

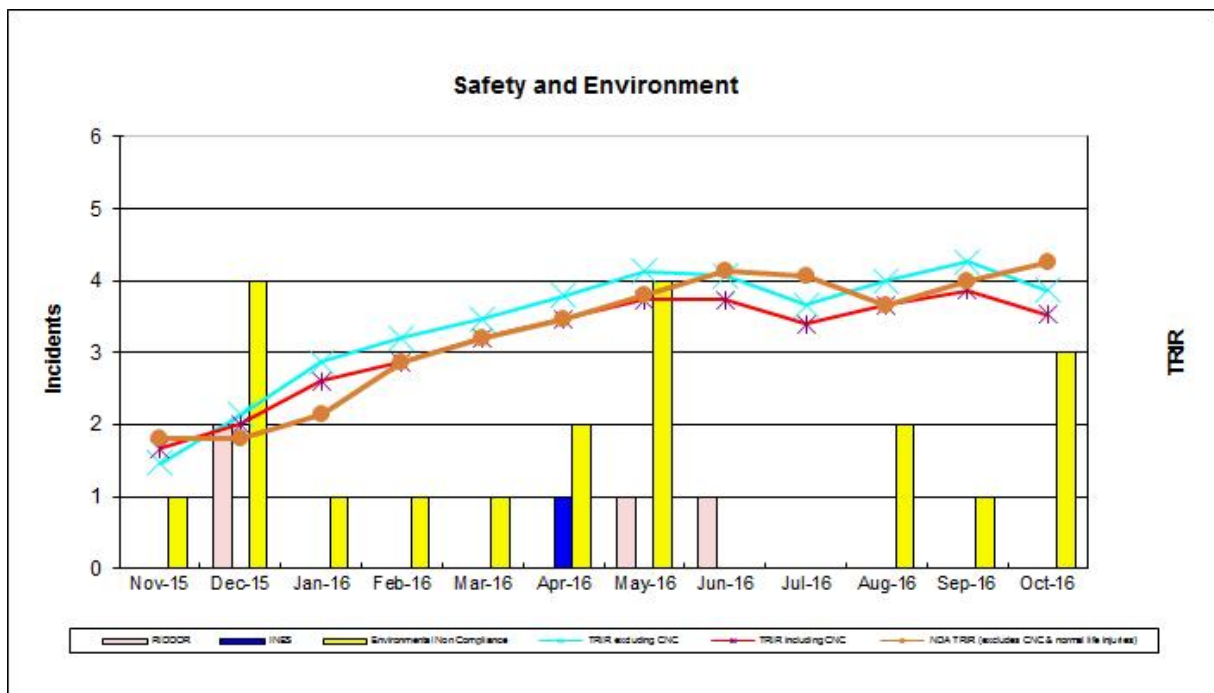
## Dounreay Report to Dounreay Stakeholder Group to end October 2016

### Site decommissioning programme

An updated decommissioning plan, reflecting the prioritisation and additional scope for nuclear materials, is currently going through an internal process culminating in a government review by the Parent Body Board in November. Subject to approval by the PBO Board it will be formally submitted to the NDA by the end of November and expect, following further discussion, to have an approved plan by end of this calendar year. Once NDA has approved the programme it will take a number of weeks to implement into the Dounreay systems and therefore is expected to be ready for the beginning of the new financial year in April 2017.

The NDA has confirmed that additional funding will be provided to support this programme over the next two years, totalling £24 million, in addition to the assured funding of £177 million. In return, the challenge has been set to deliver efficiencies and value for money.

### Health, Safety, Security and Environment



The site has gone 67 days (as of 4 November 2016) without a lost time accident.

A mandatory safety stand-down was held in September as part of the site's continual improvement programme with a focus on ensuring that learning is captured, shared and re-enforced. It also provided an opportunity to reinforce the message that anyone has the right to stop work if they think what they are doing, or witness, could be unsafe.

Analysis to understand the underlying causes of behaviours as identified by recent investigations on site is underway. As part of this analysis a site wide independent survey will be rolled out in November on safety culture and will be open to all DSRL and contractor staff.

Following SEPA's final warning discussed in the last report (Krypton 85 monitoring), a site wide review is being carried out to identify any further potential gaseous release pathways that are not monitored.

Work is underway to vent some of Dounreay's waste containers after a small number showed signs of a build-up of pressure. A full investigation has been undertaken and it showed that the predominant gas was identified as hydrogen.

During the removal and transfer of a redundant glove-box (a sealed engineered enclosure facility used to handle radioactive material), contamination was detected when a worker involved in the task was monitored. Those working on this project took prompt and appropriate action, ceasing operations and withdrawing from the area. ONR was informed and a controlled re-entry has now taken place to allow decontamination of the workspace. This occurrence has a provisional INES rating of Level 1 (anomaly).

The Committee on Medical Aspects of Radiation in the Environment (COMARE) published their 17<sup>th</sup> report, which has found that clusters of cancer cases around Sellafield and Dounreay nuclear sites were very unlikely to have been caused by radiation exposure. Previous reports found an increased risk of leukaemia and non-Hodgkin lymphoma in children and young adults around these sites. The report said that rural population mixing may have been a factor. The clusters have now disappeared.

AFNOR UK completed the surveillance audit of DSRL against ISO 9001:2008 (Quality Management Systems), ISO14001:2004 (Environmental Management) and OHAS 18001:2007 (Health and Safety Management) in October. Both auditors were very complimentary about the openness and honesty of the personnel they interacted with during the week and the fullness of the discussions.

## **Site performance**

Appendix 1 provides information of the key project milestones for 2016/17. Specific performance achievements are outlined below.

## Reactors

- **Dounreay Fast Reactor (DFR)**

The destruction of one of the highest hazards remaining in the NDA estate is now complete. Around 68 tonnes of highly radioactive liquid metal coolant was removed from DFR and safely destroyed over a ten year period. The liquid metal, a blend of sodium and potassium (NaK) was used to remove heat from the reactor's nuclear fuel. A specially built plant and removal system was used to safely convert the NaK to hydrogen gas and salt water. The Dounreay team was supported by the supply chain to remove and convert the NaK into safe products.



The bulk removal of NaK was completed in 2012 and, since then, work to remove the last of the coolant from the pipework and base of the structure has been undertaken. This final stage was extremely challenging because of the accessibility of the hazardous material.

Detailed technical solutions, including remotely drilling through parts of the reactor, had to be developed.

The DFR pond wall removal project started stitch drilling of the pond corners. This allows removal of the pond corners which cannot be reached by previous work carried out with a remotely operated saw. The radioactively contaminated pond wall will be cut into blocks which will be wrapped and transported to the waste directorate for final packaging and disposal. The project team undertook extensive offsite trials to develop the wall removal process.

A grout barrier has been installed to prevent leakage of water during the cutting of the pond top cap. Cutting operations were resumed after the effectiveness of the barrier was verified.

DFR completed sampling of the graphite surrounding the reactor vessel. The work involved developing a long-reach coring tool to pierce the bottom of the instrument tube and collect core samples. The samples have been sent for further analysis which will inform reactor dismantling activities. Trial tests were completed on site before using the tool in a radioactive environment.

- **Prototype Fast Reactor (PFR)**

Video and radiation measurements from within the reactor vessel have been carried out. The video inspections have provided information about the condition inside the reactor vessel including the level of sodium deposition and mechanical interferences not captured in plant drawings.



An off the shelf CCTV camera has provided crystal clear images of inside the reactor. Fifty years on from the construction of PFR, footage is being viewed that will allow the innards of the second (and last fast reactor) to be taken apart.

The PFR tank farm team completed the cleanout of tank four after removing debris and cleaning the interior surfaces with a weak acid solution. Tanks three and four will be removed at a later date before initiating sodium removal in tanks one and two. The treatment of tank four used the water vapour nitrogen technique.

Repairs to the power manipulator in the PFR irradiated fuel cave (IFC) are complete with the failed gear wheel now replaced. The work involved replacing the nitrogen atmosphere in the maintenance cell with air and conducting air-line suit entries to diagnose and repair the fault. The IFC has now returned to service after performing preventative maintenance on a similar component associated with the hoist.



The PFR irradiated fuel cave (IFC) team installed a new adaptor plate. The new plate will facilitate the characterisation of waste packages as they are removed from the IFC. ILW shipments using the Z6016 flask have begun.

The construction of the argon gas blanket filters and pipework mock-up are complete. The mock-up, located in the steam generator building, will be used to trial decommissioning work and train operators for the remote removal activities.

The PFR team started active commissioning of the Wet Area Size Reduction Facility (WASRF). The team removed a neutron shield rod from the mortuary store and laid it down into the WASRF. The first cut was started in early July 2016. The procedures and saw worked very well with very little contamination of the surrounding area. The WASRF is a purpose built enclosure with contamination and fire controls systems to allow handling of waste containing alkali metals.

During October the team met a major milestone by disposing of the first component to be lifted from the reactor when it shut down. The 11 metre long neutron shield rod, which formed part of the shielding round the outer edge of the reactor, has been in storage since it was removed from the reactor a number of years ago. The five-tonne rod was lifted and size-reduced in the PFR reactor hall and has now been transferred to a container ready for disposal.



A heating system has been installed on the primary cold trap loop (PCTL) vessel. The heating system will melt sodium contained in the gap between the filter basket and inner PCTL which in turn will free the basket, allowing it to be removed for processing.

A small team from the Reactors directorate recently undertook an information sharing visit at Magnox Winfrith. There was an excellent exchange of information on a variety of subjects including dismantling/cutting techniques, works control, waste containers and resource management.

## **Fuel Cycle Area**

DMTR (Dounreay Materials Test Reactor) is making good progress with the removal of the redundant high level ventilation ducting and services from the reactor shell.

The DMTR team completed an internal radiation survey of the reactor block (photo shows the underside of the top shield plug). The survey showed that the radiation levels are in line with the previous reactor block survey completed in 2004, and our calculations, which supports the decommissioning programme.



D1200 Labs 79 and 8 fume cupboard conditioning has been completed. This supports the isolation of the ventilation system.

Work has started to remove the brick lining from pit two in D1211, which was part of the old site low active drain system.

The windows in the north and south walls of the cell in D1217 have now been removed and the zinc bromide residue removed. Conditioning grout has been applied to the south cell floor which is part of the work involved in preparing the cell for disposal. The ventilation filter unit and support steelwork has been installed.

The D1206 team is continuing glove box removal in the sample tank annex this is part of the work to decommission the whole sample tank annex.

The filling in of the pond and remote handled intermediate level waste store floor voids is now complete in D1251 which allows preparations to begin for building demolition. Work continues with the internal building soft strip out.

## **Fuels**

The programme to remove the inventory of nuclear material from Dounreay is progressing and is fully compliant with all regulations which govern nuclear transports. The NDA recently announced that a small amount of inventory of material at Dounreay will be exchanged with the USA in return for material that can be used to maintain the production of medical isotopes in Europe. Following the discussion at the September DSG meeting, a document has now been distributed providing written responses to questions received and discussions at the meeting. In addition, this document also incorporates extracts of minutes of DSG meetings and sub groups along with a list of all correspondence received by DSG related to this topic.

## **Waste**

The last of the higher activity liquid waste produced during Dounreay Fast Reactor (DFR) fuel reprocessing has been made safe. This was an important milestone in the immobilisation of the historic liquid waste (known as raffinate) which had been created from reprocessing undertaken during the operation of the site's three reactors. Around 232 cubic metres (875 drums) of DFR raffinate were made safe by grouting the material through the Dounreay Cementation Plant (DCP) and is now suitable for long term storage. This achievement featured on STV news in July.



The DCP will now undergo some engineering modifications and enhancements to allow work to begin on immobilising the PFR raffinate. Completion of the modifications of the plant is due in August 2017 with processing of PFR raffinate (phase 1) completed by December 2017. This will be followed by phase 2 PFR raffinate processing scheduled for around 2021 to allow work to be completed of the DCP Drum Store Extension.

During August a key milestone for the NDA and site was completed when the waste team performed a predictive waste inventory walk down at the encapsulation plant.

The site waste management process has been revised to improve the waste strategy as well as business and regulatory needs to improve the site's predictive waste inventory. Inventories are required for each facility, building or standalone structure on-site, in order to make informed decisions on the management of waste that will be generated from ongoing decommissioning activities.

WRACS carried out re-commissioning in early October, successfully compacting 15 drums following a number of improvements to the conveyor system and other items of plant. A minor fault that needed repair was discovered in the buffer conveyor that feeds the super compactor and a further adjustment to the conveyors was required. Full operation of the facility has now commenced.

## **Environmental Closure and Demolition**

### **Highland Council Planning Framework 3**

Discussions continue with Highland Council on the phase three planning application. Because of the timescales for approval of the revised decommissioning plan, a new timeline is being developed to ensure that the planning application submission aligns with the updated programme.

### **Site End State Review**

DSRL, supported by Amec Foster Wheeler, has undertaken a Site End State Review. The review aimed to provide a more focused definition of the Site End State by building on the existing definitions from the 2007 Best Practicable Environmental Option study and the current NDA Client Specification. The review also aimed to identify constraints, such as

conflicting regulation or policy that may prevent DSRL achieving the optimal end state. Workshops have been held over the past few months with attendance from representatives from NDA and Magnox and DSRL stakeholders. Observers from DSG (Bob Earnshaw) and SEPA (Richard Macleod) also attended.

It was recognised:

- wholesale excavation and removal of very low levels of residual contamination could actually result in more detriment than good
- current understandings of site residual contamination need to be integrated with results of the review
- that large areas of the site will be available for re-use at Interim End State
- results are broadly consistent with the 2007 BPEO
- low levels of residual contamination will need to be regulated under the Radioactive Substance Act.
- that the most significant challenge to the re-use of the site was not associated with residual contamination but with the current lack of economic drivers.

This draft assessment report is under DSRL review. Accompanying the Assessment Report will be a decision paper summarising the process with presenting opportunities where legislative, regulatory or contractual constraints should be challenged or changed in order for an optimum end state to be achieved.

### **Interim End State Landscape Options**

As part of the DSRL plan to submit a full planning application to cover the 'Phase 3' work activities from 2018 to Interim End States (IES), a preferred conceptual landscape design is to be included. The landscape design at IES is of considerable interest to stakeholders as, along with the land quality influences the potential re-use of the Dounreay Site. The Local Planning Authority (The Highland Council) has indicated that the current landscaping concept does not meet their expectations.

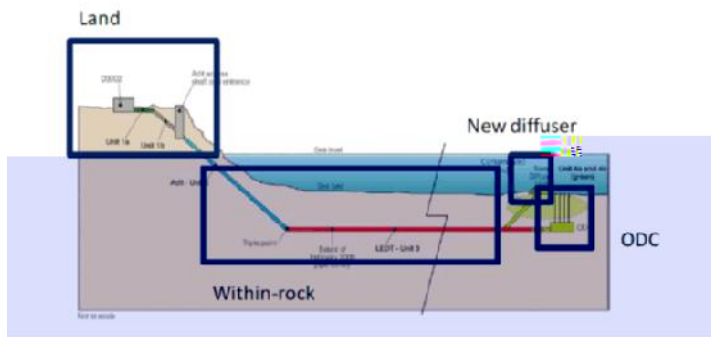
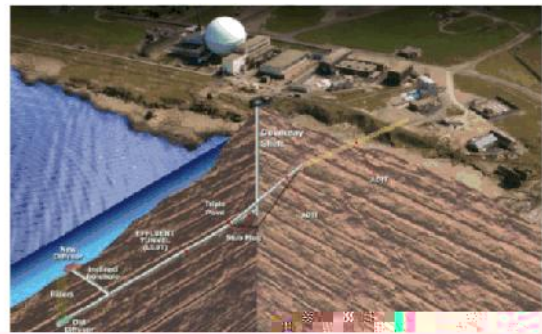
A series of optioneering workshops were held following the NDA guidance for strategy production. Five potential conceptual designs were identified, with two designs considered not credible. The remaining three options underwent a sensitivity analysis, with the recommended preferred conceptual design being evaluated by NDA. The NDA decision will then be included in the Phase 3 Planning Application, which is planned to be submitted middle of 2017.

### **Liquid Effluent Discharge System**

In relation to the liquid effluent discharge system, SEPA identified two improvement requirements in the RSA Certificate of Authorisation:

- perform additional radiological characterisation of the OLEDS; and
- develop an action plan for the disposal of the redundant aqueous liquid effluent discharge system pipework (OLEDS).

As a result of this, DSRL carried out a characterisation investigation of the old pipelines via ROV to collect data to support a closure strategy. In addition, they have commissioned Amec Foster Wheeler to aid with the development of the action plan. Dialogue with SEPA has identified that the action plan needs to take account of an overall strategy for closure of both the old and new LEDES. A new options study to identify and assess technical options for an integrated closure plan for both the old and new LEDES is therefore being undertaken.



On 19-20 October an optioneering workshop was held in Thurso which was attended by DSRL, Amec Foster Wheeler and Magnox technical staff, with an observer from SEPA (Linda Buchan) and a DSG representation (Bob Earnshaw) was also in attendance. Marine Scotland was unable to attend the event, but

DSRL plans to engage with them throughout the study.

The objective of the workshop was to assess the most appropriate closure strategy for both the old and new liquid effluent discharge systems splitting the system into four main sections. The workshop provisionally agreed a preferred option for each of the four zones, however it was recognised that although high level, additional work was required to consider the interfaces between each zone before a closure strategy could be finalised.

## Heritage

James Gunn and June Love represented Dounreay at the official opening of the National Museum of Scotland's new Science & Technology galleries on 8 July 2016. Objects from Dounreay feature strongly in the Energise gallery, including panels from the PFR control room.

Twenty four members of the Institute of Chemical Engineers Panel for Historic Engineering Works visited Dounreay as part of a tour of the North. Presentations on the heritage project and current work were given by James Gunn and Mick Moore, Technical Director.

Four heritage objects were collected in the period

- A hygienic hand spray tube with Dounreay logo



- A letter signed by R Hurst, Director, in Nov 1959 commemorating the first criticality at DFR
- A 2016 Halkirk Highland Games T-shirt signed by the World Heavy Events Champion, who was sponsored by Dounreay at the world championships held at Halkirk
- Acetate sheet detailing the training programme for the 1978 intake of craft apprentices

Two leavers completed a Dounreay Memories form.

The PhD student continues with the heritage project looking at the social aspects of the nuclear industry in the Far North. A public lecture to update on this project is being organised and will be held end Oct/early November.

## General

### Staffing (as at end of October 2016)

	FTE Target	FTE Actual /Forecast
<b>Current - DSRL</b>	1,257 (LTP)	1139.6
<b>Current – ASW</b>	N/A	153

- September 2016: 18 new starts (incl 3 contractor conversions), 1 resignation.
- October 2016: 7 new starts (incl 6 contractor conversions), 5 resignations.

Dounreay is continuing to invest by providing employment opportunities for young people through the graduate and apprentice schemes. This year 10 apprentices and 10 graduates have been recruited.

### Contracts

**Decommissioning Operatives framework contract:** The focus on the site programme has led to a reduction in the number of contractors supporting the delivery of the decommissioning operatives framework agreement. The framework covers work in the Fuel Cycle Area, Reactors and Waste. The framework is held by three companies and the reduction of operatives was shared proportionately between these companies. While the supply chain continues to have an important role in supporting the site’s decommissioning programme the need to review the resource requirements will continue until the decommissioning work is complete.

Representatives from the Commercial team took part in the NDA Supplier’s Day held on 3 November in Manchester. They also held, in conjunction with the Caithness Chamber of Commerce, a local supply chain event on 9 November.

## Events

Work is nearing completion to refurbish the Dounreay.com offices in Thurso to allow staff from Dounreay's Training and Human Resource Department to relocate into Thurso. The public information office will also get a refresh and it is expected that the building will be ready for occupancy by the end of the calendar year.



After 55+ years at Dounreay, Calder Bain retired. He and his family visited site where Managing Director, Phil Craig presented him with a small gift. Calder was the longest serving Dounreay employee (having joined Dounreay as an apprentice in 1961). He had made many contributions to the site including developing tools to remove the highly irradiated PFR components and the DFR breeder material.

Dounreay sponsored a tent at the Halkirk Highland Games on July 30 with members of the senior leadership team manning it. As part of this sponsorship Dounreay supported Scott Rider who was crowned 2016 champion beating the ground record for the 16lb light ball.



The Highlands Business Awards took place at the beginning of October in Inverness. DSRL was a regional winner (north Highlands) for the Developing the Young Workforce award.

The site held a family day on 2 October where staff took their families to work.



















## Visits

The decommissioning activities of the Dounreay site continued to attract external interest. Over the last few months visitors to the site have included:


- Dr Paul Monaghan, MP
- Ambassador of Japan to the UK (facilitated by Dr Paul Monaghan).
- GMB Senior Officials
- Gail Ross, MSP

**Dounreay Site Restoration Limited**  
**3 November 2016**

## APPENDIX 1: PROJECT MILESTONES FOR 2016/17

Area	Milestone	Due Date	Status
FCA	D1206 – Decommissioning sample tank annex	31 Mar 17	
	D1217 – Complete cell roof block	31 Mar 17	
DIT	Complete site-wide independent safety culture maturity model assessment	31 Mar 17	
	Conduct Supervisor training for the remaining SERP supervisors (achieve 95% trained).	31 Mar 17	
Chief Nuclear Officer	Roll out safety case production workshops	31 Dec 16	
	Establish Corporate Radioactive Waste Advisor (CRWA) arrangements on site.	31 Aug 16	
Fuels	Complete trials of the breeder mast at T3, to support phase 1A of	30 Nov 16	
	Start Cropping HEU metal	30 Sep 16	
Support	Adequate demonstration of the Level 2 Emergency Arrangements Exercise.	30 Jun 16	
	Achievement of level 3 Knowledge Management Maturity Assessment (KMMA)	31 Mar 17	
Waste	WRACS to compact a cumulative total of 15,000 drums	30 Sep 16	
	Completion of the processing of DFR raffinate	31 Jul 16	
Security	Successful implementation of a Security Assurance Strategy	31 Mar 17	
	The complete revision and update of all security documents in the Security Manual held on the Management System	31 Mar 17	
Reactors	Process 4 components through the PFR Wet Area Size Reduction facility	31 Jan 17	
	Complete concept design for DFR reactor and circuit dismantlement	31 Dec 16	
Technical	Implementation of the revised DMR process	31 Oct 16	
	First issue of the critical ageing asset register	30 Sep 16	

### Key:

-  On target
-  Delivered
-  Not achieved

## GLOSSARY

Abbreviation	
BCP	Baseline Change Proposal
DACR	Days Away Case Rate
DCP	Dounreay Cementation Plant
DFR	Dounreay Fast reactor
DIT	Dounreay Improvement Team
DMR	Dounreay Modification Report
DMTR	Dounreay Materials Test Reactor
DPF	Dounreay Planning Framework
DSRL	Dounreay Site Restoration Ltd
EIA	Environmental Impact Assessment
ES	Environmental Statement
IFBS	Irradiated Fuel Buffer Store
IFC	Irradiated Fuel Cave
INF	Incident Notification Form
LLLETP	Low Level Waste Effluent Treatment Plant
LLW	Low level waste
LTA	Lost Time Accident
mSv	milli Sieverts
NDP	NaK Disposal Plant
OJEU	Official Journal of the European Union
ONR	Office for Nuclear Regular
PBO	Parent Body Organisation
PCP	Project Control Procedure
PFA	Pulverised Fly Ash
PFR	Prototype Fast Reactor
PFR	Prototype Fast Reactor
PSR	Preliminary Safety Report
RAMT	Radioactive Material Transport
RIDDOR	Reporting of injuries, Diseases & Dangerous Occurrences Regulations.
RSA	Radioactive Substances Act
SEPA	Scottish Environment Protection Agency
SID	Sodium Inventory Destruction Plant
STA	Sample Tank Annex
TRIR	Total Recordable Incident Rate
WRACS	Waste, Receipt, Assay, Characterisation and Supercompaction