Fukushima Daiichi Nuclear Power Station
Tritium concentration analysis results of seawater pipes and sea area monitoring pertaining to ALPS treated water discharge into the sea

＜Reference document＞
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Fukushima Daiichi Decontamination and Decommissioning Engineering Company

- At the sixth meeting of the Inter-Ministerial Council concerning the Continuous Implementation of the Basic Policy on Handling of ALPS Treated Water held on August 22, the Japanese Government announced that it had made a decision in regards to the commencement period of the discharge of ALPS treated water into the sea and asked that TEPCO begin preparations for the commencement of discharge.
- TEPCO will quickly move forward with preparations to commence discharge with the utmost vigilance in accordance with the implementation plan, and as the First Stage of the initial discharge of ALPS treated water, a very small amount of ALPS treated water was transferred to the dilution facility using the transfer facility, diluted with seawater, and allowed to flow into the discharge vertical shaft (upper-stream storage).
- After that, diluted ALPS treated water stored in the discharge vertical shaft (upper-stream storage) was sampled and the tritium concentration of the water has since been measured. The results showed that the analysis value is approximately equal to the calculated concentration and below 1,500Bq/liter.
- We began continuously transferring/diluting and discharging the ALPS treated water in tank group B from the measurement/confirmation facility, and the water stored in the discharge vertical shaft (upper-stream storage) during the First Stage, into the sea at 13:03 on August 24. <Announced by August 24, 2023>

- We sampled water from the seawater pipe yesterday (August 24) in order to confirm that tritium is being suitably diluted during the period of discharge. Tritium concentration was then measured. As a result we have confirmed that analysis value is approximately equal to the calculated concentration, and less than 1,500Bq/liter.
- Furthermore, in order to quickly obtain results, as a part of sea area monitoring with the detection limit set to approximately 10Bq/liter at 10 locations within a 3km radius from the power station, seawater samples were taken and tritium concentrations were measured yesterday (August 24). As a result, we confirmed that analysis values do not exceed Discharge Suspension Level (700Bq/liter) nor Investigation Level (350Bq/liter).
- We will continue from today onwards to continually measure tritium concentrations in seawater pipes and the sea area.

Analysis result of the water in the seawater pipe upstream of the discharge vertical shaft (Upper-stream storage) (Analysis result in the Second Stage)

- The concentration of tritium in diluted ALPS treated water sampled on August 24 was measured, and we confirmed that analysis value is consistent with the calculated value, and less than 1,500Bq/liter.

The following was confirmed:

① Analysis value is below 1,500Bq/liter.
② Analysis value （142Bq/L～178Bq/L） was within the range of calculated value (104Bq/L～414Bq/L) that consider uncertainties when ALPS treated water is mixed with seawater, and analysis value was consistent with calculated value.

Water in the Seawater Pipe Upstream of the Discharge Vertical Shaft (Upper-stream Storage)

Summary	Analysis Value	142～178 (Bq/L) (confirmed to be less than 1,500 Bq/L)
	Comparison with calculated value	Confirmed to be consistent with calculated value (104～414Bq/L) *2

tium

Nuclide	Date and Time of Sampling	Analysis Results		
		Analysis Value (Bq/L)	Uncertainty *1 (Bq/L)	Detection Limit (Bq/L)
H-3	2023/08/24 15:22	1.6E+02	± 1.8E+01	6.2E+00

・ Values are expressed in exponential notation.
For example, "3.1E+01" means "3.1×10^{1}" and equals 31. Similarly, "3.1E+00" means "3.1×10^{0}" and equals 3.1, and "3.1E-01" means "3.1×10^{-1}" and equals 0.31.

*1 "Uncertainty" refers to the accuracy of analysis data.
"Uncertainty" is calculated using "Expanded Uncertainty: Coverage Factor k=2".

*2 "Calculated Value" is the value calculated from the tritium concentration measured at the measurement/confirmation facility and the flow rate ratio of the ALPS treated water to the seawater. "Calculated value" refers to the "Tritium Concentration after dilution" noted on TEPCO's website. Whereas it fluctuate slightly due to the tides, etc., they remain mostly the same throughout the day and therefore the value obtained at 3:00 PM on the day of specimen sampling shall be used for calculation comparisons.
https://www.tepco.co.jp/en/nu/fukushima-np/f1-rt/html-e/f1-alps_fd-month-sel-e.html
"Analysis Value" is compared with "Calculated Value" that considers uncertainties of mixed dilution (½ x "Calculated Value" ~ 2 x "Calculated Value").

Analysis results of sea area monitoring to obtain results quickly (within 3km radius of the power station)

- In order to quickly obtain results, as a part of sea area monitoring with the detection limit set to approximately 10Bq/liter at 10 locations within a 3km radius from the power station, seawater samples were taken and tritium concentrations were measured yesterday (August 24). As a result, we confirmed that analysis values do not exceed Discharge Suspension Level (700Bq/liter) nor Investigation Level (350Bq/liter).

Analysis Results of Seawater within 3km of the power station (Measurements to obtain results quickly)

Summary	Confirmed to not exceed Discharge Suspension Level (700Bq/L) nor Investigation Level (350Bq/L) *1

Sampling Location	Date and Time of Sampling	H-3 (Bq/L)
1F Unit 5/6 discharge, north side (T-1)	2023/08/24 15:25	< 6.3E+00
1F Near south discharge (T-2)	2023/08/24 15:23	< 6.3E+00
1F North side of northern sea wall (T-0-1)	2023/08/24 16:15	< 8.0E+00
1F Harbor entrance, northeast side (T-0-1A)	2023/08/24 15:58	< 4.6E+00
1F Harbor entrance, east side (T-0-2)	2023/08/24 15:48	< 8.1E+00
1F Harbor entrance, southeast side (T-0-3A)	2023/08/24 15:43	< 4.7E+00
1F South side of southern sea wall (T-0-3)	2023/08/24 15:28	< 8.0E+00
1.5km offshore north of the 1F site (T-A1)	2023/08/24 16:05	< 6.6E+00
1.5km offshore of 1F site (T-A2)	2023/08/24 15:52	< 6.6E+00
1.5km offshore south of 1F site (T-A3)	2023/08/24 15:38	< 6.6E+00

- A "less than" symbol (<) indicates that the analysis result was less than the detection limit.
- A hyphen "-" indicates that the no samples were taken or that sampling has been discontinued.
- Values are expressed in exponential notation.

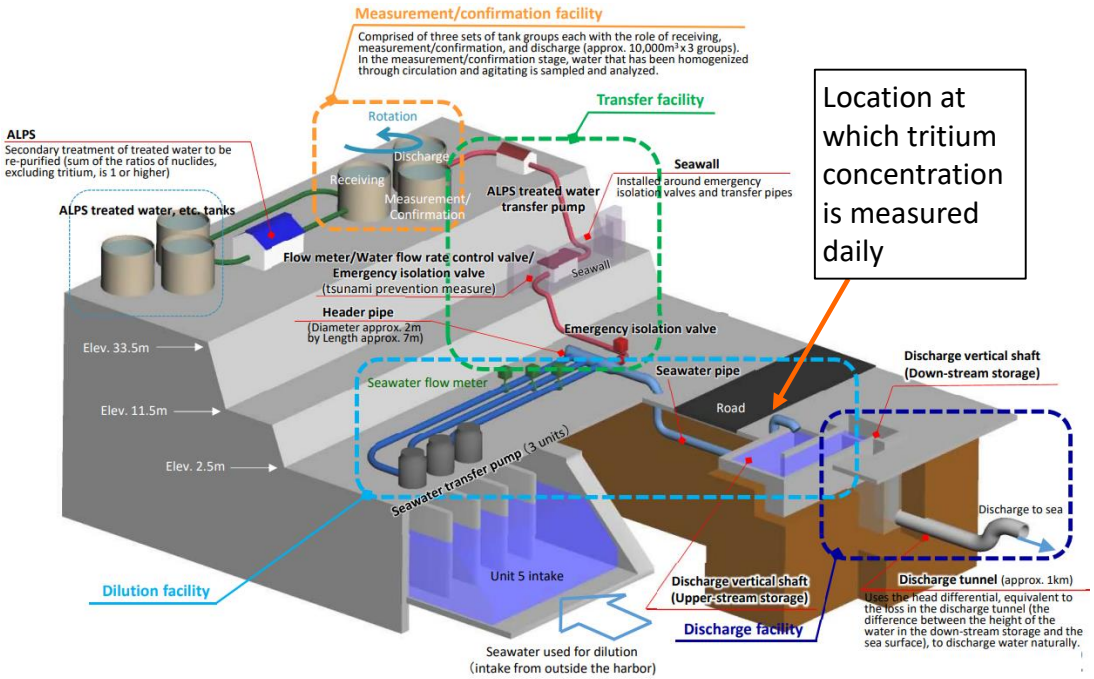
For example, "3.1E+01" means "3.1×10^{1}" and equals 31. Similarly, "3.1E+00" means "3.1×10^{0}" and equals 3.1, and "3.1E-01" means "3.1×10^{-1}" and equals 0.31.

*1 Discharge Suspension Level: Index for determining if discharge needs to be suspended.
Investigation Level: Index for determining actions (inspection of facilities and operational procedures, increased monitoring, etc.) to be taken before the Discharge Suspension Level is reached.
[reference] WHO's drinking water quality guidelines for tritium:1E+04Bq/L (10,000 Bq/L)

We confirmed that analysis values of each sampling location do not exceed Discharge Suspension Level (700Bq/liter) nor Investigation Level (350Bq/liter)

【Reference】Tritium analysis of seawater pipe

- We sample water from the seawater pipe and measure tritium concentration everyday in order to confirm that tritium is being suitably diluted during the period of discharge.
- We confirm that analysis value is consistent with calculated concentration, and less than 1,500Bq/liter.



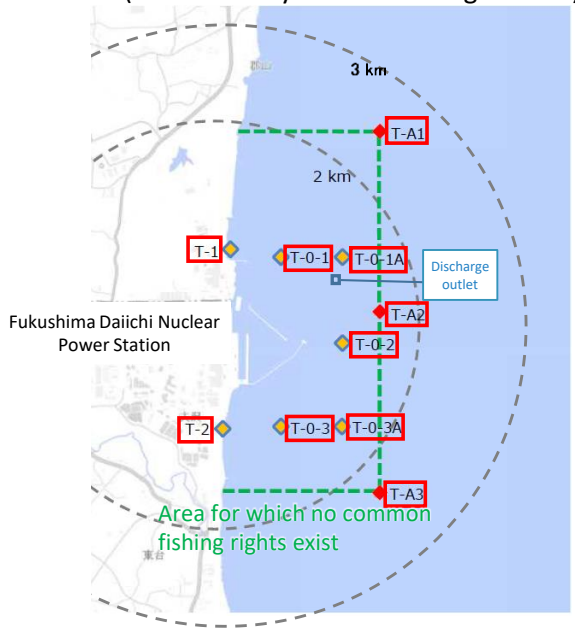
Seawater pipe

Sampling rack

Manual shutdown by operators (in response to sea area monitoring)

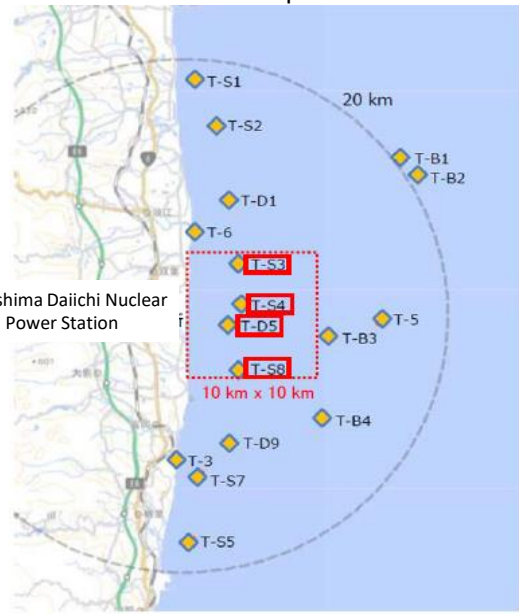
- Seawater tritium analysis is implemented once a week at all points on Figures 1 and 2 below, with the detection limit set to 0.1-0.4Bq/liter.
- In addition, quick tritium measurements with the detection limit set to 10Bq/liter will be implemented at the locations outlined in the red frames in Figures 1 and 2 below. In the case "discharge suspension level" indicators are exceeded, the discharge into the sea will be suspended.
- In light of the monitoring frequency outlined by the various organizations within the Comprehensive Monitoring Plan, frequency of quick tritium measurements specifically near the discharge outlets shown in Figure 1 will be increased from once a week to every day for approximately one month after the start of the discharge into the sea.

Figure 1. Sampling locations within a 3km radius of the power station (in the vicinity of the discharge outlet)



: Monitoring locations for quick tritium measurements (10 locations)
Indicator (discharge suspension level): 700Bq/liter
Analysis frequency: once a week → every day for approximately one month after the start of the discharge into the sea

Figure 2. Sampling locations within a 10km square in front of the power station



: Monitoring locations for quick tritium measurements (4 locations)
Indicator (discharge suspension level): 30Bq/liter
Analysis frequency: Once a week (T-D5),
Once a month (T-S3, T-S4, T-S8)