Phase: **Action**

Decommissioning Process **"Transport/Storing/Storage (including Wastes containing Alpha Nuclides originating from Fuels)"**
Investigation Subject **"Transport/Storing/Storage"**
Issue **"Investigation of transport, storing and storage"**

Needs

1. Investigating the methods of transport, storing and storage

Transport/Storing/Storage：【Short】

Desired state and reasons for it

- It is desirable to arrange the containers for the wastes containing alpha nuclides originating from fuel debris and the environment in which they are handled, and to investigate safe and reliable transport, storing and storage methods from the viewpoint of exposure. In particular, for gradual expansion of the scale of retrieval, it is desirable to investigate the establishment of a system that is equipped with safety functions such as subcriticality maintenance and confinement, hydrogen generation countermeasures and cooling, and that takes into account a series of flows from packaging to transfer and storing of collected waste and other materials.
- In investigating a transport method, it is desirable to do it based on the overall plan including storing and storage, etc. and based on the onsite transport and the scenario of each transport method.
- It is desirable to clarify the specifications of transport containers so that transport between facilities and storage can be performed safely and quickly. In particular, since storage canisters packaging waste, etc., are handled using remote control devices, it is also considered effective to investigate considering knowledge obtained through mock-up tests using actual or similar remote control devices.
- It is necessary to consider equipment (monitoring equipment, etc.) to meet safeguards requirements also.
- Since fuel debris is judged to require special consideration for handling and storage maintaining the subcritical state, it is desirable to aim to bring (sort) fuel debris and radioactive waste into separate storage conditions based on the measurement results of the amount and contained concentration of nuclear materials.
- It is also desirable to develop a method to evaluate the sequence of transportation, storing, and storage in order to confirm the safety of the system, etc.

Current state against ideal

- The retried fuel debris will be stored in the fuel debris retrieval container and on-site transportation container in the enclosure, and then stored in the first storage cell facility. The design of the first storage cell facility is underway.
- Among the work process from retrieval to storage, investigation of the step where sorting work of fuel debris and radioactive waste (investigation of sorting scenarios) is feasible, was conducted.
- Survey on technologies and devices that may be able to non-destructively measure or estimate the amount of nuclear material and its concentration (survey of candidate measurement technologies) was conducted.

- It is being investigated that powdered fuel debris generated by cutting and other processing during fuel debris retrieval will be collected in the form of powder or sludge／sludge in gas management systems and cooling water circulation systems.
- In order to further expand the scale of fuel debris retrieval, investigation on the process of transfer and storing of massive and granular fuel debris, survey and narrowing down of storing technologies and formats, treatment required prior to storing of fuel debris, and investigation on methods and routes for transfer to storing sites are also underway.

Issues to be resolved

- It is important to sort with reasonable accuracy. Therefore, it is necessary to investigate the accuracy required to understand weight and distribution. Although it is important to understand measurement errors in the development of measurement technology, it is necessary to reflect the knowledge accumulated through numerical experiments in actual development because of the uncertainty of the influencing factors.
- A variety of remote operated devices are planned to be used in handling of fuel debris in the first storage facility. The challenge is to use these devices as planned. It is necessary to fully confirm the details of the work using the equipment at the design stage, and to consider countermeasures against latent risks and reflect them in the design.
- It is necessary to continuously organize information on wastes, organize management items, and investigate measurement and evaluation methods.
- By organizing the waste information, it is revealed the generation of wastes such as retrieval equipment, air conditioning and wastes from water treatment systems. It is necessary to investigate a safe method of packaging, transferring, and storing these wastes.
- It is necessary to investigate the specifications for transport, storing and storage in multiple cases, rather than setting the uniform conservative single condition for the wastes. Currently, information and knowledge on the properties of fuel debris is limited, so the settings are conservative. However, it is necessary to rationalize the design by utilizing the knowledge and experience that will be collected and accumulated in the future.

Relevant Issues

- TSR-102 “Waste strategy”
- TSR-201 “Technology development to assess and manage storage container integrity”
- TSR-202 “Understanding hydrogen generation behavior”
- TSR-204 “Design of canister specifications”
- TSR-205 “Criticality control”