

# RADIOACTIVE MATERIALS AT DOUNREAY



Demolishing a redundant nuclear site like Dounreay produces large quantities of radioactive material.

Most of it is expected to remain at the site indefinitely. But a small amount is destined to leave, because it belongs to other people or because it could be used again to make electricity. This leaflet explains why.



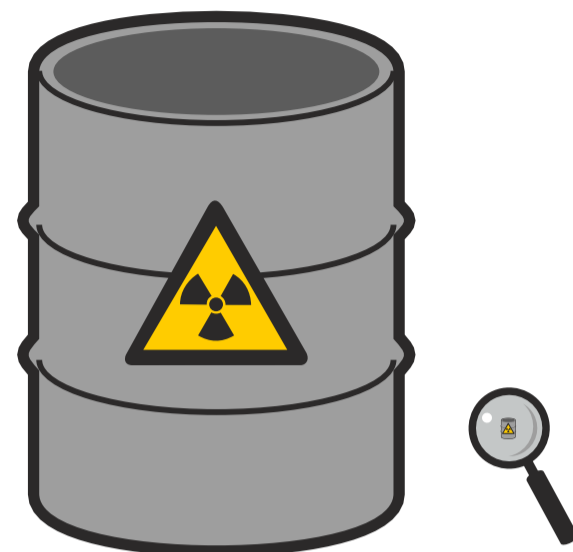
Cleaning out and demolishing all the redundant facilities over the next decade or so will produce approximately 300,000 tonnes of nuclear fuel and radioactive waste.

## How much radioactive material is there at Dounreay?

There's two types – nuclear fuel and radioactive waste.

Nuclear fuel can be used again but radioactive waste cannot.

Cleaning out and flattening the site will yield about 300,000 tonnes of radioactive material.



Of the 300,000 tonnes of radioactive material that decommissioning will yield, less than 1 per cent is expected to leave Dounreay.

## Why is there so much more waste than fuel?

Waste includes all the everyday industrial equipment, materials and buildings that have been contaminated by coming into contact with nuclear materials.

## What is the difference between fuel and waste?

Fuel that's been used in a reactor is called "spent fuel". Typically, only about 3 per cent of the fuel has been spent, so the rest can still be used if it's reprocessed. Some waste originates from the 3 per cent or so of the fuel that's been spent and can't be used again.

## What about security?

All radioactive materials attract a level of security protection, which varies according to the type of material it is. The security regime for transporting nuclear fuel and radioactive waste is rigorous and independently regulated.

## What will happen to this material?

It would take 9000 or so separate transports to clear the site of all the radioactive waste.

The waste will stay at Dounreay now and won't need to be transported, apart from a few hundred tonnes belonging to foreign customers and some material that may need specialist treatment elsewhere.

One of these customers asked NDA if their waste could be exchanged for an equivalent amount from a different NDA stock. This is known as "waste substitution" and is the subject of a recent consultation by Scottish Government and UK Government.

The number of transports needed to remove all 100 tonnes of fuel from the site is estimated at 100-200.



Armed officers of the Civil Nuclear Constabulary are responsible for the protection of civil nuclear materials in the UK.

## When will you start removing fuel and waste?

We've been moving the fuel out in small quantities for several years. As more facilities are demolished, we're reaching the stage of decommissioning where decisions about the remainder will help finalise the closure of the site.

About half of the fuel at Dounreay comes from the experimental breeder reactor programme dating from the 1950s. The Nuclear Decommissioning Authority has asked the site to be ready in 2012 to begin returning this to UK national stocks. Other fuels may follow, but no decisions have been taken yet.

Waste belonging to foreign customers is ready now to be collected under UK Government undertakings about the return of overseas waste.



Much of the waste is low in radioactivity and can be buried safely in a series of engineered vaults being developed at the site.



Radioactive materials leaving Dounreay need to travel at least part of their journey by road to reach their destination.

## How will it be transported?

It depends on the type of material and the container being used to transport it. The standards for nuclear transport are set by the UN's International Atomic Energy Agency and adopted in legislation here by the Department for Transport at the UK Government.

In general transports are by sea, road and rail.



Robust containers known as flasks shield the more hazardous waste and fuels when it is transported

## Is it safe?

Yes. The containers are designed to remain intact in all credible accident scenarios.



Radioactive material is moved routinely between nuclear sites on Britain's railways by Direct Rail Services, a part of the Nuclear Decommissioning Authority

## How is an accident dealt with?

The emergency services throughout the UK are trained to respond to all sorts of incidents involving a variety of hazardous cargo. Exercises are held regularly to test their response to radioactive cargo.

The nuclear industry formed the RADSAFE network to provide the emergency services in the UK with access to immediate technical support in the event of an incident with a radioactive cargo. The containers are designed not to be breached in the event of an accident involving its transporter.

## What other transports are needed?

Radioactive particles will be transported to the site from the seabed and local beaches for so long as the particle recovery and monitoring programme continues.

Some equipment needed to decommission particular facilities contains radioactive sources for calibration purposes. We send radioactive sources for calibration and recertification for quality control purposes. Some equipment purchased for the management of radioactive waste contains natural or depleted uranium.

Some lightly radioactive materials may be removed for recycling or specialist decontamination elsewhere (e.g. lead bricks, mercury and sodium).

In addition, we need to send some samples such as soil, concrete and graphite to specialist labs for characterisation and independent verification.



Moving nuclear material by sea is carried out by International Nuclear Services, a subsidiary of the NDA, using specially designed and modified ships.

## Who decides what stays and what goes?

The Nuclear Decommissioning Authority, a public body of the UK Government that's also accountable to Scottish Ministers. Customers can also affect the decision on the removal of materials from the site. Moving nuclear fuel is a reserved matter for the UK Government and Westminster, while radioactive waste is a devolved matter for the Scottish Government and Holyrood.

## Could it all stay at Dounreay?

Yes. The expertise exists here to manage it safely. The NDA strategy is currently for fuel to be consolidated with UK national stocks.



## Will the public be informed?

The only information we cannot disclose is detail which might compromise the safety and security of any particular movement, such as precise routes, timings, quantities and security arrangements.

## For more information

**Dounreay Site Restoration Ltd** – the contractor closing down the site  
[www.dounreay.com](http://www.dounreay.com)

**Nuclear Decommissioning Authority** – government body responsible for the site  
[www.nda.gov.uk](http://www.nda.gov.uk)

**Health Protection Agency Centre for Radiation, Chemical and Environmental Hazards** – public body that advises on all aspects of radiological protection  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)

**Direct Rail Services** – subsidiary of NDA providing transport services to the nuclear industry  
[www.directrailservices.com](http://www.directrailservices.com)

**International Nuclear Services** – a subsidiary of the NDA and the world's leading shipper of nuclear materials  
[www.innuserv.com](http://www.innuserv.com)

**RADSAFE** – industry body offering expert support in the event of a transport accident  
[www.radsafe.org.uk](http://www.radsafe.org.uk)

**Office for Nuclear Regulation** – regulates the protection of people and society from the hazards of the nuclear industry. [www.hse.gov.uk/nuclear/](http://www.hse.gov.uk/nuclear/)

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Health Protection Agency for Radiation, Chemical and Environmental Hazards – public body that advises on all aspects of radiological protection  
[www.hpa.org.uk/radiation](http://www.hpa.org.uk/radiation)

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