Phase: **Preparation**

Decommissioning Process **"Contaminated Water Management"**
Investigation Subject **"Understanding current status"**
Issue **"Understanding the current status of the contamination sources"**

Needs

1. Understanding the current status of the contamination sources

Desired state and reasons for it

- It is desirable to obtain information pertaining to the current status of contamination sources (the property of the contamination sources and the surrounding environment). This is because ultimately the contamination sources need to be removed and treated.
- Specifically, if there is information on the property of a contamination source and the surrounding environment, it is possible to rationally investigate how to access the contamination source, how to remove the contamination source, and how to handle (treat) the removed contamination source afterwards.

Current state against ideal

- In 2020, the treatment of the retained water in the buildings was completed except for the reactor buildings of Units 1-3, the main process building, and the high-temperature incinerator building.
- Sources of contamination currently considered to be of particular importance include stagnant water at the bottom of the torus chamber in the reactor building and so-called "zeolite sandbags" (installed immediately after the accident to improve the quality of the stagnant water) that exist in high-dose conditions on the lowest floors of the main process building and the high-temperature incinerator building.

Residual water in the torus chamber

- Residual water containing α-sludge and ionic α-nuclides exists at the bottom of the torus chamber in the reactor building, and relatively high concentrations of α-nuclides have been detected. In addition to α-nuclides, there is also highly concentrated stagnant water containing high concentrations of radioactive materials and salt, which is close to the condition immediately after the accident.
- Currently, the properties of the retained water are being analyzed and removal measures are being investigated to prevent the spread of α-nuclides. The nuclides that can be significantly present in contaminated water before it is treated by ALPS, etc. have been verified, and 29 nuclides have been selected as target nuclides.

Zeolite sandbags

- Zeolite sandbags are present in a high-dose state on the lowest floors of the main process building and the high-temperature incinerator building.
- The currently planned recovery work plan consists of (1) loading the ROV for accumulation work into the basement floor, suctioning the zeolite, and transferring it to the accumulation site, (2) transferring the accumulated zeolite, etc. to the ground floor by the ROV for container enclosure

work, desalinating and dehydrating it in the building, sealing it in a metal storage container, and transferring it to a temporary storage facility.

- As of FY2025, work to retrieve the zeolite sandbags is underway.

Issues to be resolved

Residual water in the torus chamber

- The chemical form of α-nuclides at the bottom of the torus chamber of the reactor building may vary depending on the water quality and coexisting materials. For reliable removal, it is necessary to collect samples from multiple locations to understand the variation in properties. For property analysis, it is necessary in the future to increase the number of samples, steadily expand data, and conduct data analysis. No major R&D issues are considered to exist here.
- Since alpha sludge also contains high concentrations of Cs-137, it is required to investigate on measure to reduce radiation doses to workers and removal measures from the viewpoint of maintainability and t secondary waste. In addition, regarding the treatment process, it is desirable to investigate optimal treatment methods considering the properties of the stagnant water and the surrounding environment. Thus, R&D issues exist.

Zeolite sandbags

- In the recovery for zeolite sandbags, securing visibility in muddy water as well as flinging sludge when working in a narrow basement floor and improving the recovery rate of zeolite are issues, and thus preliminary investigation using mockups are important. It is also necessary to investigate on evaluation of the impact and alternative measures to reduce the radiation dose in the case when some of the zeolite are left.
- As for accumulation work, on-site accumulation work began in March 2025, and it was first confirmed that the accumulation of approximately three rows had been largely completed on a trial basis.
- In response to new on-site findings, such as the discovery of additional interfering objects (e.g., fallen lighting fixtures), full-scale mock-up testing has been conducted again. Based on the knowledge obtained, improvements are being made and progressively incorporated into the actual accumulation work, and appropriate measures are being implemented accordingly.
- For the container-encapsulation work, design verification—including mock-up—is ongoing, and the plan is to begin actual operations after the future mock-up testing and the removal of existing equipment.

Relevant Issues

- CWM-301 “Efficient and effective water treatment”
- CWM-302 “Measuring alpha and difficult-to-measure nuclides”
- FDR-203 “Exposure control of workers inside buildings”
- BST-003 “Measurement and analysis technology”