Phase: **Design**

Decommissioning Process **"Fuel Debris Retrieval"**
Investigation Subject **"Strategy and risk"**
Issue **"Emergency measures"**

Needs

1. Evaluating the impacts of the environment including mental factors on work safety

Desired state and reasons for it

- In order to ensure the safety and health of workers, it is desirable to understand the impact of the environment in which workers are placed including their mental aspects, on work safety.

Current state against ideal

- Currently, it is considered that it is managed as part of TEPCO's work management, but the details are unknown.

Issues to be resolved

- It is necessary to identify areas where, and conditions under which, workers may make mistakes, including their mental aspects, and to take appropriate measures.
- For example, measures should be developed to prevent mistakes in monotonous repetitive work, while other measures should be developed to deal with the stress caused by highly stressful work in a failure.

2. Evaluating accidental internal exposure and providing associated health care intended

Desired state and reasons for it

- In order to properly manage the health of workers, it is desirable to identify environments where, and conditions under which, radioactive particles can be accidentally ingested, and to evaluate their effects on the human body.
- Regarding internal exposure protection, appropriate protective measures should be selected based on the target nuclide, airborne concentration, and surface density in the work area, and efforts should be made to prevent inhalation intake and physical contamination leading to internal exposure, after taking measures on facilities such as controlling the dispersion of radioactive dust, preventing contamination spread, etc..

Current state against ideal

- Research and development under Government-led R&D Program on Decommissioning, Contaminated and Treated Water Management for internal uptake protection and dose assessment during uptake, has been started since FY2021, and conceptual study of internal

exposure dose assessment program, research and study on the speeding up of bioassay methods, etc., and technical development on the optimization of protective equipment, etc., were carried out.

- Based on the above results, from FY2023, a program for internal exposure dose assessment has been developed through technological development related to the measurement and assessment of internal exposure doses, including the advancement of bioassay methods and studies on skin contamination and wound contamination measurements, by establishing an internal exposure dose assessment system and standards.
- Starting from FY2025, efforts are underway to develop bioassay techniques to address situations in which a large number of internal uptake cases may occur, and develop technologies to improve the accuracy of assessments in cases of skin contamination and enable rapid and reliable detection of body alpha contamination.

Issues to be resolved

- It is necessary to identify environments where, and conditions under which, radioactive particles can be accidentally ingested, in places that have not been assumed so far. Actions should be taken against such incidents as necessary.
- Particularly, it is necessary to develop assessment methods for internal exposure. When an internal uptake event occurs, it is necessary to properly evaluate the deposited effective dose by in vitro measurement methods (lung monitors) and bioassay methods. Therefore, it is important to select important α-nuclides for exposure assessment in advance and reflect them in the management of airborne concentrations, wearing standards of protective equipment, and calibration management of equipment.
- In addition, it is important to control surface density in the work environment and on the bodies of workers entering and exiting the work area in order to detect the spread of contamination beyond the area classification at an early stage and to prevent internal uptake by dust that has been re-suspended from free contaminants.
- Toward the full-scale implementation of future fuel debris retrieval, a key challenge is the prompt determination of the radioactivity of incorporated radioactive materials and the evaluation of the resulting dose, in order to enhance protective functions against internal intake and to more accurately consider response and countermeasures in the event that an internal intake incident occurs.

Relevant Issues