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Development of In-can melting solution for Fukushima-Daiichi specific waste treatment, in coordination with TEPCO and Nuclear Damage Compensation Facilitation Corporation (NDF) as stakeholders from Japanese institutions

Since 2018, Orano with its partners CEA and the Japanese subsidiary ANADEC, is studying the applicability of In-Can melting system developed for French needs to Fukushima-Daiichi. Target wastes are secondary waste from the contaminated water treatment and are present in different forms and properties. Zeolites, silicotitanate, ion exchange resin, activated carbon are solid waste ; carbonated, ferric and barium-sulfate slurry and sludge are rather wet waste ; each of the waste type containing more of less Sr and Cs. The goal of the project is to verify the applicability of an industrial process compatible with a variety of wastes, relatively easy to operate. Many laboratory tests have been performed to adjust the matrix formula to each waste or waste-mix. Bench scale tests and pilot-scale tests are then performed to confirm the industrial feasibility, especially regarding efficiency of the off-gas treatment, the waste loading, and overall quality of the waste matrix produced.

This project is particular because Orano and its partners are working side-by-side with TEPCO and the institutional sponsor of the project NDF who are in charge of defining the Fukushima waste policy. Indeed, waste produced on site are very different from what TEPCO has been managing before the accident and Waste Acceptance Criteria are still to be defined.
As an example, the definition of "acceptable glass quality"can be mentioned. During this project a wide range of stabilization solutions and associated matrices are considered with the aim of maximizing the waste loading while ensuring high quality regarding the long term behavior. Tests performed, from laboratory scale up to pilot scale, bring out that In-Can melting system is compatible with a large majority of Fukushima waste inventory, providing significant volume reduction (high waste loading ratio achieved: up to 80 wt%) and long-term immobilization of the radionuclides.

The definition of the final waste package can also be mentioned. Orano designed the melt-can to fit inside a Universal Canister for easy handling and coherence with other MA-HA wastes. The selection of the can material is currently ongoing, taking into consideration not only the mechanical / chemical resistance but also the economic performance.

All those structuring decisions are taken jointly with the end-user TEPCO and the institutional representative NDF. By doing so, the industrial solution DEM&MELT to be proposed by Orano will match Fukushima waste policy and associated WAC to be defined in the coming years.

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Do you wish to participate as a Young Professional?

Yes

Do you wish to be considered for a Young Professional grant?

Not specified

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