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

Technology Information	
Area	1 (Select the number from “Areas of Technologies Requested”)
Title	Hot Isostatic Pressing of Inorganic Ion Exchange Compounds
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1. Overview of Technologies (features, specification, functions, owners, etc.)

It has been demonstrated that many inorganic ion exchangers can be consolidated to dense, stable and durable products by hot isostatic pressing (HIP). These wasteforms are suitable for long-term storage and ultimate disposal. For appropriately formulated compounds, including Ionsiv, it is possible to achieve a 100 % waste loading. Ideally, the waste is contained in a specially designed HIP can which compacts into a right cylinder, as shown in the image.

Although this is peripheral to the current call, to obtain maximum benefit from this technology requires it to be considered as part of the contaminated water clean-up process. The ion exchange compound needs to be deployed in a cartridge that has been designed such that it will collapse in a controlled and regular manner during the consolidation process. This allows the spent ion exchange compound to be stabilized without removing it from the cartridge. Note that it is still possible to consolidate the ion exchanger in this manner if it has not been deployed in specific cartridges, but doing so minimizes the number of handling operations.

The design of the HIP can will require that contaminated water can pass freely into and out of the HIP can. This would be achieved in service by having filters built into the end caps. After the

contained ion exchanger has been Cs loaded, residual water must be removed from the HIP can by a bake out process, and the HIP can is then hermetically sealed by blanking off the filters. Finally the ion exchanger is consolidated by the HIP cycle.
HIP cans of the generic design shown have been made with dimensions 1.5 m high by 0.7 m diameter.

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

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

HIP is widely used in manufacturing of high performance components. The use of the generic design of HIP can has, to date, been limited to experimental work. It is proposed to use this design of HIP can to immobilize Pu bearing residues on the Sellafield site, and to immobilize wastes arising from medical isotope production on the ANSTO site in Australia.

- **Challenges**

The main novelty in this proposal relates to combining the functionality of the HIP can with its use as a cartridge in which the ion exchanger is contained during service.
This includes:

1. Modification to allow water flow through the end caps whilst maintaining the ability to seal the HIP can prior to consolidation.
2. Possible inclusion of vanes within the HIP can to ensure full contact of water with ion exchanger media.
3. Elimination by design of any volatile seal materials from the HIP can.

- **Others (referential information on patent if any)**

Primary intellectual property for the design of HIP cans belongs to ANSTO.

【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