

4-② Investigation of method for processing damaged fuel, etc. retrieved from spent fuel pool

Project objectives

It can be thought that the salinity is due to the seawater adhered to the fuel of the spent fuel pool, and there is also the possibility that some of the fuel has been damaged or leaked due to fallen concrete pieces, etc. For this reason, technical issues in the reprocessing of these fuels were investigated and examined, and the development of indicators to decide the necessity of reprocessing was also examined.

Project details and progress

(1) Evaluation of corrosive influence of impure substances on re-processing equipment

Corrosion tests (immersion, electro chemistry) were conducted on materials in high-level concentrated waste liquid storage tanks and high-level liquid waste storage tanks, using simulated high-level liquid waste solutions that took into account impurities and fission products, etc. Under all conditions, results showed that while there was uniform corrosion in the form of inter-granular corrosion, pitting was not observed (Fig.1).

Furthermore, an increase in chloride ion concentration was accompanied by a decrease in corrosion (Fig.2).

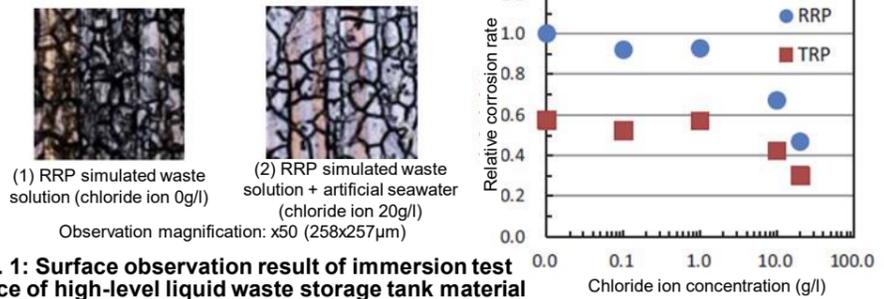


Fig. 1: Surface observation result of immersion test piece of high-level liquid waste storage tank material

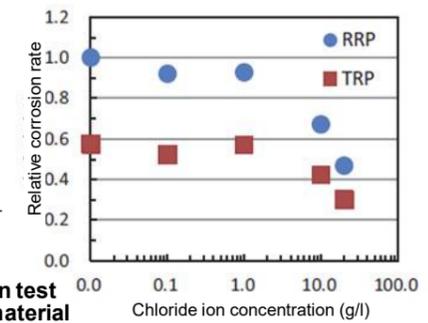
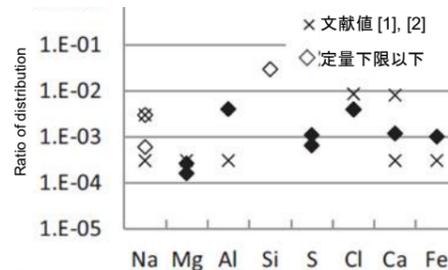


Fig. 2: Corrosion rate of high-level liquid waste storage tank material (relative corrosion rate: corrosion rate of RRP simulated solution containing no impurities is valued as "1")

(2) Evaluation of in-process behavior of impurities

The extraction operation of impurity was conducted under the condition of coexistence with FP to check the impact of FP on the extraction of impurity. As a result, the distribution ratio of impurity was as low as 10^{-2} to 10^{-3} order (Fig. 3).

In addition, the extraction operation of U and Pu was conducted under the condition of coexistence with an anion, with the possibility of obstructing the extraction of U and Pu, and the impact of the anion on the extraction of U and Pu was checked. As a result, it was confirmed that the distribution ratio of U and Pu would not be influenced by the anion.



[1]Data of Inorganic Solvent Extraction (1) JAERI1047
[2]PUREX Technical Manual (1980)

Fig. 3: Distribution ratio of impurity components under the condition of coexistence state with FP



Fig. 4: Homogeneity results of glass specimens (visual observation)

(3) Evaluation of the influence of impurities on waste body

To determine the composition of waste solutions, a glass specimen was created from a formulation of powder materials with the major components of seawater and mortar added as impurities, and an evaluation of homogeneity and so on was then performed. The result was that, under all conditions, there was no phase separation precipitation, and vitrification occurred (Fig.4).

(4) Identifying and outlining of other influences

The influences of the processing of damaged fuel in reprocessing facilities were comprehensively extracted, and the presence or absence of required research elements and the findings obtained in this research were summarized.

Implemented by

International Research Institute for Nuclear Decommissioning (IRID)

FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
		Study of Methods to Process Damaged Fuel Removed from the Spent Fuel Pool					