

Sellafield Ltd: In Pond Manipulator

Sellafield, UK



| The challenge

Sellafield's First Generation Magnox Storage Pond (FGMSP) is one of the most hazardous industrial building in Western Europe. The pond is used for storage of >1000 filled waste skips, a significant amount of these are unrecorded. With large levels of radioactive sludge present and the quality of pond containments deteriorating it is in Sellafield critical plans to deal with the waste in the FGMSP.

KEY CHALLENGES

- Hostile radioactive conditions
- Recovery in event of system failure
- Operation in an underwater environment
- Restriction on installation capabilities

| Veolia's solution

Increasing the client's capability to sort and export legacy waste Veolia Nuclear Solution (VNS) was contracted by Cavendish to design and build equipment for retrievals of corroded fuels and material from FGMSP as the first stage of a multi-staged decommissioning programme. The 'In Pond Manipulator' incorporates a robust and innovative design which enabled the quickest and simplest installation possible whilst ensuring reliable operation in the harsh environment of FGMSP for the next 15 years. It sort, segregate, consolidate and condition the waste in the pond.

Conditions in the pond required durable, fully remotely controlled systems that could be easily operated to deliver their mission. In the event of system failure the equipment is fully recoverable to minimise potential for further congesting FGMSP. The system can perform underwater operations with limited visibility adding operational complexity. It had to be installed within 72h with access restrictions. The system therefore has a modular design to match on site installation constraints operators well trained to perform assembly.



Sellafield, UK

Contract Facts:

Duration: 2015-2018
 Scope: Design and build
 Activity: Decommissioning & Remote Handling
 Clients: Sellafield & Cavendish

The Legacy
Ponds swiss
army knife

Ability to
consolidate 2
skips per week

**15-year lifetime and
able to operate 24/7**



Called the legacy ponds swiss army knife as it can consolidate two skips a week ready for export from FGMSP. It will process over 1,200 skips containing various nuclear materials.

The tasks required by this system involve:

- Picking up and moving waste, of varying size and shape, between skips
- Reducing size of large waste items
- Aiding in the identification of waste material
- Removal of sludge deposits
- Self-washing (for contamination control)



| The benefits

COLLABORATION

A collaborative approach was taken from design to installation. Veolia Nuclear Solutions worked closely with both Sellafield and Cavendish throughout the process and with other specialists along the way to ensure delivery of the project within the given time scale.

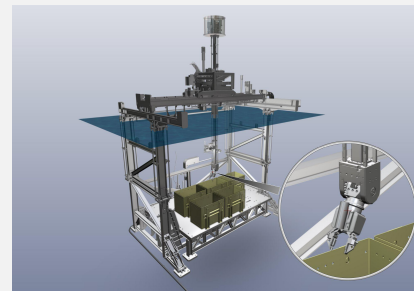
FIT FOR PURPOSE

All work is carried out underwater in a corrosive environment dealing with fissile material which pushed the design, engineering and materials used to be fit for purpose. Re-positional cameras and lights available around system enables complete remote operations. Vision and lighting were incorporated as part of rig and expedites consolidation missions for the pond. These enabled operators to be removed from increased exposure at pondsides.

| System Description

The In Pond Manipulator is 12m tall when fully raised, weights over 30 tonnes and consists of a variety of modular assemblies including:

- Gantry Frame
- Cartesian X-Y-Z Gantry
- Manipulator Wrist and Jaws
- Remote Handling Tools, including hydraulic power
- Sludge Removal Suction System
- Lights and Camera
- Control Room



It has 7x axes of movement providing dexterity to do the tasks and the ability to reconfigure into a maintenance/transport position. An adjustable force control enables the system to work with a variety of materials in the skips and avoids crushing delicate parts. It has a selection of tooling created for the manipulator to use and an integrated suction pump to remove sludge. As well as retrieving materials, the equipment cleans off excessive sludge and segregate the different materials into waste streams prior to consignment.



PLANET, RÉGIONS & CITIES

Supporting NDA in achieving their mission to ensure that the UK's nuclear legacy sites are decommissioned and cleaned up safely, securely, cost-effectively and in ways that protect people and the environment.



WOMEN & MEN

System designed to keep human operators at a safe distance from the radioactive environment.