

[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	Design of materials for rapid, selective removal of Sr and Cs from waters
Submitted by	UK National Nuclear Laboratory (NNL)
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>Manchester University and the National Nuclear Laboratory have been evaluating high throughput approaches to the design and screening of materials for the selective removal of Sr and Cs from waters.</p> <p>In designing a selective material, the solid support used, the linker, and the type and properties of the functionality included (see below left, illustrated for a crown ether extractant) can be varied. This allows fine tuning of the properties of the material, including selectivity, kinetics and affinity.</p> <p>These materials can be screened in bulk using autoradiographic techniques (below right), allowing assessment of their affinity for the radionuclide of interest; their selectivity (by exposing the material to a radionuclide solution containing potentially competing elements, for example seawater <math>\text{Na}^+</math> concentrations); and reaction kinetics (by varying contact times). Lead materials which display the desired properties can then be synthesized on a larger scale for further evaluation and eventual deployment.</p> <p>For the applications envisaged here, Sr will be a particular target, with Cs as a secondary objective, and with a focus on crown-type extractants, on fast kinetics and on discrimination from <math>\text{Na}^+</math>.</p>	

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

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

For the applications envisaged here, these materials are at about TRL 2. Potential deployment of these materials is being incorporated into UK planning for radioactive releases.

- Challenges

Timescale to reach deployment in this specific application.

- 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