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

Technology Information	
Area	3 (Select the number from “Areas of Technologies Requested”)
Title	Process intensified chemical precipitation
Submitted by	UK National Nuclear Laboratory (NNL)

1. Overview of Technologies (features, specification, functions, owners, etc.)

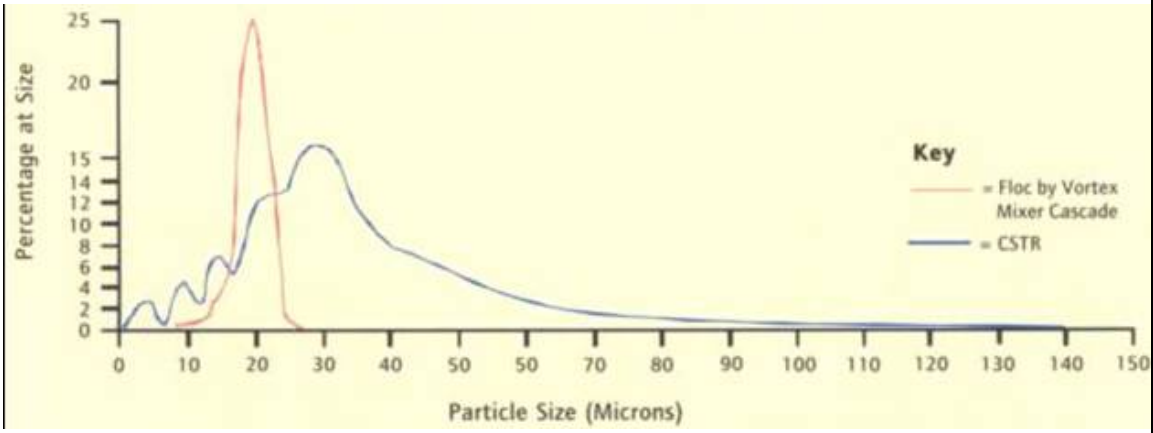
A technology which could be viable for the removal of radioactive materials in seawater in the harbor is process intensified chemical precipitation. Process intensified plant can provide increased throughput with reduced footprint through improvement in floc settling and dewatering characteristics.

Compact chemical precipitation plant

Chemical precipitation is used to remove a wide range of radionuclides dissolved in aqueous solution (e.g. caesium, strontium or plutonium) usually by addition of an alkali to increase pH so that radionuclides are co-precipitated as insoluble carbonates or hydroxides. Where possible it is desirable to exploit the stream chemistry to avoid addition of reagent and hence reduce secondary waste arisings.

The National Nuclear Laboratory (NNL) has developed an intensified flocculation process based on the use of High Intensity Vortex Mixers, dedicated floc growth vessels and tight on-line pH control. Because the mixing is ‘fast’ there are no concentration gradients resulting in a tight size distribution. The floc produced is crystalline rather than spongy. These properties enhance dewatering of the product. The mixers are fluidic i.e. free from moving parts. The plant has a compact footprint with typical dimensions of 2m height and plan area of $6m^2$. The size of the vessels used will vary depending on feed throughput. For example, the footprint for a feed throughput of $0.5m^3$ /hr is 1.5 x $2.5m^2$.

Comparison of precipitated floc particle size distribution of conventional continuous stirred tank reactor (CSTR) with intensified mixing:



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

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

The chemical precipitation process has been employed for over 20 years for the treatment of radioactive effluent at the Enhanced Actinide Removal Plant at Sellafield, UK. A process intensified arrangement (depicted above) was developed for deployment in non-nuclear trade

effluent treatment.

- Challenges

Design modification would be required to account for application-specific shielding requirements.

- 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