

Sludge Canister Depressurisation

Water Jet Cutting Service

Magnox Berkeley Site, UK



Magnox, owned by Cavendish Fluor Partnership, is the management and operations contractor responsible for twelve nuclear sites and one hydroelectric plant in the UK, working for the sites' owner, the Nuclear Decommissioning Authority.

Berkeley is located on a 27 hectare Site of Special Scientific Interest (SSSI) on the eastern bank of the River Severn in Gloucestershire. Electricity generation started in 1962 and stopped in 1989. During 27 years of operation the site generated 43 TWh of electricity. The site is currently decommissioning, following the entry of the two reactors into safestore in 2010.

This site, which has stored radioactive waste from both the nuclear power station and the neighbouring research laboratory, presents a uniquely complex range of decommissioning activities. Clearance of waste from its three storage vaults is in progress, this being critical for Berkeley's entry into care and maintenance (C&M). One of the crucial remaining challenges ahead of C&M is the removal of sludge canisters (cans) from Vault 3. As a result of internal corrosion and microbial activity, these steel cans are likely to be in a weakened condition and internally pressurised with hydrogen and methane gases.

“The results speak for themselves. Before we conducted this work there was considerable doubt as to the benefits of waterjetting. With the expert advice and hands-on approach of BHR we have moved from waterjetting being one possible choice of can piercing to the preferred choice.”

Jo Adams, Senior Project Manager
BERKELEY WASTE PROGRAMME

The controlled release of these gases is therefore essential before the cans are removed from the vault. It has been proposed that a safe method of depressurising the sludge cans is by remotely piercing them using an abrasive water jet cutting (AWJC) method.

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BHR's approach

BHR Group was awarded Phase 1 of a project from Magnox Ltd to determine a way to use its waterjetting knowhow and DIAJET AWJC equipment to demonstrate controlled piercing and depressurisation of cans and their simulated sludge contents. In a mock-up at its laboratories in Cranfield the trials both established and optimised the piercing technique over a variety of sludge content/ullage and internal pressure conditions.

In Phase 1 BHR was responsible for: the design and manufacture of the dummy canisters and selection of the simulated sludge; selection and optimisation of the DIAJET waterjet piercing operating parameters; and the choice of verification measurement and monitoring equipment including video monitoring, can pressure and noise measurement.

Outcomes

Critical to the success of this piercing method is gathering evidence that a can has been pierced and that it has been purged of gas. BHR has now been awarded a Phase 2 project to develop the in-vault operations for locating the can onto the waterjet cutting nozzle and establishing the waterjet and other operating condition for the controlled release of gas from the cans.

For over 40 years BHR Group has designed, built and sold or licenced specialist high pressure cold-cutting and cleaning abrasive water jetting products.

ABRASIVE COLD CUTTING

Our cutting systems are ideally suited to hazardous and explosive environments or where heat would have a detrimental effect on the material being cut.

FIELD DEPLOYABLE OPERATIONS

Our portable abrasive jet cutting systems can be carried, wheeled, or vehicle mounted to support a wide variety of field applications.

CONTROLLED AND PRECISE

The cutting systems are capable of cutting through virtually any known material with millimetre precision making them ideal for decommissioning, decontamination and disposal operations.

“BHR has provided more than a product that is capable of undertaking this sensitive work, they have provided comprehensive, proactive support that has dealt with any issues as they have arisen. The effective integration between their team and ours has provided a smooth exchange of information at every stage in the process and has helped develop the best solution possible for Magnox Berkeley.”

Jo Adams, Senior Project Manager

BERKELEY WASTE PROGRAMME

This phase of the work will validate the equipment and cutting processes before BHR together with Magnox and their contractors conduct an initial series of in-vault trials ahead of productionising the complete process.

BHR Group

EXPERTS IN FLUID ENGINEERING