

DIDO and PLUTO Material Testing Reactors



Background

Commissioned in 1956 and 1957, DIDO and PLUTO at Harwell were material testing reactors (MTRs) for the UK civil nuclear research programme.

DIDO and PLUTO were used mainly for fuel, material testing and sample activation experiments, such as the study of the behaviour of graphite under irradiation. Materials tested for a few months in these reactors demonstrated the effects of irradiation over a period of 20-30 years in a civil nuclear reactor. They also took over commercial isotope production from Harwell's BEPO reactor supplying up to 70% of the UK's isotope market until their closure in 1990.



Objective

To take the DIDO and PLUTO reactors to Stage Two decommissioning, involving the removal and dismantling of most of the Low Level Waste radioactive materials, leaving the reactor in a state of care and maintenance until further decommissioning can be implemented.



Key challenges

- First MTRs of this type in the world to enter decommissioning.
- Disposal of large volumes of Low Level Waste.
- Removal and treatment of fuel and the heavy water moderator.

Solution

Decommissioning began on the shutdown of the reactors. This enabled experienced staff, who were familiar with the reactors, to work on and guide the programme.

Where possible decommissioning work was carried out using existing engineering techniques. Robotic technology was used to clean up the areas with the most contamination such as remote handling cells.

A close working relationship between the UKAEA project management team and the main contractor, AEA Technology, achieved the required decommissioning outcome and maximised value for money.



DIDO reactor in long-term care and maintenance



Workers removing an active handling cell inside DIDO

Outcome

- During 1994/95 both reactors were successfully taken to Stage Two decommissioning. They will remain in a state of care and maintenance until 2040.
- By 2040 most of the radioactive material within the reactors will have decayed enough to be disposed of as Low Level Waste, reducing radiological exposure for the decommissioning team and allowing safe access for further decommissioning using standard technology.
- To date, the decommissioning programme has generated 2400 m³ of 'clean' waste and 1000m³ of Low Level Waste, all of which has been consigned to authorised disposal routes.
- The ancillary buildings around DIDO have all been demolished.
- Land surrounding the reactors has been restored with careful consideration for the local habitats and indigenous species; this is emphasised by wild orchids now growing on the site of former administration blocks.
- Utilising the knowledge and skills of staff who worked on the reactors was key to the project's success. This practice is being repeated across UKAEA to effectively manage site restoration.
- As the first MTRs of this type in the world to be decommissioned, the DIDO and PLUTO project team has been able to advise MTR operators in Europe and Australia on best practice for decommissioning their plant.

Key facts

• Reactor type	Material Testing Reactors	
• Coolant & moderator	Heavy water	
• Fuel	Enriched uranium (DIDO 25 fuel elements; PLUTO 26)	
• Output	26 MW each	
Timescales	DIDO	PLUTO
• Initial operation	1956	1957
• Final shutdown	March 1990	March 1990
• Defuelling	June 1990	June 1990
• Demolition of associated buildings	1992–1998	1992–1998
• Project value	£23M	

Contact:

Nick Hance
Harwell Public Relations Manager
Tel: 01235 436909
Email: nick.hance@ukaea.org.uk