



Bradwell Magnox NPP, United Kingdom

Cesium and cobalt can be removed from very challenging liquids, such as magnesium-rich FED effluent.

CsTreat® and CoTreat® for treatment of liquid from a Fuel Element Debris (FED) treatment system, 2013 - 2017

Magnesium alloy fuel element debris is dissolved and cesium and cobalt are removed from the effluent by CsTreat® and CoTreat®.

Power Plant: Bradwell Magnox Nuclear Power Plant (NPP) under decommissioning
Location: Bradwell-on-Sea, Southminster, Essex, UK
Surrounding water environment: North Sea
Operation period: 2013-2017
System: Advanced Discharge Abatement Plant (ADAP) to treat FED effluent

DESCRIPTION OF THE PROJECT

Fuel element debris (FED) was produced during the Bradwell NPP's operation as the magnesium alloy cladding of the nuclear fuel was removed before the fuel was shipped for reprocessing. FED is a major source of intermediate-level waste (ILW) at the Bradwell NPP site.

FED had to be conditioned during the decommissioning. Aim of the treatment was to separate radionuclides from non-radioactive bulk material in order to minimize the permanent disposal of radioactive waste. In the treatment process FED was dissolved in acid and after this the liquid was treated in the ADAP system where CsTreat® and CoTreat® were used to remove radioactive cesium and cobalt.

RESULTS

During 2013-2017 65 tons of ILW FED was treated at the Bradwell dissolution plant. The dissolved Magnox effluent is extremely challenging liquid for cation ion exchangers due to the very high magnesium concentration.

Despite the challenging conditions the effluent was successfully purified from Co-60 and Cs-137 due to the high selectivity of CoTreat® and CsTreat®.

The treated effluent was salt water with very low radioactivity and it was possible to discharge the treated liquid to the North Sea. All the ILW FED from Bradwell was successfully treated by the Summer 2017.