

# Settling tank – sludge retrieval



World winning solutions

< General view.

## Key project data

<b>Dimensions</b>	28m length x 10m width. Uncovered pond.
<b>Pond contents</b>	170m <sup>3</sup> sludge and accumulated solid debris.
<b>Timescales</b>	POCO 1992-1994. Initial decommissioning 1999-2002.
<b>Project value</b>	£13m.
<b>Radiological characteristics</b>	30-800pSv/h.

### 1 UK Waste categories:

- High-level wastes (heat generating): Fission product concentrates.
- Intermediate-level wastes: Fuel cladding, Low and medium active liquids, Slurries, Sludges, Flocs  
Low alpha technical wastes, High alpha technical wastes.
- Low-level wastes: <12GBq/t beta gamma, <4GBq/t alpha.

The challenging radiological conditions present particular problems in removing sludge and debris from this vulnerable and inaccessible site. BNFL has developed a cost-effective local solution integrating the waste arising with its site-wide waste management strategy.

These tanks at Sellafield were commissioned in 1959-60 and acted as a settling tank to remove traces of sludge and corrosion products from pond purge liquor from the Magnox Fuel Ponds and Decanning Facility. The tanks were used between 1960 and 1986 during which time approximately 170m<sup>3</sup> of sludge categorised as Intermediate-level waste<sup>1</sup> (ILW) was accumulated. As part of the long term strategy for retrieval and storage of nuclear waste BNFL decided to retrieve this sludge and transfer it to intermediate storage tanks built to current containment standards pending subsequent treatment and encapsulation in cement in the downstream Waste Encapsulation Plant (WEP).

## Project objective

The objective of the Post Operational Clean Out (POCO) and Initial Decommissioning work is to remove the pond sludge and debris. This will enable the plant to be put into a surveillance and maintenance regime, allowing further decommissioning to be safely deferred, if required, at minimal cost.



### Project methodology

The first POCO operation was carried out from 1992-1994. This involved removal of 70% of the sludge from the main tanks. A remotely operated sludge retrieval machine was designed and installed to remove the sludge. The machine is a travelling bridge and grab unit on rails. Two different sized desludging pumps (one for larger tanks and one for the smaller chambers) suspended from the bridge allows access to the full area of the tanks. Sludge is transferred via a shielded pipebridge to interim storage.

Initial decommissioning is under way to remove the residual sludge mixed with general debris. This will be achieved by utilising the existing sludge removal machine (modified and refurbished to include deployment of hydraulic tools) and a Brokk remotely operated vehicle (ROV) for size reduction of larger items of debris.

### Project challenges

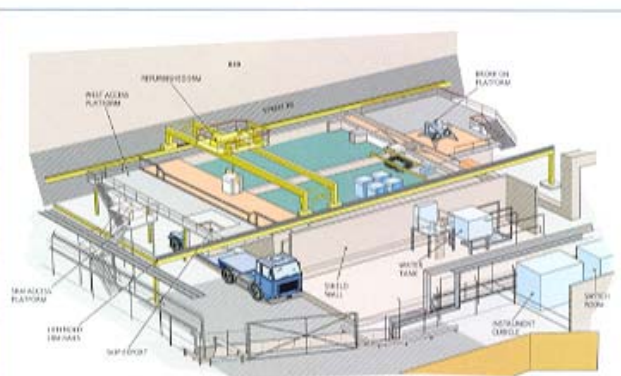
- Limited working times in the area due to radiological conditions.
- Removal of a mixture of sludge and debris.
- Operating restrictions due to lack of water clarity.
- Structural integrity of tanks.
- Regulatory scrutiny.
- Vulnerable and inaccessible plant items.

### Project successes

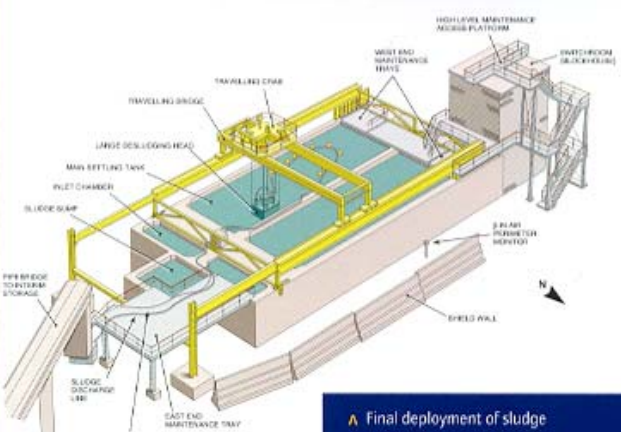
- Installation of retrieval machine and pipebridge in challenging radiological environment.
- Sludge retrieval machine remotely operated by CCTV.
- Extensive training of personnel using an inactive mock up of the settling tanks.
- Travelling grab and bridge design which reduced loading to the tank structure.

ALARP principles achieved by:

- pre-erection of main steel work in non-radioactive environment;
- detailed briefing of teams utilising CCTV, video and photographic records prior to crucial tasks;
- Improved site access.



A Initial deployment of sludge retrieval machine.



A Final deployment of sludge retrieval machine.

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