

Sellafield special seal

A novel pipeline sealing and remote deployment technique is set to slash risk, while speeding up the Magnox plant remediation work at Sellafield. Brian Tinham reports

Novel wet pipeline sealing and deployment techniques, successfully trialled for the now redundant first-generation nuclear waste treatment and storage plant at Sellafield, will not only prevent hazardous conditions arising on plant, but significantly reduce operator exposure to radiation during their implementation.

The trials were carried out by Corus Process Engineering (CPE) as part of a project aimed at permanently shutting off two sludge and effluent lines, formerly used for pumping intermediate level nuclear waste. The achievement means that the effluent tank in which they are submerged now won't need to be drained before the lines can be sealed – hugely speeding up the plant's remediation programme, while also cutting costs.

Nasty environment

This story starts in April 2006 when Sellafield commissioned CPE to provide a sealing solution for its redundant effluent sludge pipework system (RESPS), which connects the old Magnox storage pond to its lower level effluent tank. Chris Cunningham, project manager at Sellafield, explains that, due to the hydraulic link between the two plant units, there was a theoretical risk of uncontrolled flow in the event, for example, of an adjacent operation causing a pressure pulse. Hence the need to isolate the pipelines prior to commencing operations to remove sludge and effluent from the Magnox storage pond.

"The pipelines are 6.5m and 4m below the surface of the effluent tank – one within the sludge sump and the other in its inlet chamber – so we wanted a solution that didn't depend on evacuating and drying the pipes," says Cunningham. "That could have been achieved semi-remotely using cameras, but it's in a hazardous environment. It would have been long-winded, difficult and costly."


So Corus was tasked with developing a method for sealing the pipes and providing engineering support to underpin the safety case on a plant mock-up. Subcontractors involved in the effort were several, including Derwent Fluid Power, Unblock Cumbria, Hewdens Hire, REACT, PKA, Lloyds Kone Crane, Yarl Hydraulics, SLB Pumps, Tubros Engineering, Westlakes Engineering and Carlisle Hydraulics.

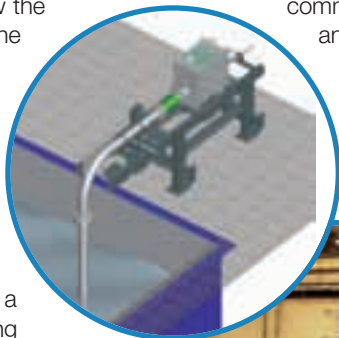
Sellafield and CPE worked together, initially using

knowledge gained from a previous collaboration on the Magnox pond RESPS project – that one involving development of various grout and resin sealing techniques. Early trials led to attempts with a similar technique, using an off-the-shelf dry foam bag sealing system, sourced from Steve Vicks International. However, given the problems with drying the pipes, while trials progressed the project team also worked with Steve Vicks to develop an alternative – and it was this work and subsequent trials that resulted in the new wet seal system.

Says Cunningham: "The project was very successful... In terms of safety, the new sealing technique provides the plant with a step change in risk reduction, and negates any potential fault scenarios with the effluent and sludge tank systems. CPE's mock-ups and trials also mean that there will be no trial and error on-site. All the testing has been done in a full-scale clean environment, and we've proved both the technique and its deployment."

And he adds: "The approach taken on this project will realise an acceleration of the effluent tank remediation programme of approximately two years, with corresponding cost savings. The solution will also have additional safety benefits, in terms of reduced operator dose uptake, as the pipes no longer have to be drained of liquor before the sealing mechanism is deployed. Together, we've made the sealing product fit the environment, rather than the environment fit for the product."

Stuart Pegler, project engineer at CPE, comments: "Potentially, the new sealing and deployment technique has many other plant applications, and may also offer opportunities as a solution in the remediation and decommissioning of facilities across the site." 



Pointers

- Grout and resin, as well as off-the-shelf dry foam bag pipeline sealing systems, can handle most pipeline requirements
- CPE's trials with the new wet sealing system suggest it is ideal for extreme effluents and sludges – and not just the nuclear industry
- For Sellafield, it has resulted in a step change in risk reduction, while shaving two years off the plant's RESPS (redundant effluent sludge pipework system) project

Sellafield's full-scale trials tank mock-up at CPE

