



Sludge Can Processing Skid

Client: Cavendish Nuclear

Aims and objectives

The project was to design, manufacture and factory test plant equipment to allow the reprocessing of packaged wastes from the active vaults, prior to being stored in Ductile Cast Iron Containers (DCICs). This case study describes the Sludge Can Processing Skid (SCPS).



Remote Handling

Cyclife EDF Group - Subsidiaries





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The client

Cavendish Nuclear offers experience and specialist knowledge across all aspects of the nuclear energy life cycle, from design and build, through operations and maintenance, to decommission, waste management and remediation.

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Project overview

Berkeley Nuclear Power station is currently undergoing a programme of decommissioning.

As part of the Magnox ILW Management Programme (MIMP), Intermediate Level Waste (ILW) currently stored in the Active Waste Vaults (AWV) will need to be retrieved and transferred to DCICs. Amongst the waste streams that are stirred within the vaults, there are approximately 1400 sludge cans containing types of mixed aqueous sludge and solid waste.

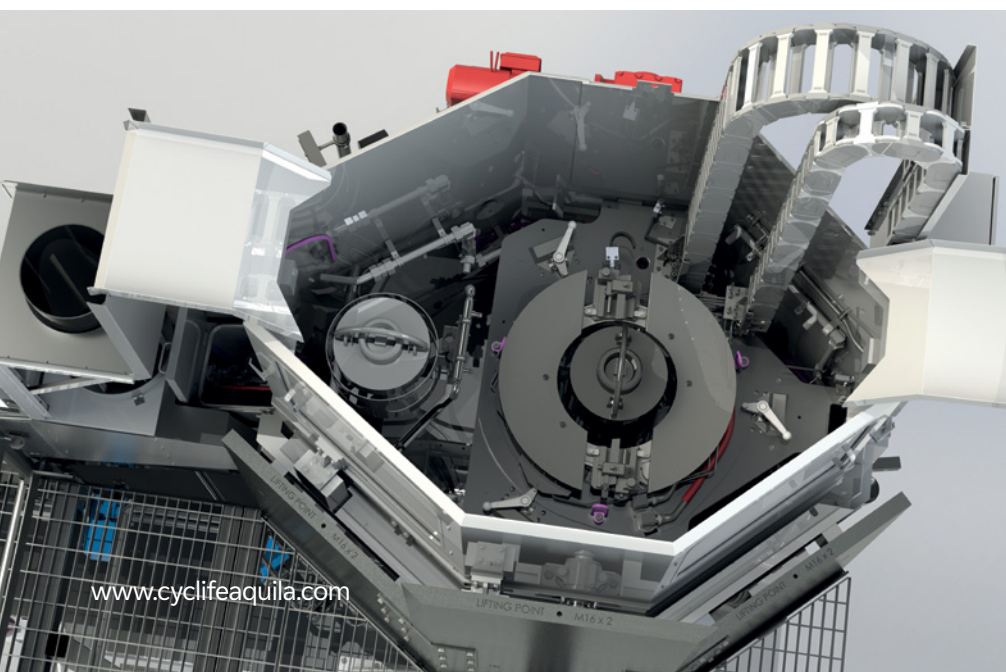
The decommissioning facility for this project involved the retrieval of sludge canisters from the AWW through a posting port before being loaded into the processing skid for sludge removal and processing.

Cavendish Nuclear had completed a concept scheme for the equipment and Cyclife Aquila developed this into a detailed scheme before producing detail manufacturing drawings.

The key parts of the equipment comprised off:

- Can cutting and rotating table
- Sludge auger and wash out system
- Macerator and associated pipework

The equipment design needed to be carefully considered as the processing skid was to be operated remotely during normal operations, thus a control system for remote operation was also required with a series of interlocks. Health and safety were also a primary objective as maintenance activities required personnel access so suitable guarding and operator protection needed to be put in place.



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Equipment Description

The SCPS is a major assembly in a suit of assemblies which are part of the R4 project. The SCPS is designed to receive depressurised sludge cans, remove the sludge can lids and empty the contents, clean the emptied sludge cans, homogenise and macerate the sludge prior to sampling and transfer to a DCIC.

Sludge Can Processing Skid Design

Cyclife Aquila took ownership of the concept scheme from Cavendish Nuclear, producing 3D models and detail manufacturing drawings along with supporting substantiation and justification documentation. The equipment was designed as a skid and allowed for the equipment to be lifted and transported to site as a single unit resulting in ease of installation.

Shielding & Framework

The Frameworks included the 'Processing Skid Platform Assembly' and the 'Upper Frame Assembly' which provided support for the process equipment and operator access for maintenance. The Shielding Assembly was assembled to the side of the upper frame assembly using simple bracketry. The SCPS, when in its transport configuration, is vertically lifted using the lifting bosses on the 'Processing Skid Platform Assembly'.

Can Clamp & Lid Cutting Assembly

This assembly consists of a modified pipe cutting assembly and hydraulic clamping unit mounted to a rotating table. Cans are loaded into the assembly, clamped and lid removed. The entire assembly is then rotated to align with the Auger to allow the sludge to be emptied from the Can into the Hopper.



Auger Assembly

The Auger Assembly is designed to remove sludge from inside the Can. It is mounted to the 'Processing Skid Platform Assembly'. The Can is rotated by the 'Can Clamp and Lid Cutting Assembly' to be in line with the Auger Shaft at 110 Degrees from the vertical. When operated, the Motor Frame is driven up the rails by the hydraulic cylinder which pushes the rotating paddle inside the Can.

Hopper & Macerator Assembly

The Hopper and Macerator assembly are the primary vessels which sit on the frameworks. The Hopper provides interfaces for the Auger and Macerator and allows for emptied sludge to funnel into the Macerator. A recirculation system was employed to allow resuspension of the sludge, which after being macerated, was transferred through the process pipework.

Process Pipework

The sludge pipework included various manual and electrically actuated valves for processing the sludge or valves for various blockage / fault scenarios. Macerated sludge is transferred through pipework before being placed into the DCICs. The process pipework included for 2 wash systems that allowed for cleaning of cans and resuspension of the sludge within the Hopper.

Project Management & Programme

Cyclife Aquila was engaged on an NEC3 Option A contract with programme as the critical drive from the end user (Magnox) Cyclife Aquila was able to complete the project to specification and on time.

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Summary

Cyclife Aquila worked closely with Cavendish Nuclear to design the SCPS and carried out extensive factory trials and fault scenarios to ensure the equipment met the functional and lifetime requirements for processing of the sludge cans.



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