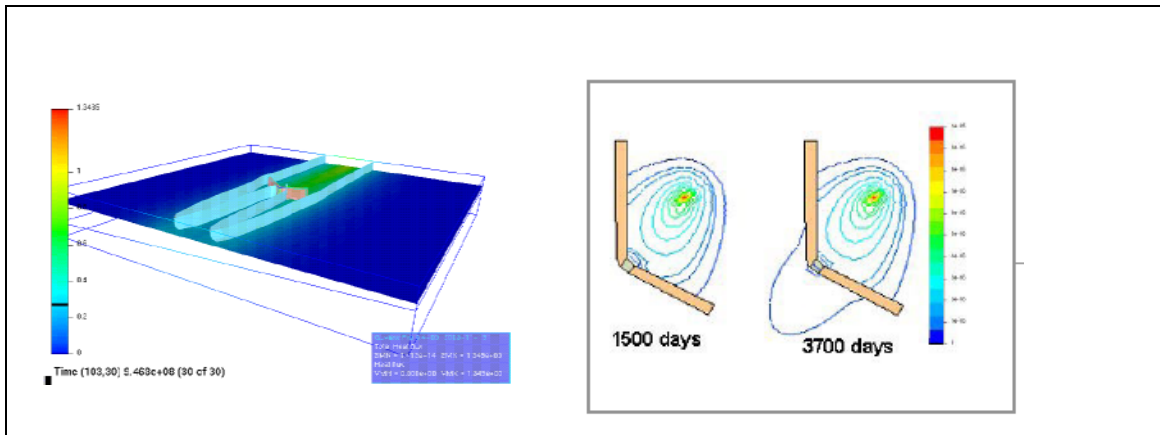


[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)]

Technology Information	
Area	3 and 5 (Select the number from "Areas of Technologies Requested")
Title	Reactive barriers
Submitted by	UK National Nuclear Laboratory (NNL)
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>Permeable reactive barriers (PRBs) offer a potential solution for the treatment of sub-surface contamination. These barriers involve the construction of a permeable zone of reactive material. As the contaminant plume moves through the reactive material under natural hydraulic gradients, the contaminants are immobilised or converted into less hazardous forms. A range of different reactive materials are available for use, with the potential to use mixtures of materials for the treatment of multi-contaminant plumes.</p> <p>The team at NNL has significant experience in engineering, operation and support of groundwater treatment systems from design through commissioning. NNL staff have particular experience in PRBs having been members of the steering committee responsible for the delivery of the UK guidance on the use of PRBs and drafting the guidance on carrying out treatability studies for PRBs. This expertise, coupled with our access to unique laboratory and rig hall facilities, allows us to provide a bespoke service from laboratory assessment and modelling to design and pilot scale assessment. Our experience at nuclear sites includes:</p> <ul style="list-style-type: none"> <li>- Modelling studies to determine optimum design and positioning of barriers.</li> <li>- Treatability testing involving batch and column experiments using various types of zero valent iron (ZVI) materials, cation exchange materials (e.g. zeolites) and apatite (APII and APIII) materials. Both the batch and column experiments have been carried out using simulant groundwater spiked with Tc, Cs or Sr, as appropriate.</li> <li>- A project to determine the feasibility of emplacing a permeable reactive barrier at Sellafield. This work includes laboratory and rig scale experiments, groundwater and contaminant transport modelling and design and optimisation.</li> </ul>	





## 2. Notes (Please provide following information if possible.)

- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)

PRB technology is a mature technology having been applied at over 200 sites around the world (TRL 8/9).

- Challenges

Rapid groundwater flow rates would increase the size of the PRB required and amount of reactive material consumed.

Site specific geological conditions may impact on the optimum placement of the PRB, i.e. the base of the PRB needs to be keyed into an impermeable layer to ensure optimal hydraulic performance.

- Others (referential information on patent if any)

### 【Areas of Technologies Requested】

- (1) Accumulation of contaminated water (Storage Tanks, etc.)
- (2) Treatment of contaminated water (Tritium, etc.)
- (3) Removal of radioactive materials from the seawater in the harbor
- (4) Management of contaminated water inside the buildings
- (5) Management measures to block groundwater from flowing into the site
- (6) Understanding the groundwater flow