

Decommissioning Process **“Transport/Storing/Storage (including Wastes containing Alpha Nuclides originating from Fuels)”**

Investigation Subject **“Maintaining stabilized condition”**

Issue **“Understanding the behavior of hydrogen generation”**

Needs

1. Managing hydrogen gas generated in the fuel debris storage canisters and controlling the corrosion resistance

Transport/Storing/Storage : **[Short]**

Desired state and reasons for it

- It is desirable to understand what physical phenomena (e.g., radiolysis of coolant) produce hydrogen in the storage canister. In addition, under complex conditions (reaction field, irradiation field) that are scientifically unexplained, a deeper scientific elucidation of the mechanism is desirable for regulatory compliance.
- It is desirable that event progression scenarios from hydrogen generation to combustion are comprehensively investigated, and management policies and facilities based on these scenarios are defined. In addition, it is desirable to have an evaluation model or experimental findings that can evaluate the effectiveness of the management policies and facilities investigated in preventing hydrogen combustion.

Current state against ideal

- R&D of a realistic and reasonable prediction method for hydrogen generated in the storage canister is being conducted. Also, the venting mechanism for hydrogen gas release installed in the lid of the storage canister is being investigated using that prediction method, and safe transfer conditions considering the accumulation of hydrogen gas in the transfer container are also being investigated.

Issues to be resolved

- Since information on fuel debris (properties, source strength, etc.) is limited at this time, it is necessary to constantly incorporate the latest information on fuel debris and review hydrogen gas management and corrosion resistance management methods as necessary.

2. Advancing the radiolysis behavior evaluation

Transport/Storing/Storage : **[Short]**

Desired state and reasons for it

- It is desirable that the phenomena model and parameters with large uncertainties are clarified in order to determine the priority of the advancing target. In addition, it is desirable that a deeper scientific mechanism is clarified for regulatory compliance under complex conditions (reaction field, irradiation field) that are scientifically unexplained.

Current state against ideal

- At this stage, it is clarified which parameters affect hydrogen generation by radiolysis.
- The G-values used for the PCV and other facilities on the 1F are different from those of general wastes, and are forced to be evaluated conservatively.

Issues to be resolved

- It is desirable to properly evaluate G-values that are set excessively conservatively. In particular, the effects of the material and nuclide composition of the object, trace constituents in water, and water content on G-values should be developed, including basic data, to lead to appropriate G-value evaluation.

Relevant Issues

- TSR-101 "Characterization"
- TSR-201 "Technology development to assess and manage storage container integrity"
- TSR-204 "Design of canister specifications"
- TSR-301 "Transport/storing/storage method investigation"