

Decommissioning Process “**Contaminated Water Management**”  
Investigation Subject “**Water treatment**”  
Issue “**Measuring alpha-nuclide and difficult-to-measure nuclides**”

## Needs

### 1. Measuring all 62 nuclides and streamlining the measurement method

Contaminated Water Management : [Mid]

#### Desired state and reasons for it

- In order to improve accuracy and eliminate excessive conservativeness, it is desirable to be able to measure all 62 nuclides for ALPS treated water.

#### Current state against ideal

- At present, not all 62 nuclides in ALPS treated water are measured. Then, there are some nuclides of which radioactivity are calculated by the other isotope abundance ratio or are conservatively estimated to be equal with total alpha radioactivity.
- Shortening the measurement time is also an issue. In particular, it takes about two months to measure difficult-to-measure nuclides such as Cd-113 and Ni-63, and it would be better if the measurement could be done in about two weeks.
- Twenty-nine nuclides are selected as target nuclides to be measured and evaluated before discharging ALPS processed water to the sea based on a flow (see Figure) that combines inventory evaluation, measured data of nuclide concentrations in building retained water, etc., and consideration of physical and chemical properties of nuclides.

#### Issues to be resolved

- If the nuclides to be measured and evaluated change due to factors such as changes in the transfer coefficient from fuel debris to contaminated water during future decommissioning work, it will be necessary to reevaluate the nuclides to be measured and evaluated.
- In particular, for nuclides that are quantified in evaluations based on the isotope existence ratio, etc., and for nuclides that are encapsulated in total alpha radioactivity, the accuracy can be further improved by actually measuring them rather than conservatively evaluating them.
- Shortening the measurement time is also an issue. In particular, it takes about two months to measure difficult-to-measure nuclides such as Cd-113 and Ni-63, and it would be better if the measurement could be done in about two weeks.

### 2. Monitoring alpha nuclides in water

Contaminated Water Management : [Mid]

#### Desired state and reasons for it

- In the water treatment process, it is desirable to avoid alpha-nuclides from entering downstream to the extent possible. For this purpose, it is desirable to develop a technology for monitoring alpha-nuclides in water.

## Current state against ideal

- At present, water samples are collected and analyzed for alpha-nuclides. If the trend of alpha-nuclide concentrations in water can be monitored, it would be possible to understand the influence on downstream areas, and improve the reliability of the system.

## Issues to be resolved

- In particular, alpha nuclides are continuously monitored and it is required enabling a monitor system to issue an alert if the measured values rise.

## Relevant Issues

- CWM-101 "Understanding current status of contamination source"
- CWM-301 "Efficient and effective water treatment"
- BST-003 "Measurement and analysis technology"