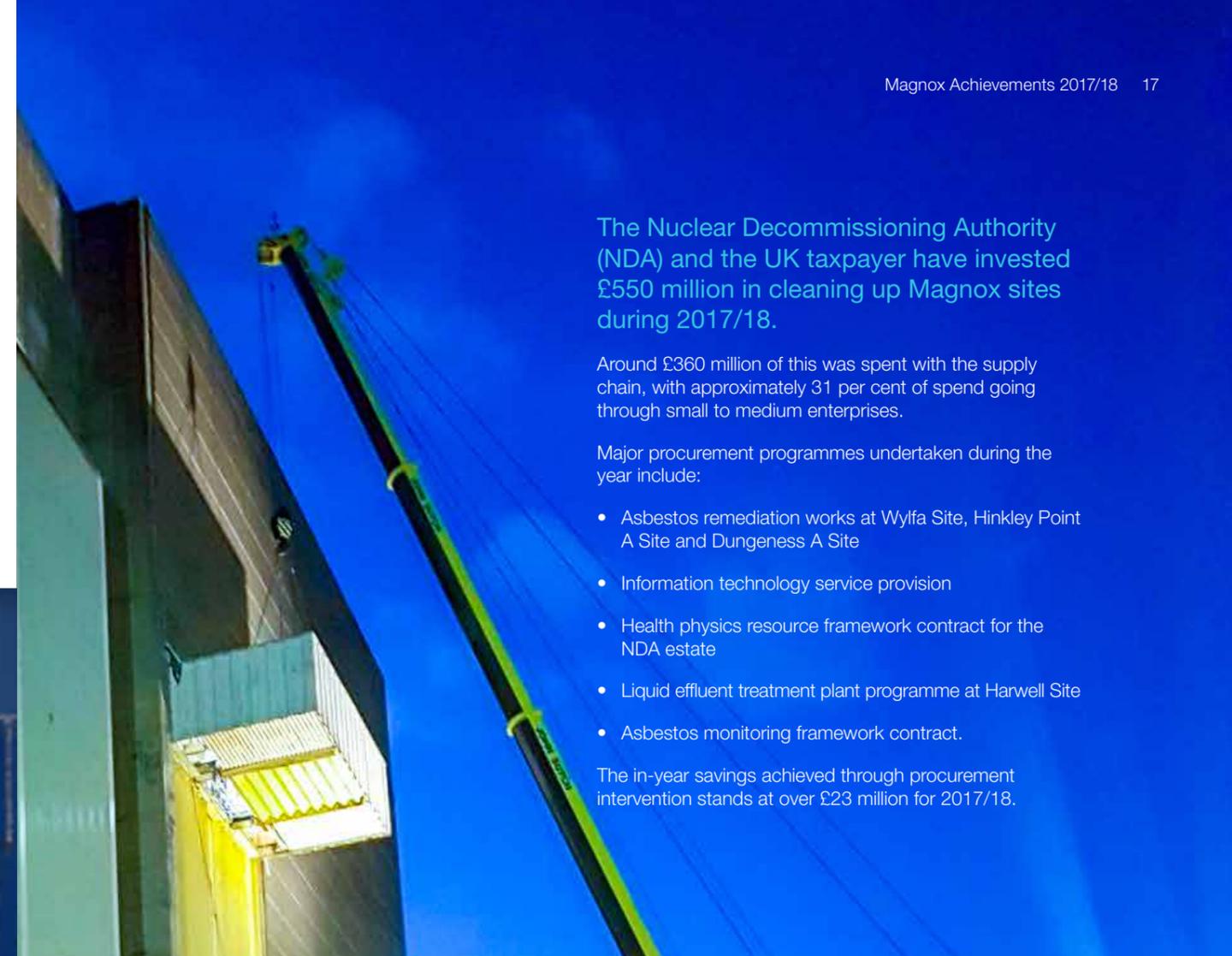
In addition a three-year pay deal was agreed during the year, providing stability for staff going forwards. And a new resource planning process was implemented to give future

visibility, and enable better decision making on skills and capability development.

A new payroll and accounts payable solution delivered a 60 per cent saving on previous arrangements while at the same time improving service quality.



People



The Nuclear Decommissioning Authority (NDA) and the UK taxpayer have invested £550 million in cleaning up Magnox sites during 2017/18.

Around £360 million of this was spent with the supply chain, with approximately 31 per cent of spend going through small to medium enterprises.

Major procurement programmes undertaken during the year include:

- Asbestos remediation works at Wylfa Site, Hinkley Point A Site and Dungeness A Site
- Information technology service provision
- Health physics resource framework contract for the NDA estate
- Liquid effluent treatment plant programme at Harwell Site
- Asbestos monitoring framework contract.

The in-year savings achieved through procurement intervention stands at over £23 million for 2017/18.

Finance



Delivery

Retrieval, packaging and management of waste remained a top priority across Magnox in 2017/18.

Construction of new waste stores is underway at three sites, and innovative technologies are being used to process waste that is currently housed in unique and challenging conditions.

In addition planning permissions were gained for a new waste encapsulation plant to be built at Hinkley Point A Site; recladding work to be completed at Hunterston A Site; a new drainage system to be installed at Trawsfynydd Site and building of a new waste processing system at Oldbury Site.

During the year Magnox handled over 5,500 tonnes of low level waste, with 96 per cent of this diverted away from the Low Level Waste Repository, saving space within its valuable stores.



Magnox has focused on making improvements across its business to drive efficiencies during 2017/18.

This year, in line with operational changes, three sites have removed their 24/7 shift presence, saving several millions of pounds for the UK taxpayer.

In addition a new contract management safety improvement programme has been initiated, to improve how we manage our contractors to safely deliver.

We have safely removed 2,700 documents from our management systems and implemented new streamlined common arrangements across our 12 sites; on topics such as security, conventional risk assessment, asbestos management and fire safety management.

In addition...

All 35 intermediate level waste skips have been size-reduced in the ponds at Sizewell A Site ready for disposal

Half of Hunterston A Site's higher activity waste has now been packaged and placed into the interim storage facility

Business Improvements





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