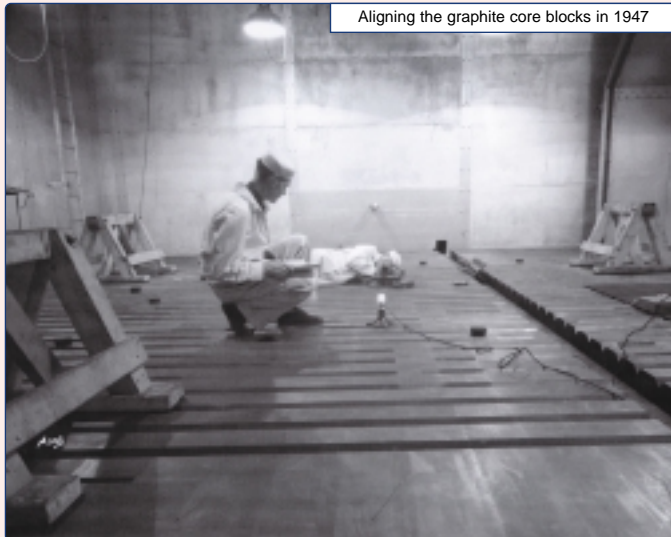


## GLEEP Graphite Low Energy Experimental Pile



### Background

GLEEP (Graphite Low Energy Experimental Pile) was the first reactor in Europe and was built in 1946. Generally operating at 3kW, GLEEP was used for initial investigations into how to make a reactor work and later used as an international standard for materials testing and calibration. After continuous operation for 43 years, GLEEP was closed in 1990. Until the fuel could be removed, extra control rods were inserted into the core.



### Objectives

To take GLEEP to Stage Two decommissioning including the removal of fuel, control rods, and other external equipment, leaving the reactor in a state of care and maintenance until further decommissioning can be implemented.

### Key challenges

- Removal of 11,500 spent fuel rods. GLEEP had only been refuelled once in 1960, so experience of fuelling/defuelling was very limited.

## Solution

Stage One decommissioning, the removal of spent fuel, took place in 1994. This accounted for 99% of the inventory of radioactive materials in GLEEP.

In order to defuel the reactor a specialist remotely operated crane was designed and commissioned. The fuel removal machine had a 4-point lift crane, which moved on rails between the graphite core and the bio-shield. Attached to the crane was a fuel retrieval unit.

Fuel was discharged by manual rodding from the opposite face of the core, which loaded the spent fuel into trays in the retrieval unit. The retrieval unit then posted the fuel through the bio-shield into a shielded cell where it was manipulated into storage cans and despatched to the waste store.

The control rods from the core and other external equipment were removed in 1995.



## Outcome

- All fuel elements were removed and despatched for storage in 7 months.
- Cross-department working enabled the UKAEA team to enhance productivity and efficiency completing defuelling within time and budget, and resulting in minimal dose rate to operators.
- GLEEP remains isolated receiving care and maintenance in Stage Two decommissioning.
- Stage Three decommissioning is planned for 2003-2005.

## Key facts

### Reactor type

- |                           |   |
|---------------------------|---|
| • Coolant & moderator     | Natural air                             |
| • Fuel                    | Natural uranium with aluminium cladding |
| • Number of fuel channels | 676                                     |
| • Number of fuel rods     | 11,500                                  |
| • Output                  | 3kW                                     |

### Timescales

- |                     |      |
|---------------------|------|
| • Initial operation | 1947 |
| • Final shutdown    | 1990 |
| • Defuelling        | 1994 |

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