ALPS Treated Water Discharge Status Update

September 28, 2023

TEPCO

Tokyo Electric Power Company Holdings, Inc.

1. Foreword

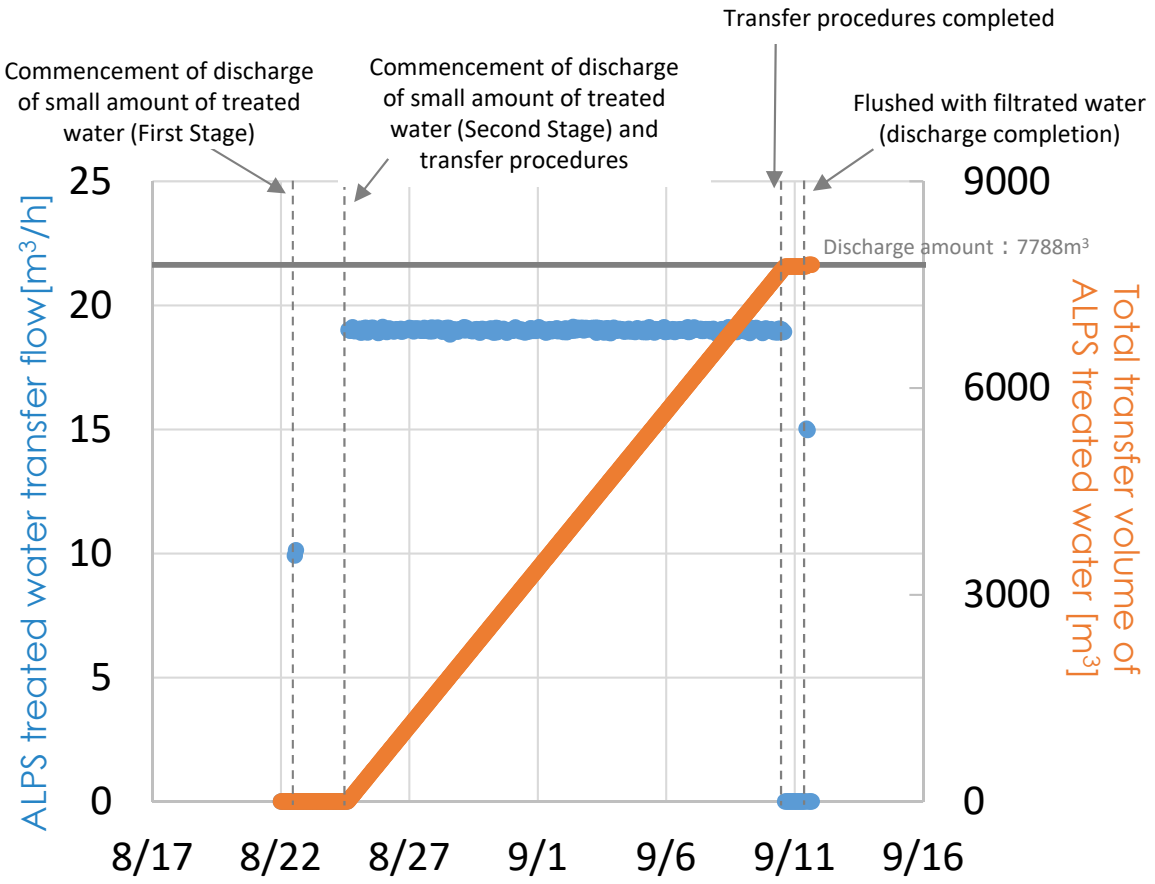
- In this update, we will show that there were no abnormalities with operating parameters or sea area monitoring results during this initial discharge, and also provide the analysis results for the next tank group from which ALPS treated water will be discharged (Group C).

- We have implemented the following during the initial discharge of ALPS treated water into the sea:
  - ✓ During the First Stage of the initial discharge of ALPS treated water, on August 22, a very small amount of ALPS treated water (approximately 1m³) was diluted with seawater (approximately 1,200m³) after which this water was held in the discharge vertical shaft (upper-stream storage) and sampled in order to verify that ALPS treated water is indeed being diluted as planned.
  - ✓ On August 24, we confirmed that the tritium concentration in the diluted ALPS treated water was less than 1,500Bq/liter and that the analysis value was within the range of uncertainty of calculated concentrations. So, on the same day (August 24), we commenced the discharge of ALPS treated water, and this initial discharge was completed on September 11.

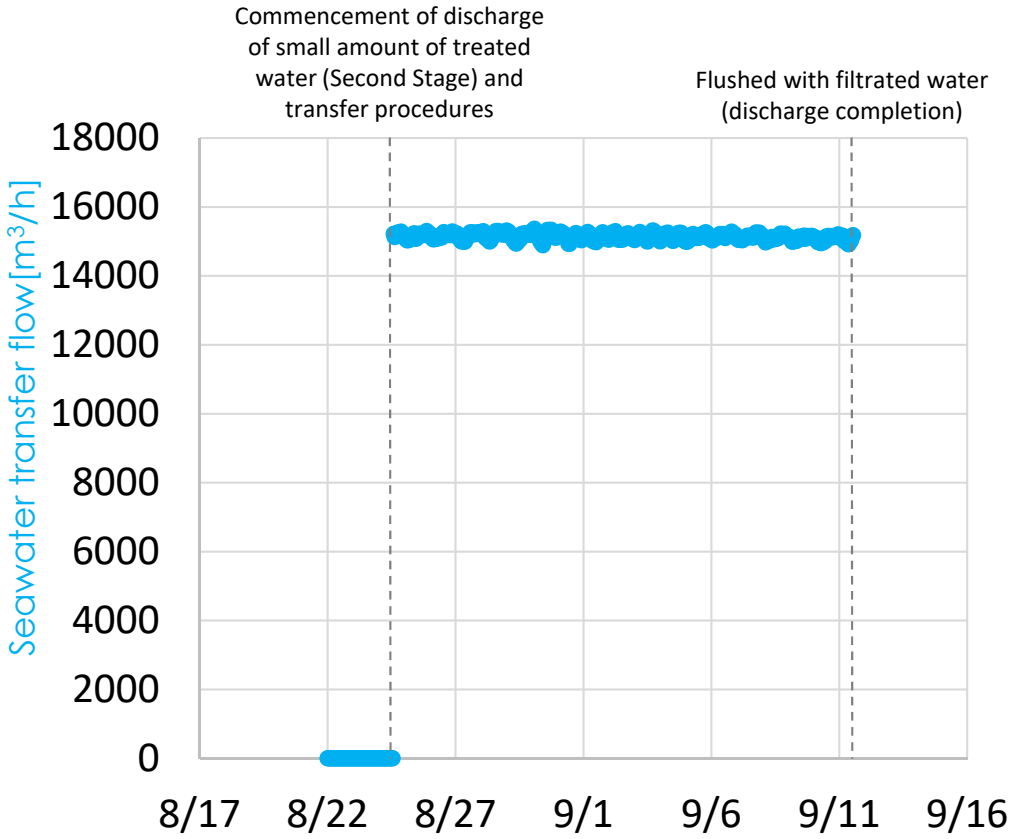
Discharged tank group	Tritium concentration	Commencement of discharge	Completion of discharge	Amount of discharge	Amount of tritium radioactivity
Group B	140,000 Bq/liter	August 24, 2023	September 11, 2023	7,788m³	1.1 trillion Bq

2. Operating parameter records during the initial discharge (1/3)

- We were able to operate ALPS treated water transfer systems and seawater systems without issue.



ALPS treated water transfer flow and total transfer volume of ALPS treated water



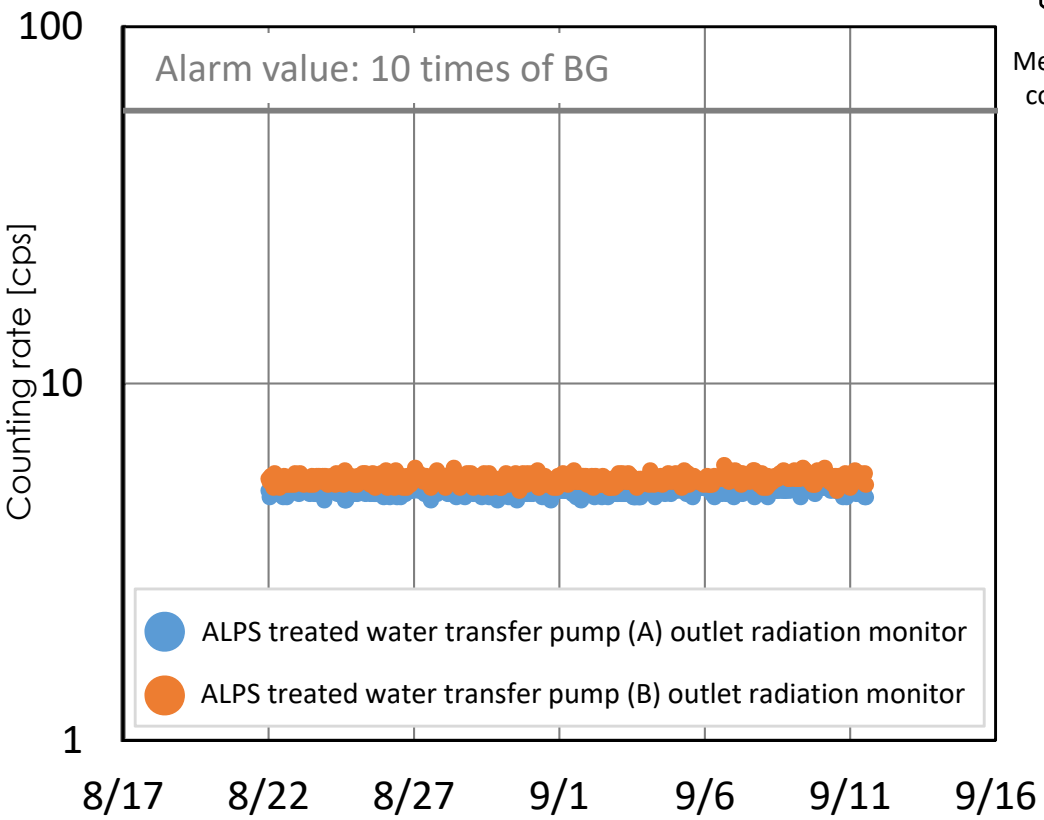
Seawater transfer flow

- ALPS treated water transfer flow*1
- Total transfer volume of ALPS treated water
- Seawater transfer flow*2

※1： The flowmeters are reduplicate, so the higher of the figures from both meters was used.
※2： Total for systems A and B

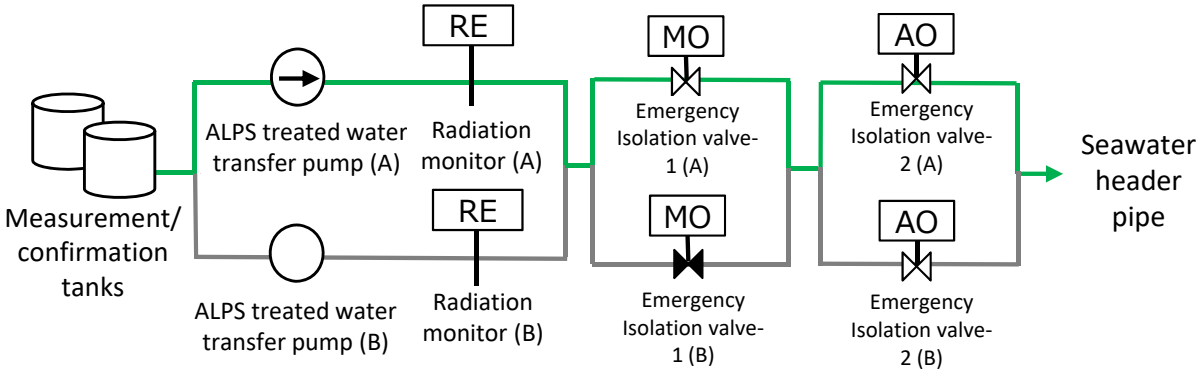
2. Operating parameter records during the initial discharge (2/3)

- No abnormalities were seen in the figures from the ALPS treated water transfer pump outlet radiation monitor.

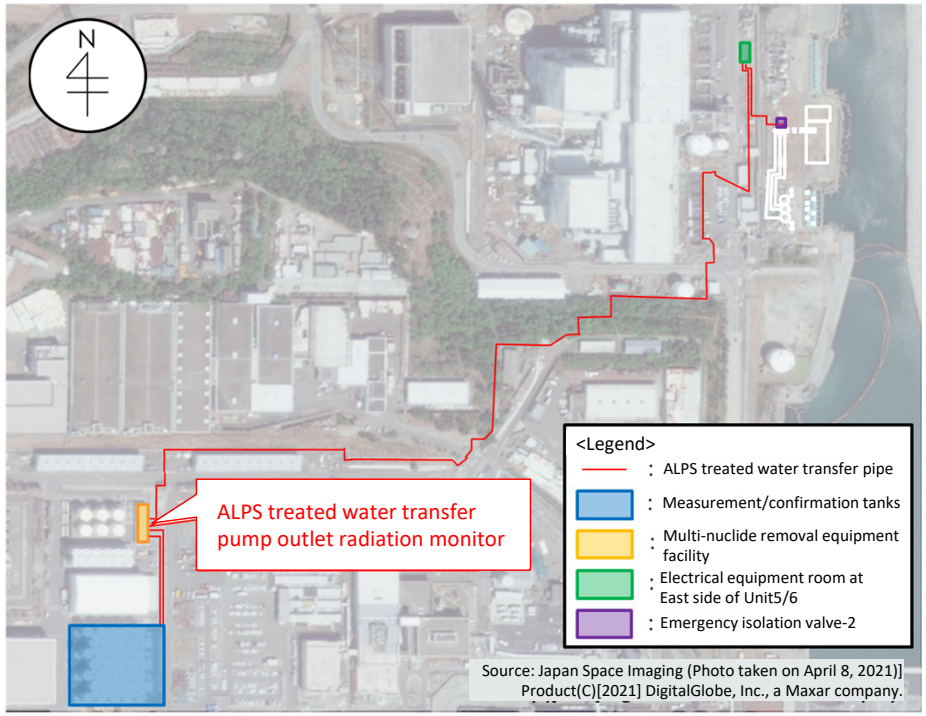


Figures of ALPS treated water transfer pump outlet radiation monitor※

※： As shown in the schematic on the upper right, during the initial discharge, ALPS treated water was passed through System A. (System B was filled with filtrated water)



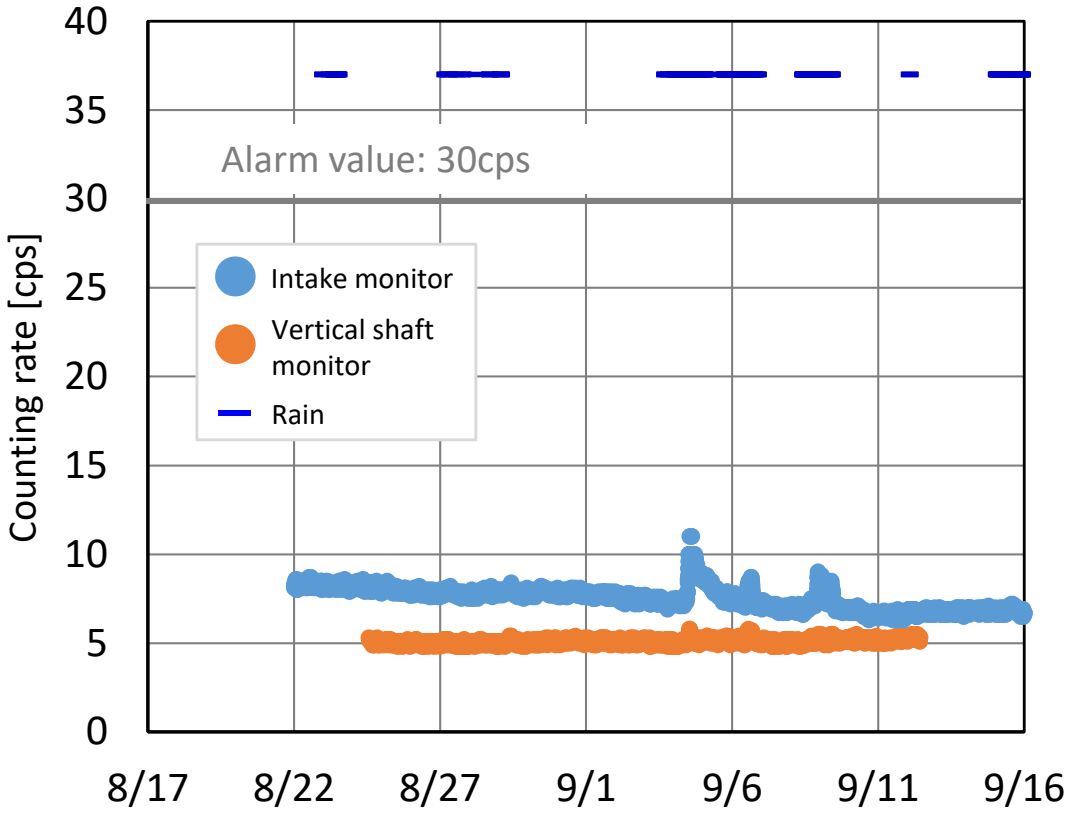
ALPS treated water transfer system schematic for the initial discharge



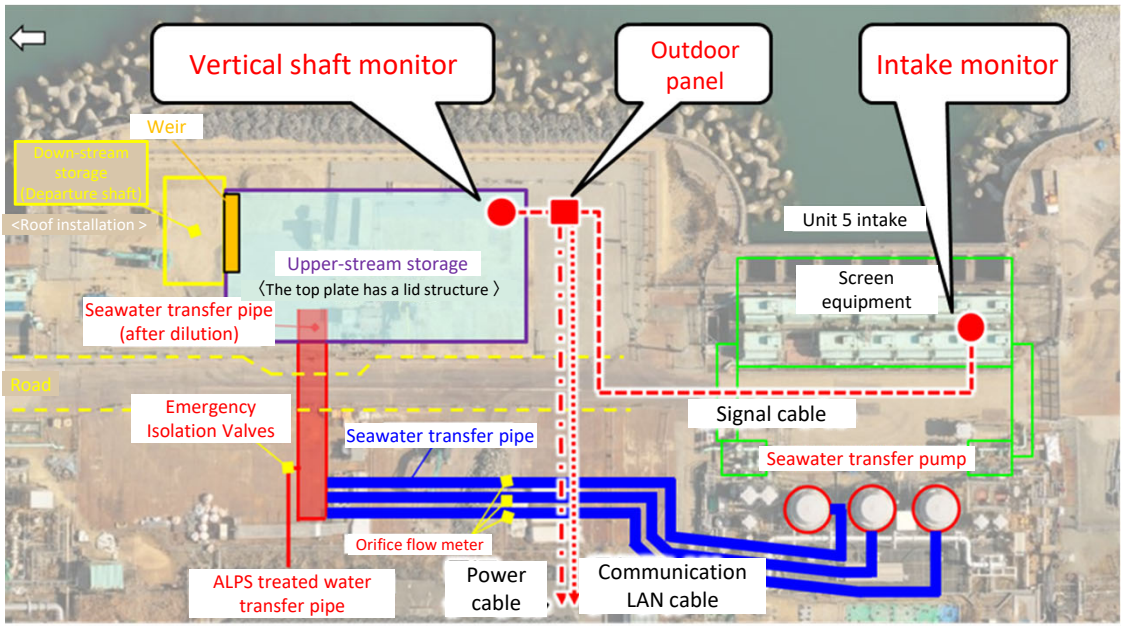
Overview of ALPS treated water dilution/discharge facility

2. Operating parameter records during the initial discharge (3/3)

- A temporary spike assumed to be caused by rainfall was seen in the figures from the intake monitor, but there were no abnormal fluctuations.



Figures of Intake/Vertical shaft monitor



Overview of Intake/Vertical shaft monitor

※Compared with the vertical shaft monitor, the intake monitor is more easily affected by radiation from the surrounding environment (background radiation), so it is believed that the discrepancies are caused by the differences in installation locations.

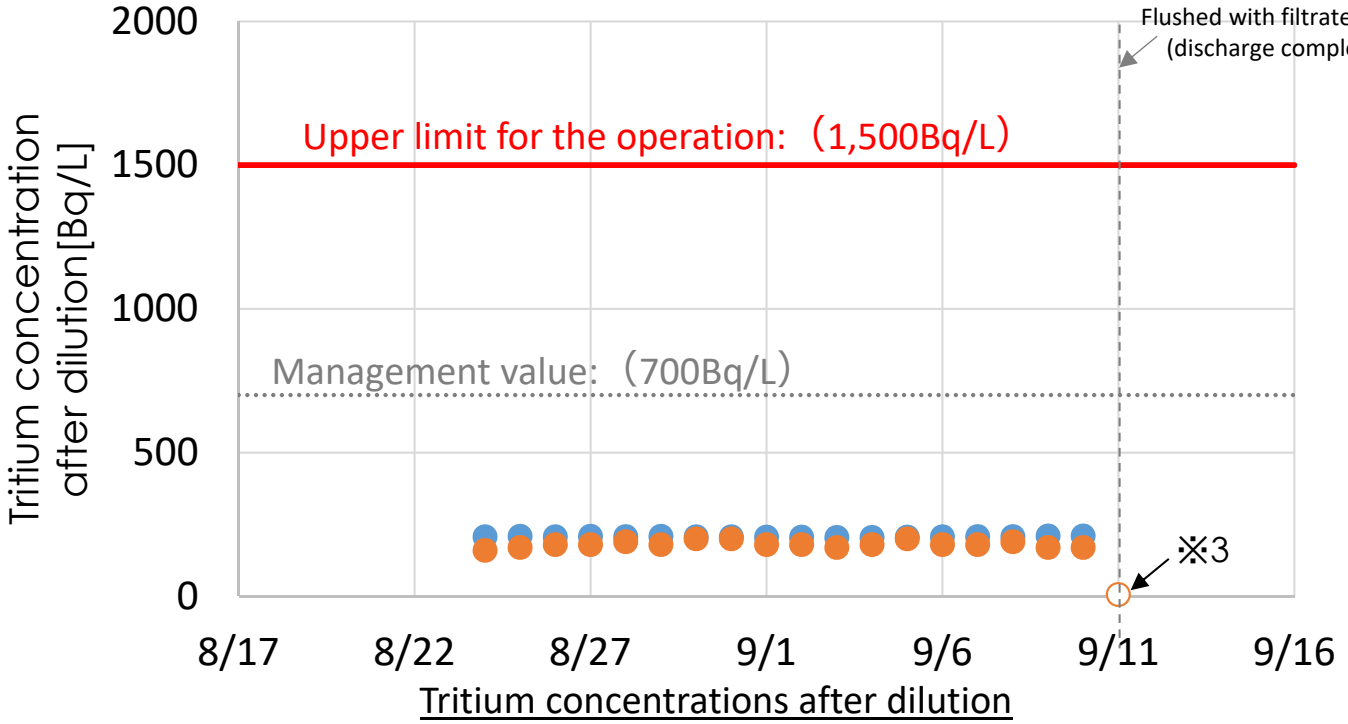
It is believed that during rainfall, the concentration of radioactive materials in seawater increases due to the fallout runoff from onshore areas.

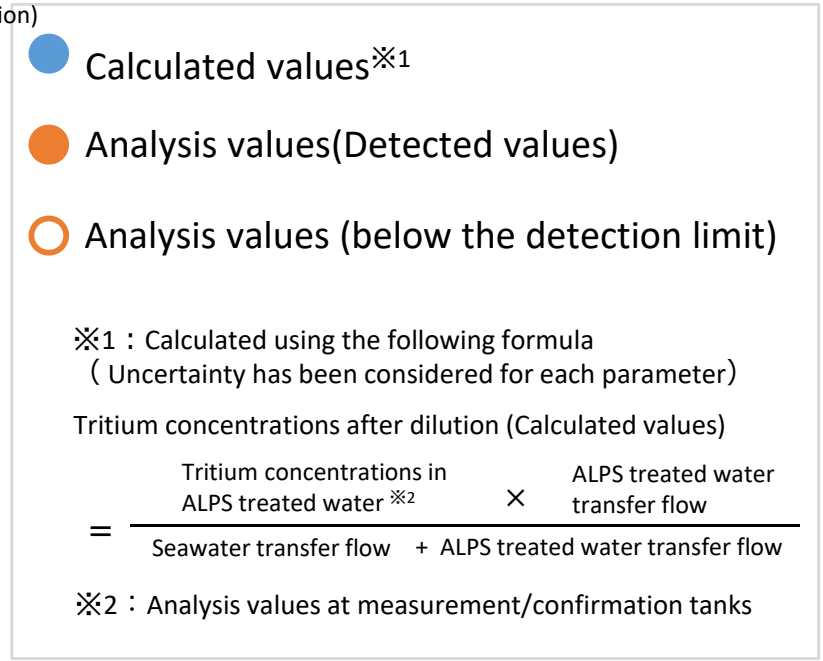
3. Tritium concentrations after dilution during discharge

- During the discharge period, water was sampled daily from the seawater pipe to analyze tritium concentrations.

  ⇒Confirmed to be less than the upper limit for the operation: 1,500Bq/liter

- Furthermore, on September 11, the ALPS treated water transfer pipe was flushed with an amount of filtrated water that exceeds the volume of the pipe and samples were taken afterwards. An analysis of these samples showed no detection (ND; concentrations of radioactive substances were below detection limit) thereby confirming that the water inside the ALPS treated water transfer pipe had been flushed with filtrated water.



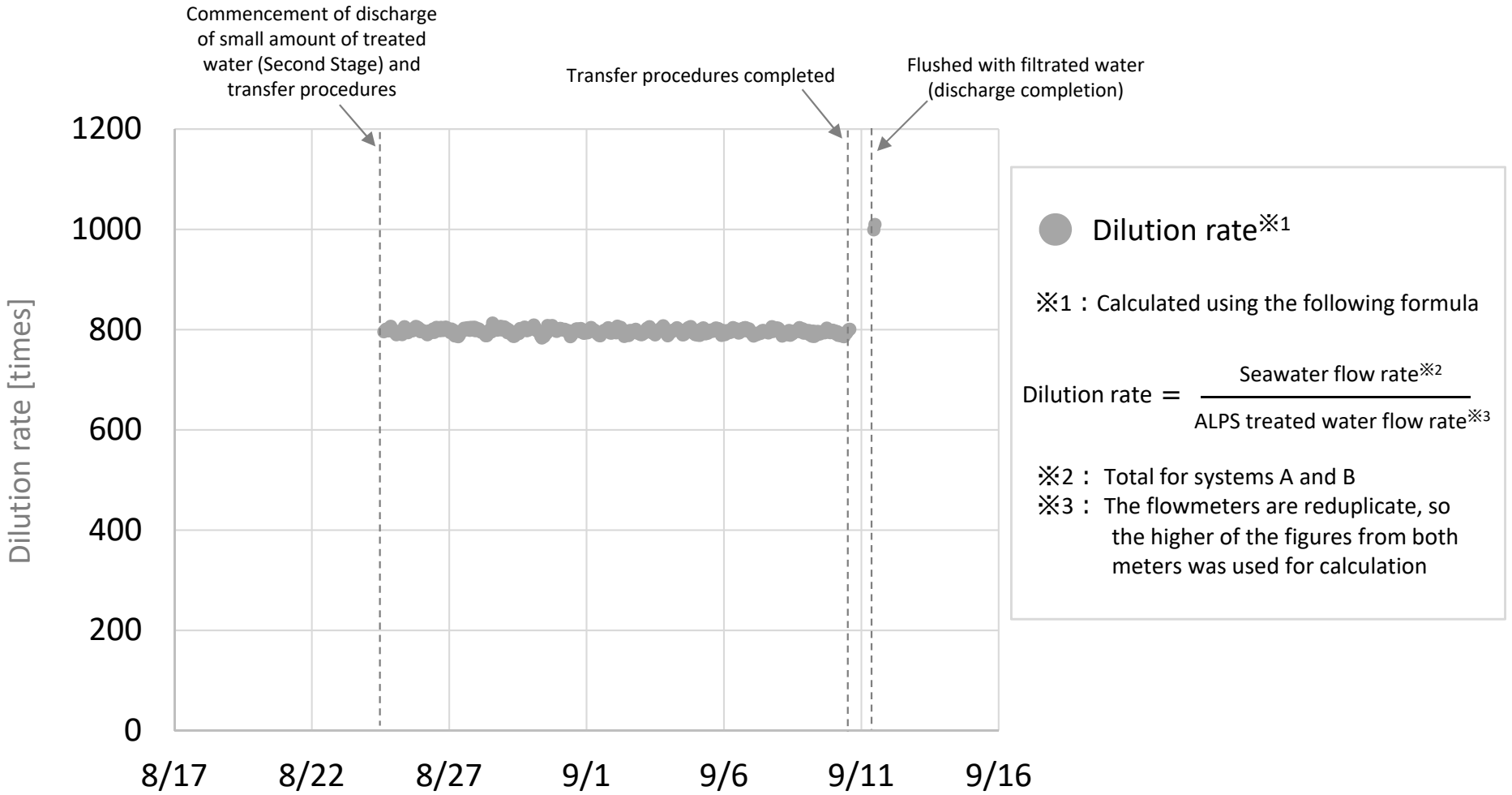


	8/24	8/25～9/10	9/11
Calculated value: Time of data acquisition	16:00	7:00	–
Analysis value: Time of specimen sampling	15:22	7:00～10:00	12:11

※3：No calculated values since the pipes were flushed out with filtrated water.

【Reference】 Dilution rate of ALPS treated water

- The dilution rate was always kept at over 100 times during the discharge.



Dilution rate of ALPS treated water

[Reference] Total radioactivity of nuclides to be measured and assessed (29 nuclides)

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- The following chart shows the total radioactivity (bq) for nuclides to be measured and assessed (29 nuclides) during the initial discharge (Group B). (Calculated from analysis values※1 (Bq/liter) and discharge volume (7,788m³) for each nuclide)

  ※1: It was confirmed that the sum of the ratios of legally required concentrations of the nuclides targeted for measurement/assessment is 0.28 and less than 1.

- The total radioactivity from nuclides for which analysis values were below detection limit (ND) have not been included.

Nuclide	Analysis value (Bq/L)	Total radioactivity (Bq)	Nuclide	Analysis value (Bq/L)	Total radioactivity (Bq)	Nuclide	Analysis value (Bq/L)	Total radioactivity (Bq)
C-14	1.4E+01	1.1E+08	Sb-125	1.8E-01	1.4E+06	U-234※3	<2.1E-02	－
Mn-54	<2.6E-02	－	Te-125m※2	6.4E-02	5.0E+05	U-238※3	<2.1E-02	－
Fe-55	<1.5E+01	－	I-129	2.0E+00	1.5E+07	Np-237※3	<2.1E-02	－
Co-60	3.5E-01	2.7E+06	Cs-134	<3.3E-02	－	Pu-238※3	<2.1E-02	－
Ni-63	<8.8E+00	－	Cs-137	4.7E-01	3.6E+06	Pu-239※3	<2.1E-02	－
Se-79	<9.3E-01	－	Ce-144	<3.6E-01	－	Pu-240※3	<2.1E-02	－
Sr-90	4.1E-01	3.2E+06	Pm-147※2	<3.1E-01	－	Pu-241※2	<5.8E-01	－
Y-90※1	4.1E-01	3.2E+06	Sm-151※2	<1.2E-02	－	Am-241※3	<2.1E-02	－
Tc-99	6.8E-01	5.3E+06	Eu-154	<7.0E-02	－	Cm-244※3	<2.1E-02	－
Ru-106	<2.5E-01	－	Eu-155	<1.9E-01	－			

※2 Analysis values were assessed with radioactive equilibrium

※3 Gross Alpha measurements

4. Sea area monitoring history（1/4）

○ Measurement results of tritium concentrations in water sampled in the vicinity of the discharge outlet (within 3km of the power station) and outside of the vicinity of the discharge outlet (within a 10km square in front of the power station) since the commencement of the discharge on August 24 were all below indices (discharge suspension level and investigation level).

○ For quick tritium measurements taken in the vicinity of the discharge outlet, we will initially increase the frequency from once a week to daily after the commencement of the discharge and promptly disclose the results.

（Unit：Bq/L）

	Sampling location	Frequency	August											
			24*1	24 conventional*2	25	26	26 conventional*3	27	28	29	30	30 conventional*2,3	31	31 conventional*3
In the vicinity of the discharge outlet	T-1	Once a week*	<6.3	<0.34	<5.6	<6.6	Being measured	<6.2	<7.3	<5.9	<6.4	1.0	<6.8	—
	T-2	Once a week*	<6.3	<0.33	<5.5	<6.5	Being measured	<6.2	<7.3	<5.9	<6.3	1.3	<6.8	—
	T-0-1	Once a week*	<8.0	<0.34	<6.8	<6.1	Being measured	<6.1	—*4	—*4	<6.8	<0.32	<8.2	—
	T-0-1A	Once a week*	<4.6	2.6	<7.6	<6.2	Being measured	<6.1	—*4	—*4	<6.9	0.43	10	—
	T-0-2	Once a week*	<8.1	<0.35	<6.8	<6.1	Being measured	<6.1	—*4	—*4	<6.8	1.4	<8.2	—
	T-0-3A	Once a week*	<4.7	<0.33	<7.6	<6.8	Being measured	<6.8	—*4	—*4	<7.6	<0.32	<5.1	—
	T-0-3	Once a week*	<8.0	<0.34	<6.9	<6.1	Being measured	<6.1	—*4	—*4	<6.8	<0.31	<8.3	—
	T-A1	Once a week*	<6.6	<0.32	<7.6	<6.8	Being measured	<6.8	—*4	—*4	<7.6	1.1	<5.1	—
	T-A2	Once a week*	<6.6	<0.32	<7.6	<6.8	Being measured	<6.8	—*4	—*4	<7.7	1.5	<5.1	—
	T-A3	Once a week*	<6.6	<0.32	<6.9	<6.8	Being measured	<6.8	—*4	—*4	<7.6	1.1	<5.2	—
Outside the vicinity of the discharge outlet	T-D5	Once a week	—	—	—	—	—	—	—	—	—	—	<6.8	Being measured
	T-S3	Once a month	—	—	—	—	—	—	—	—	<7.6	Being measured	—	—
	T-S4	Once a month	—	—	—	—	—	—	—	—	<7.7	Being measured	—	—
	T-S8	Once a month	—	—	—	—	—	—	—	—	<7.7	Being measured	—	—

※：A “less than” symbol (<) indicates that the analysis result was less than the detection limit.
*：Monitored daily for the time being after the commencement of discharge

*1：Sampled after the commencement of discharge at 3PM
*2：Detection limit 0.4 Bq/L
*3：Detection limit 0.1 Bq/L
*4：Sampling suspended due to rough seas

4. Sea area monitoring history（2/4）

（Unit：Bq/L）

	Sampling location	Frequency	September											
			1	2	3	4	4 conventional*1	5	6	6 conventional*1	7	8	9	10
In the vicinity of the discharge outlet	T-1	Once a week*	<7.2	<6.8	<5.8	<6.6	0.68	<7.1	<7.1	–	<6.1	<5.9	<6.0	<7.8
	T-2	Once a week*	<7.4	<6.8	<5.8	<6.6	0.90	<7.1	<7.1	–	<6.1	<5.9	<6.0	<7.8
	T-0-1	Once a week*	<7.3	<7.3	<6.8	<6.9	Being measured	<6.6	<6.6	–	<8.7	<6.9	<8.0	<7.0
	T-0-1A	Once a week*	<7.3	<8.2	<6.8	<6.9	Being measured	<7.0	<6.6	–	<8.7	<6.9	<8.0	<7.1
	T-0-2	Once a week*	<7.3	<7.3	<6.7	<7.0	0.74	<6.5	<6.6	–	<8.6	<6.8	<8.0	<7.0
	T-0-3A	Once a week*	<7.0	<7.8	<6.5	<5.9	Being measured	<7.6	<6.3	–	<5.3	<7.4	<6.5	<6.5
	T-0-3	Once a week*	<7.3	<8.2	<6.7	<6.8	Being measured	<7.8	<6.6	–	<8.7	<6.9	<8.0	<7.1
	T-A1	Once a week*	<7.1	<7.9	<6.5	<5.9	1.1	<7.6	<6.3	–	<5.3	<7.4	<6.4	<6.5
	T-A2	Once a week*	<7.1	<7.8	<6.5	<7.3	0.88	<7.6	<6.2	–	<5.3	<7.3	<6.6	<6.4
	T-A3	Once a week*	<7.1	<7.9	<6.5	<7.3	0.82	<7.6	<6.3	–	<5.3	<7.3	<6.5	<6.5
Outside the vicinity of the discharge outlet	T-D5	Once a week	–	–	–	–	–	–	<7.1	Being measured	–	–	–	–
	T-S3	Once a month	–	–	–	–	–	–	–	–	–	–	–	–
	T-S4	Once a month	–	–	–	–	–	–	–	–	–	–	–	–
	T-S8	Once a month	–	–	–	–	–	–	–	–	–	–	–	–

※：A “less than” symbol (<) indicates that the analysis result was less than the detection limit.

*：Monitored daily for the time being after the commencement of discharge

*1：Detection limit 0.4 Bq/L

4. Sea area monitoring history（3/4）

（Unit：Bq/L）

	Sampling location	Frequency	September											
			11*1	11 conventional*2	12	12 conventional*2	13	13 conventional*2	14	15	16	17	18	18 conventional*3
In the vicinity of the discharge outlet	T-1	Once a week*	<7.0	Being measured	<7.2	–	<7.2	–	<6.5	<7.3	<6.7	<7.0	<7.6	Being measured
	T-2	Once a week*	<7.0	Being measured	<7.2	–	<7.2	–	<6.5	<7.4	<6.8	<6.9	<7.6	Being measured
	T-0-1	Once a week*	<6.8	Being measured	<7.7	–	<6.6	–	<7.5	<7.8	<7.6	<7.8	<7.4	Being measured
	T-0-1A	Once a week*	<6.8	Being measured	<7.8	–	<6.5	–	<7.5	<7.7	<7.5	<7.7	<7.3	Being measured
	T-0-2	Once a week*	<6.8	Being measured	<7.7	–	<6.5	–	<7.5	<7.7	<7.6	<7.7	<7.3	Being measured
	T-0-3A	Once a week*	<6.2	Being measured	<7.0	–	<5.9	–	<6.6	<7.4	<6.8	<6.9	<7.6	Being measured
	T-0-3	Once a week*	<6.8	Being measured	<7.8	–	<6.5	–	<7.5	<7.7	<7.5	<7.8	<7.3	Being measured
	T-A1	Once a week*	<7.0	Being measured	<7.0	–	<5.9	–	<6.7	<5.5	<7.2	<5.5	<6.7	Being measured
	T-A2	Once a week*	<7.0	Being measured	<7.0	–	<5.9	–	<6.7	<5.5	<7.3	<5.4	<6.7	Being measured
	T-A3	Once a week*	<7.0	Being measured	<7.0	–	<5.9	–	<6.7	<5.5	<7.2	<5.5	<6.7	Being measured
Outside the vicinity of the discharge outlet	T-D5	Once a week	–	–	–	–	<7.2	Being measured	–	–	–	–	–	–
	T-S3	Once a month	–	–	<7.1	Being measured	–	–	–	–	–	–	–	–
	T-S4	Once a month	–	–	<7.1	Being measured	–	–	–	–	–	–	–	–
	T-S8	Once a month	<6.2	Being measured	–	–	–	–	–	–	–	–	–	–

※：A “less than” symbol (<) indicates that the analysis result was less than the detection limit.
*：Monitored daily for the time being after the commencement of discharge

*1：Sampled before 9AM, prior to the completion of the discharge
*2：Detection limit 01 Bq/L　*3：Detection limit 0.4 Bq/L

4. Sea area monitoring history（4/4）

（Unit：Bq/L）

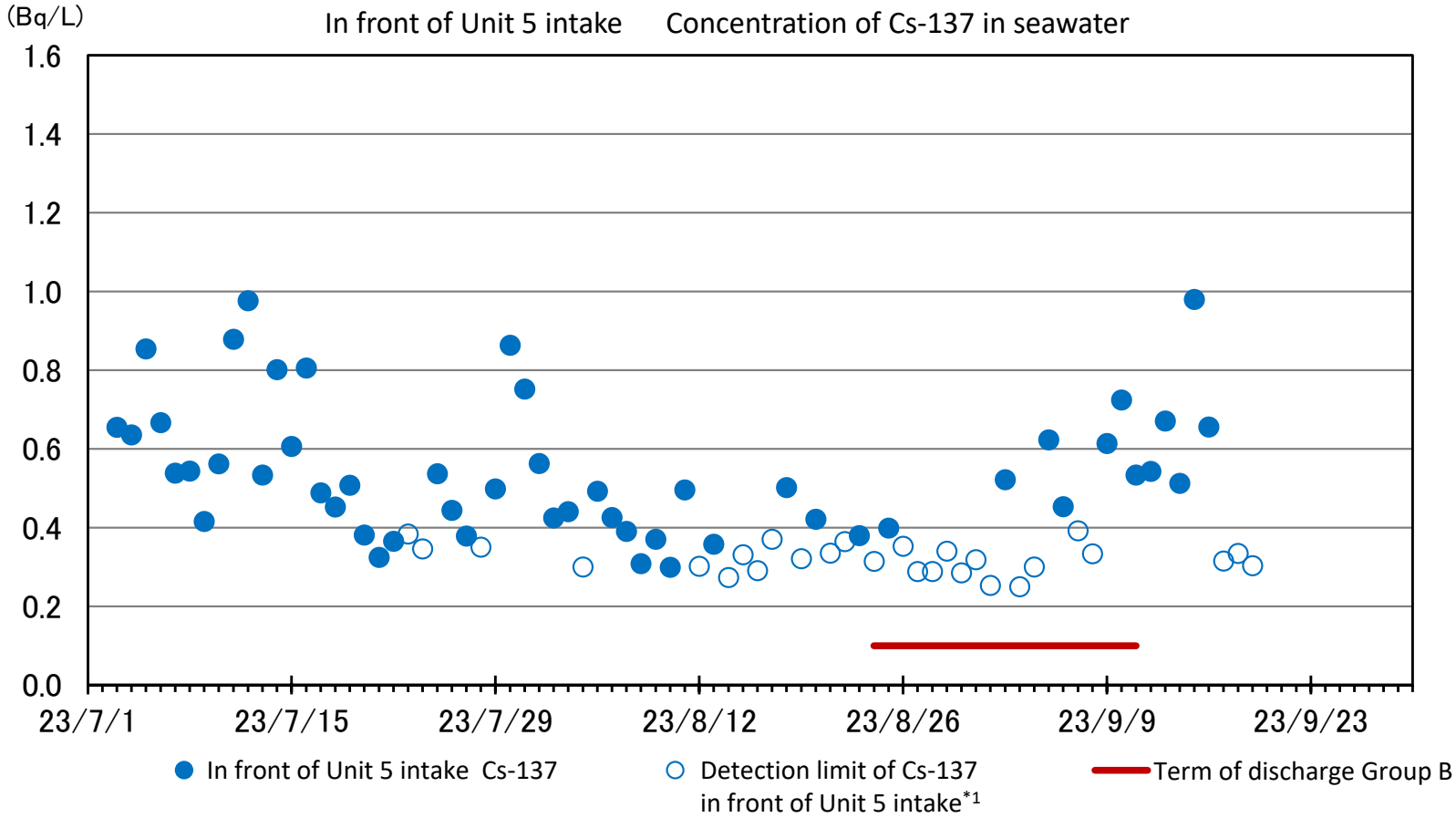
	Sampling location	Frequency	September								
			19	20	20 conventional*1	21	22	23	24	25	25 conventional*1
In the vicinity of the discharge outlet	T-1	Once a week*	<5.0	<6.9	–	<5.0	<5.3	<6.5	<6.7	<7.2	Being measured
	T-2	Once a week*	<5.0	<6.9	–	<5.0	<5.3	<6.5	<6.7	<7.2	Being measured
	T-0-1	Once a week*	<5.5	<7.9	–	<6.5	<6.3	<6.5	<7.6	<8.7	Being measured
	T-0-1A	Once a week*	<5.6	<8.2	–	<6.5	<6.3	<6.5	<7.5	<8.7	Being measured
	T-0-2	Once a week*	<5.6	<7.9	–	<6.5	<6.2	<6.5	<7.5	<8.7	Being measured
	T-0-3A	Once a week*	<5.0	<6.1	–	<5.0	<5.3	<6.5	<6.7	<7.2	Being measured
	T-0-3	Once a week*	<5.5	<7.9	–	<6.5	<6.3	<6.5	<7.5	<8.7	Being measured
	T-A1	Once a week*	<6.9	<5.9	–	<6.6	<7.0	<7.6	<5.1	<6.3	Being measured
	T-A2	Once a week*	<6.9	<5.9	–	<6.7	<7.0	<7.6	<5.1	<6.3	Being measured
	T-A3	Once a week*	<7.0	<6.3	–	<6.6	<7.0	<7.6	<5.1	<6.3	Being measured
Outside the vicinity of the discharge outlet	T-D5	Once a week	–	<6.1	Being measured	–	–	–	–	–	*2
	T-S3	Once a month	–	–	–	–	–	–	–	–	–
	T-S4	Once a month	–	–	–	–	–	–	–	–	–
	T-S8	Once a month	–	–	–	–	–	–	–	–	–

※：A “less than” symbol (<) indicates that the analysis result was less than the detection limit.
*：Monitored daily for the time being after the commencement of discharge

1：Detection limit 0.4 Bq/L　2：To be sampled on September 27

5. Unit 5 intake channel monitoring

- Monitoring results during the discharge of treated water have confirmed that values are similar to those prior to discharge and there were no fluctuations.



*1: Detection limit is displayed on the graph when the concentration is lower than detection limit.

※The location of seawater monitoring inside the Unit 5/6 intake open channel has been changed to the sampling location near the intake for seawater to be used for dilution (changed from “in front of the Unit 6 intake” to “in front of the Unit 5 intake”).

6. Facility inspection results

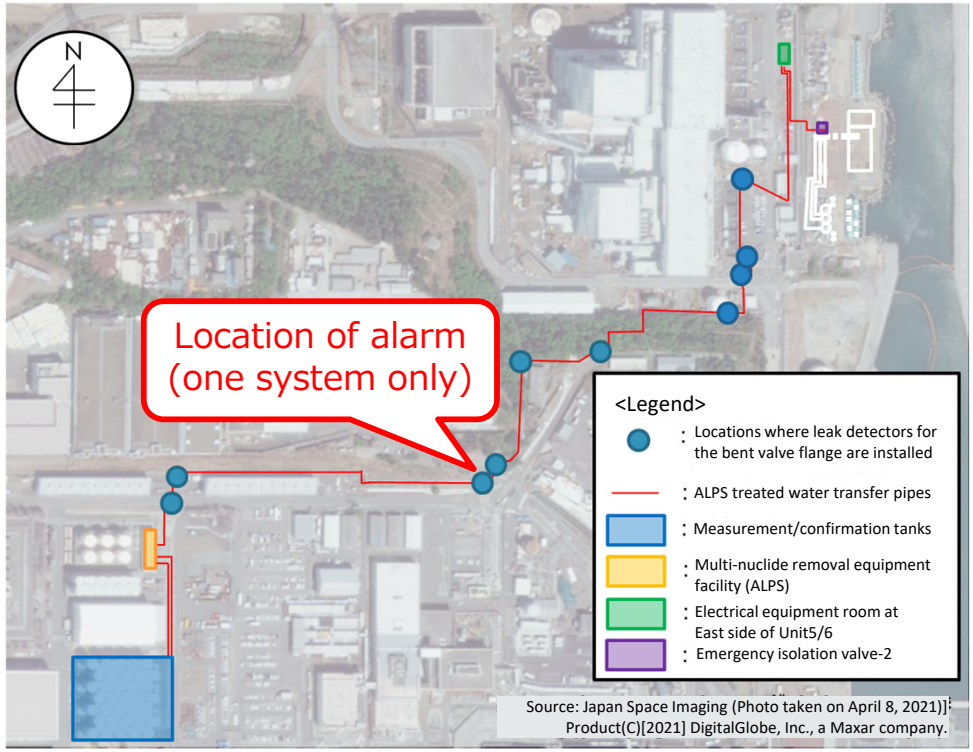
- We have performed daily patrol inspections since the commencement of discharge and have confirmed that there are no abnormalities with facilities. Furthermore, after the completion of initial discharge from tank group B, we have performed the inspection of entire facilities and have confirmed that there are no abnormalities. Main inspection details are as follows:

Facility name	Patrol Inspection details	Inspection after the completion of initial discharge	Results
Measurement/ confirmation facility	**External inspection (measurement/confirmation tanks)** - Visual check for any abnormalities	**Inspections implemented in accordance with the long-term inspection plan (agitators/MO valves)** - Insulation resistance measurement - Check for leakage thorough the valve seat	No abnormalities
Transfer facility	**External inspection (ALPS treated water transfer pump/transfer pipes)** - Visual check for abnormalities - Check for abnormal sounds using tool	**External inspection (ALPS treated water transfer pump/transfer pipes)** - Visual check for abnormalities **Internal inspection (vent valve waterproof cover)** - Check for leaks from the vent valve flange **Miscellaneous** - Strainer cleaning, check for leakage through MO valve seat	No abnormalities*
Dilution facility	**External inspection (seawater transfer pipes/seawater pipe header, etc.)** - Visual check for abnormalities - Check for abnormal sounds using tool **External inspection (discharge vertical shaft (upper-stream storage))** - Visual check for abnormalities	**External inspection (seawater transfer pipes/seawater pipe header, etc.)** - Visual check for abnormalities **External inspection (discharge vertical shaft (upper-stream storage))** - Check for abnormalities in the concrete surface - Check for abnormalities with the surface of the waterproof sealant (cracks/flaking, etc.) - Check for sediment inside the upper-stream storage	No abnormalities*
Discharge facility	**External inspection (discharge vertical shaft (down-stream storage))** - Visual check for abnormalities ※ Submerged areas, such as the discharge tunnel, etc., have been omitted from these inspections		No abnormalities
Seawater intake facility	**External inspection (partitioning weirs)** - Visual check for abnormalities		No abnormalities

＊Details can be found on the following pages

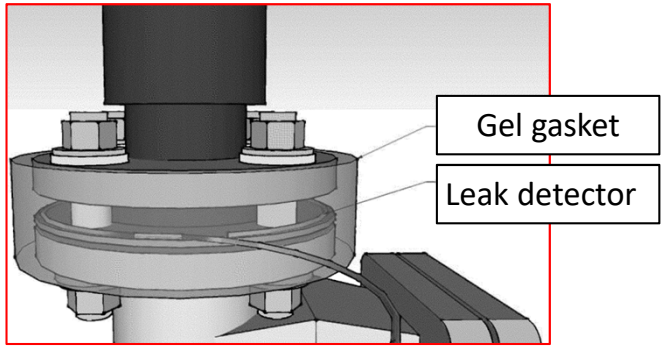
6-1. Transfer facility inspection results (vent valve waterproof cover)

- There are 10 vent valves installed on the ALPS treated water transfer pipes and each flange has been equipped with redundant leak detectors .
- On Wednesday, September 6, an alarm went off for the leak detector installed on the vent valve flange shown at the location in the following diagram (one system only). After removing the vent valve waterproof cover and insulation, it was confirmed that there was no leak from the flange, and moisture was found inside the waterproof cover that was determined to be either rainwater or condensation.
- After revising installation methods for all of the waterproof covers, the flange was waterproofed once again.

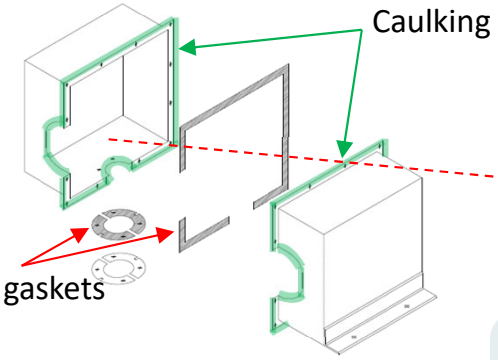


Installation location of vent valve flange leak detector

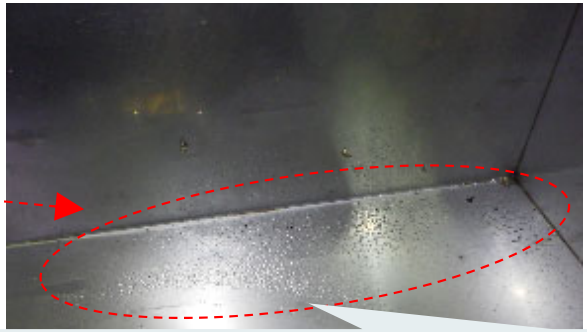
Outer appearance of the waterproof cover



Flange diagram



Waterproof cover structure



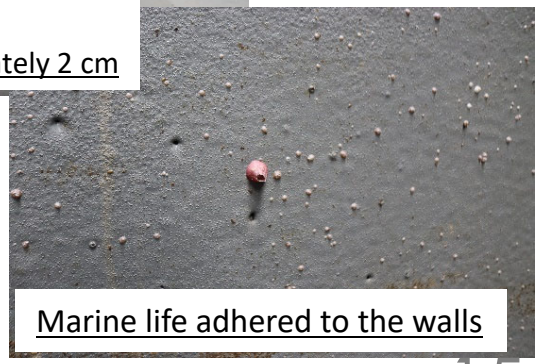
Salinity measurements were 0.00%, so it was determined that the aforementioned moisture was not ALPS treated water, but rather rainwater or condensation

6-2. Dilution facility inspection (Discharge vertical shaft (upper-stream storage)) (1)

- Upper-stream storage internal inspection results are as follows:
  - There are no cracks in the waterproof coating and the water storage remains waterproof
  - Coating was found to have bubbled (width: more than 10 cm) in four locations
  - The amount of sediment did not hinder the inspection
  - Marine life (barnacles) were found to have adhered to the walls

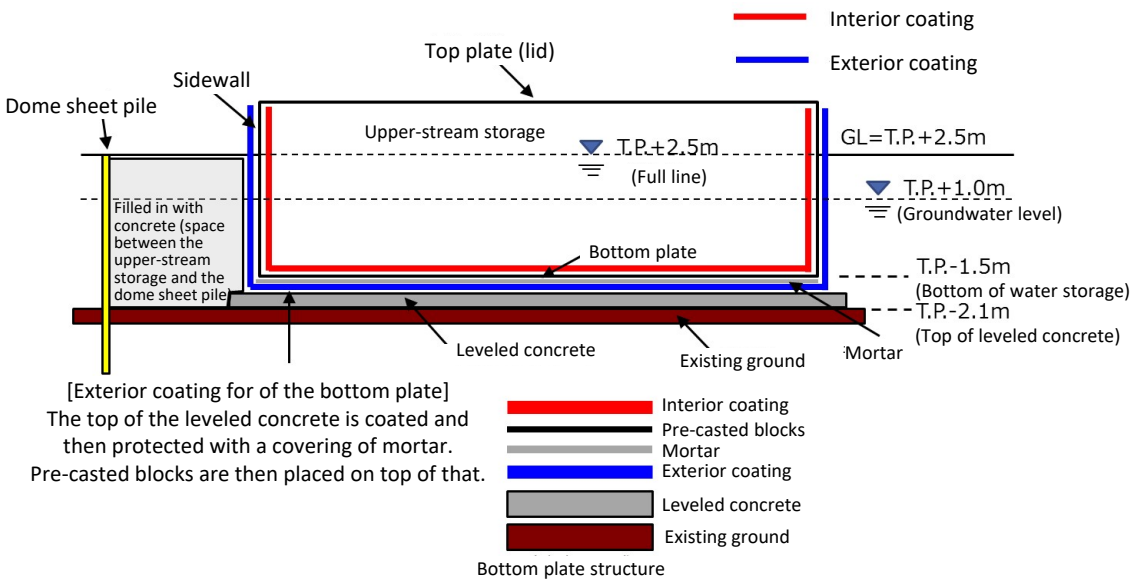
Inside upper-stream storage

Inside upper-stream storage
※Sediments depth: Approximately 2 cm



Marine life adhered to the walls

Measures for maintaining the waterproof function of the upper-stream storage



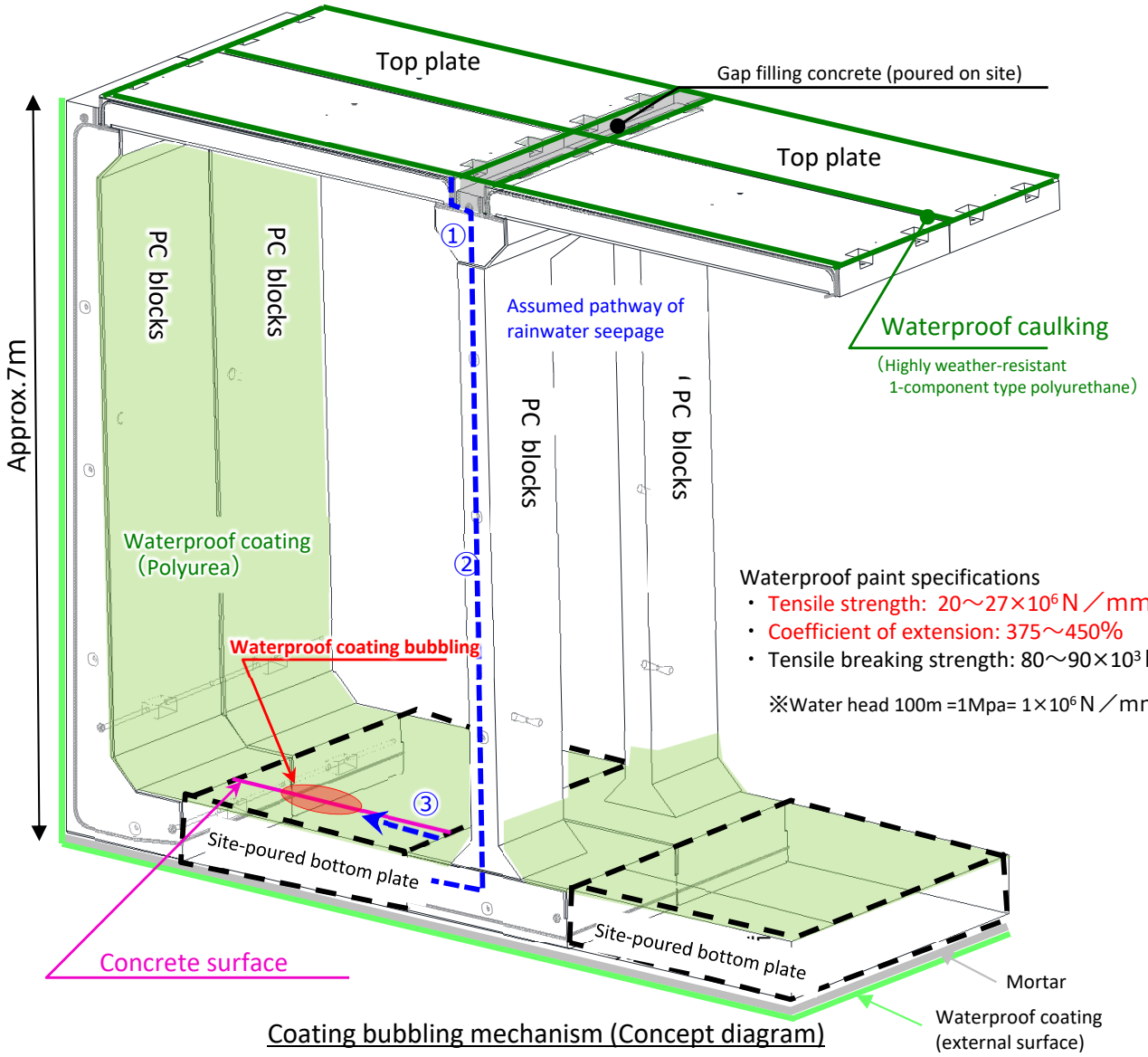
⇒Waterproof coating applied to external and internal surfaces. Filling in the surrounding area with concrete helps to reinforce waterproof function.

⇒Waterproof function was verified during the pre-use inspection through pressure resistance and leak test

6-2. Dilution facility inspection (Discharge vertical shaft (upper-stream storage)) (2)

- The coating has bubbled in some locations but the membrane is intact※ and still functions as a waterproof layer.
- Rain water seeping in from the top plate was the cause of the bubbling, but this seepage was exasperated by flaking of the waterproof coating of the top plate caused by the frequent travel of workers and observers over the top plate.

※ Considering the coefficient of extension and the fact that there are no cracks in the membrane, integrity has been deemed to be intact

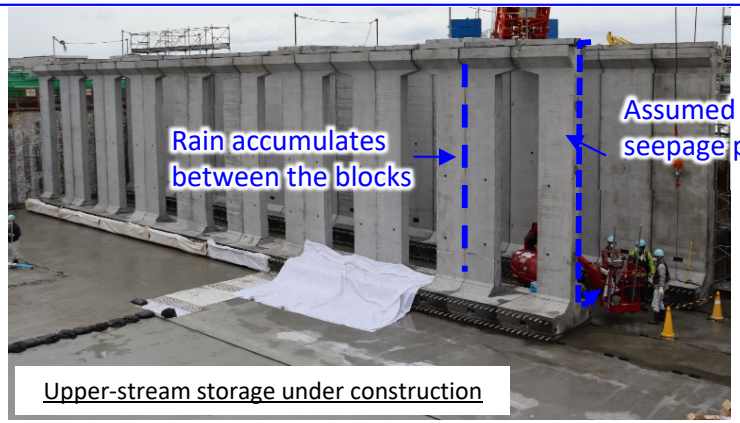


Coating bubbling mechanism (Concept diagram)

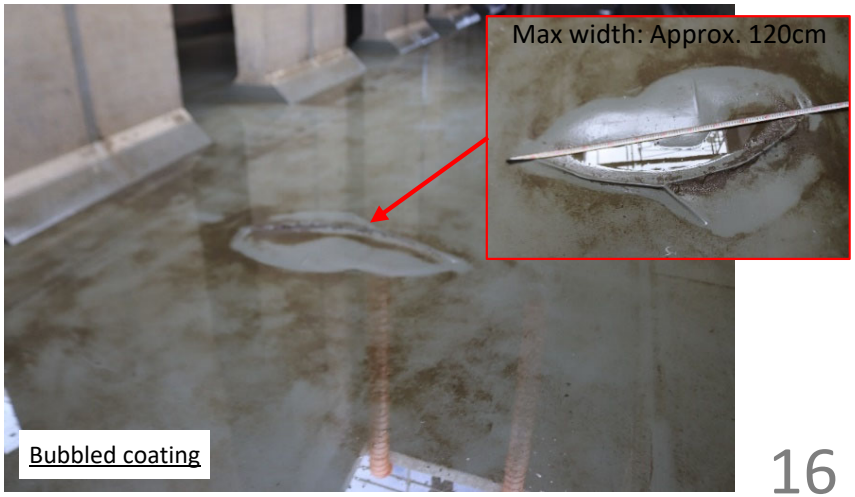
Waterproof paint specifications
- Tensile strength: $20 \sim 27 \times 10^6$ N／mm^2
- Coefficient of extension: 375～450%
- Tensile breaking strength: $80 \sim 90 \times 10^3$ N／m

※Water head 100m =1Mpa= 1×10^6 N／mm^2

– Cause of bubbling –
① Some rain seeped in from the top plate during construction and some rain water has seeped in through locations where the waterproof caulking has flaked off.
② This rainwater accumulated between the PC blocks. Since there is no way for the water to escape, the gap between the blocks became filled with water.
③ Water head pressure was applied to the surface of the bottom plate concrete due to the accumulated water between the blocks. When the water head pressure exceeds the adhesive power of the waterproof paint on the bottom plate, the paint bubbles.



Upper-stream storage under construction

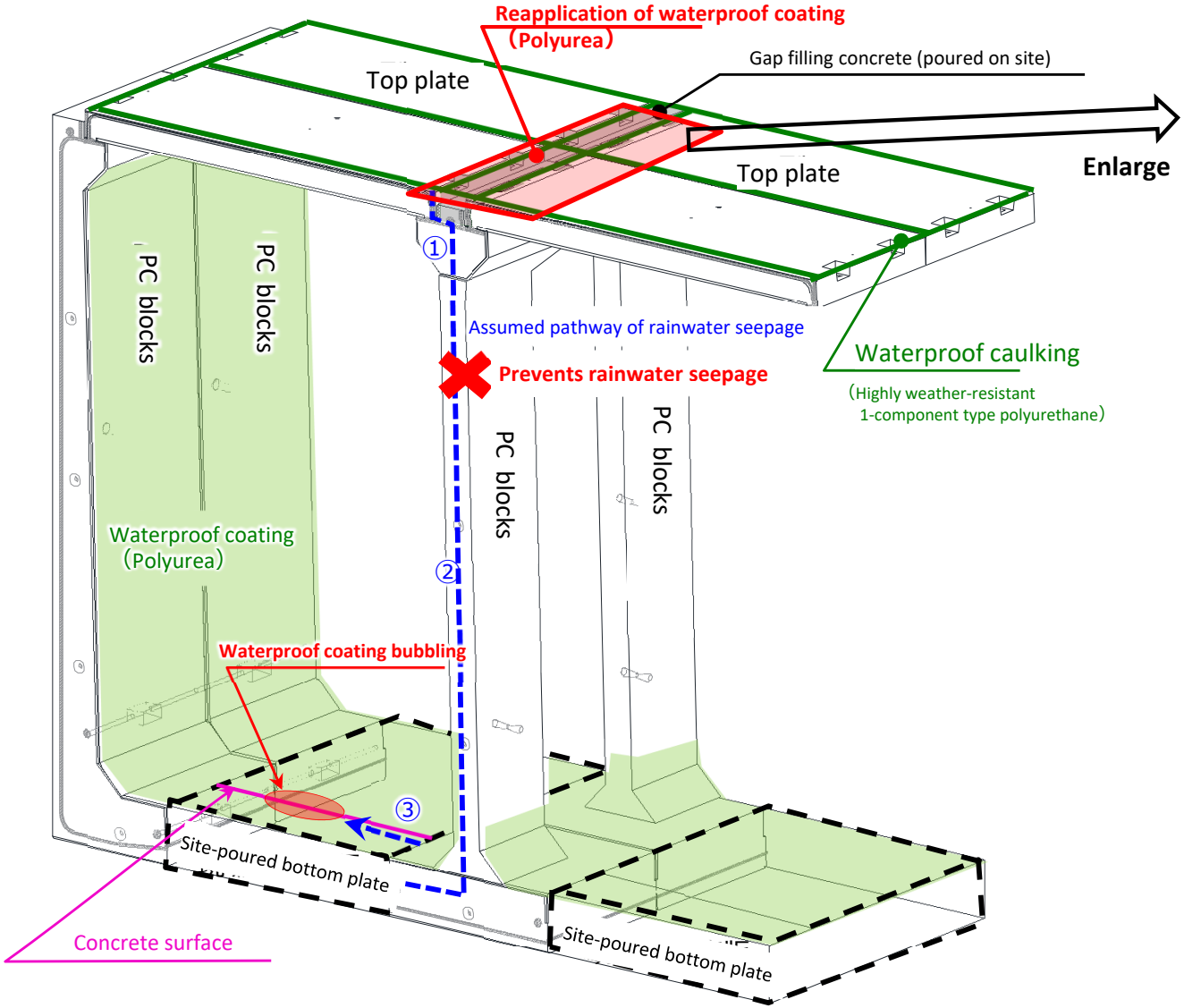


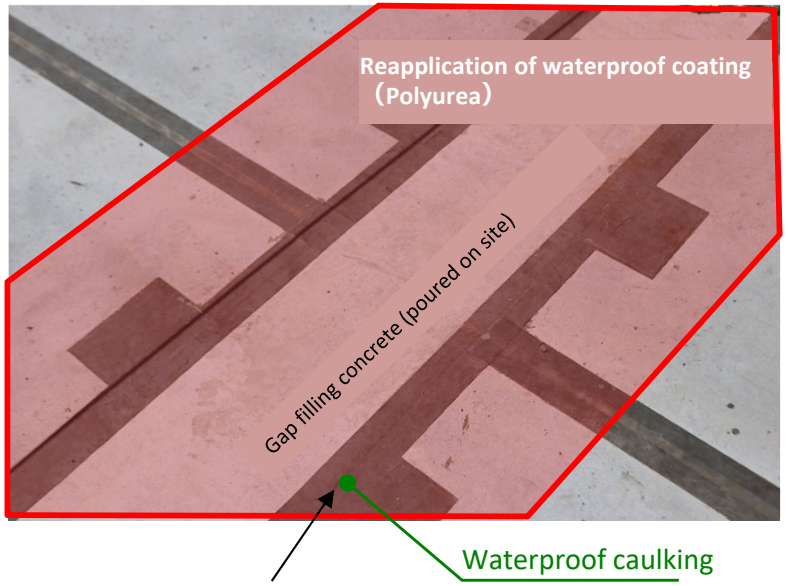
Bubbled coating

6-2. Dilution facility inspection (Discharge vertical shaft (upper-stream storage)) (3)

Countermeasures to be implemented

- Waterproof coating will be periodically applied to areas near the gap-filling concrete on the top plate as a countermeasure to prevent rainwater seepage (the area where the coating bubbled has already been applied the measure to prevent further bubbling)
- Measures to protect the caulking on the top plate will also be implemented, such as building a safety path that limits where people can walk on the top plate

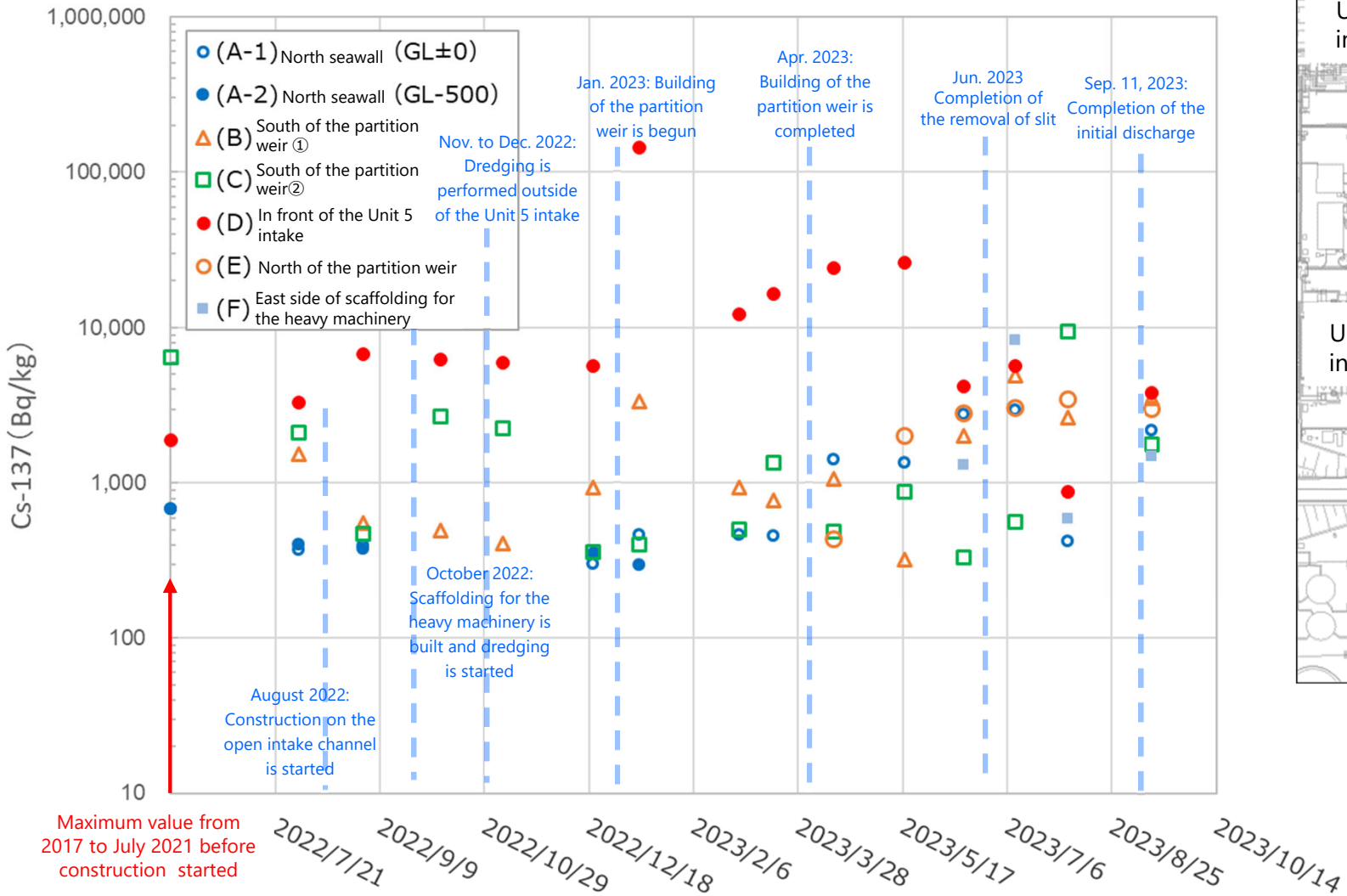


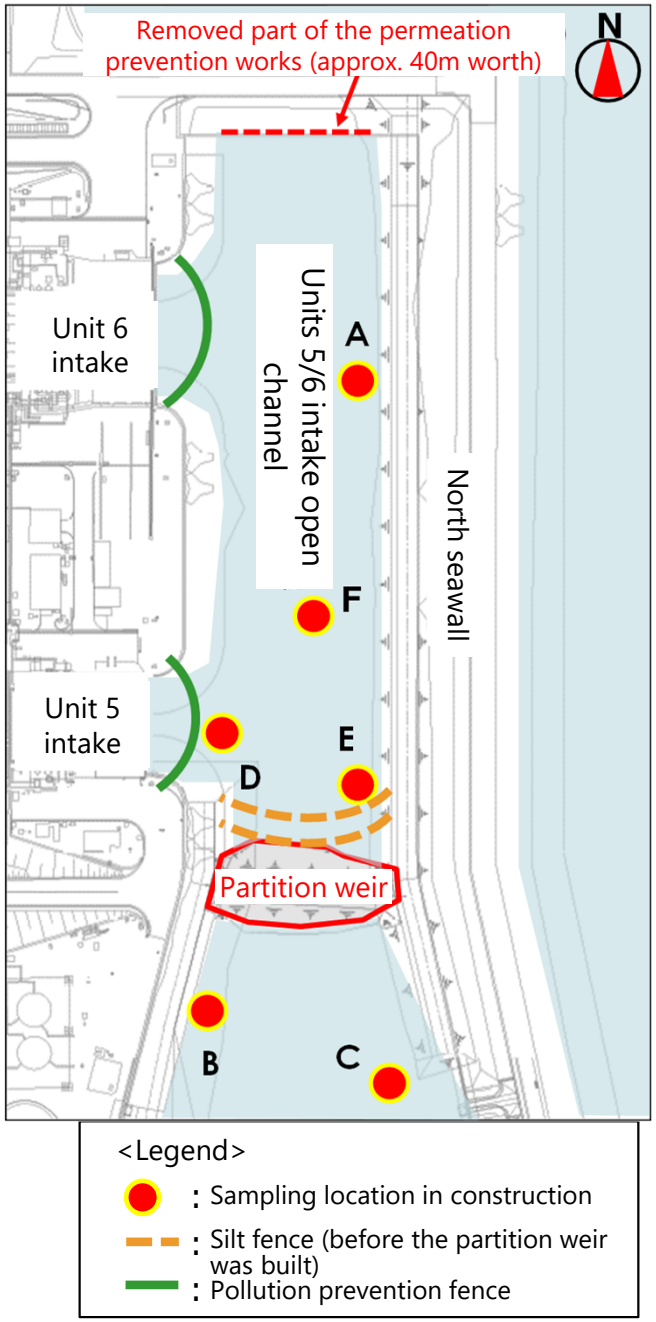


Waterproof caulking damaged by fieldwork (rubbing hoses) and footsteps

7. Monitoring results for seabed soil inside the Unit 5/6 intake open channel

- Monitoring results from in front of the Unit 5 intake showed higher readings during the construction of partition weir, but these readings decreased in conjunction with the completion of the removal of slit and we have confirmed that there were no significant fluctuations during the discharge.
- We will continue to monitor the seabed soil and maintain the improved environment inside the Unit 5/6 intake open channel.





8-1. FY2023 Discharge Plan

- Following the completion of the inspection after the initial discharge, we will commence the 1st Stage of the second discharge on October 3. The 2nd Stage, which marks the beginning of the second discharge of ALPS treated water into the sea, will start on October 5.

1st discharge	Measurement/confirmation facility (K4 area) Group B:	Approx. 7,800m^3	Secondary treatment: No Tritium concentration: 140,000Bq/liter Total amount of tritium: 1.1 trillion Bq	Completed
2nd discharge	Measurement/confirmation facility (K4 area) Group C:	Approx. 7,800m^3	Secondary treatment: No Tritium concentration: 140,000Bq/liter Total amount of tritium: 1.1 trillion Bq	Details on the next page
3rd discharge	Measurement/confirmation facility (K4 area) Group A:	Approx. 7,800m^3	Secondary treatment: No Tritium concentration: 130,000Bq/liter ※1 Total amount of tritium: 1.0 trillion Bq ※1	
4th discharge	K4 area Group E (Transferred to Measurement/confirmation facility group B ※2):	Approx. 4,500m^3	Secondary treatment: No Tritium concentration: 170,000～210,000Bq/liter ※1 Total amount of tritium: 1.4 trillion Bq ※1	
	K3 area Group A (Transferred to Measurement/confirmation facility group B ※2):	Approx. 3,300m^3		

➥ Total amount of tritium discharged during FY2023: Approx. 5 trillion Bq

※1 Average value of the tank group that was assessed taking into account the radioactive decay until July 1, 2023

※2 To be transferred to K4 area tank group B that will be empty after the 1st discharge is completed

8-2. Outline of Second Discharge for Group K4-C

Outline of discharge for group K4-C			
Attributes of the treated water	Concentration of the 29 types of radionuclides (excluding tritium) in scope of measurement/evaluation	Within regulatory requirements (sum of the ratios of legally required concentrations of radioactive substances is less than 1) (sum of the ratios of concentration: 0.25*) (details on p1 of the link)	
	Tritium concentration	140,000Bq/liter (details on p2 of the link)	
	Concentration of the 39 significant types of radionuclides measured voluntarily	No significant radionuclides identified (details on p3 of the link)	
	Status of water quality assessment	Within government and prefectural requirements (details on p4 of the link)	
	Water temperature	Same as outdoor temperature. After diluted to 740 times, same as sea water temperature (not the same as plant's thermal discharge)	
Expected volume of treated water discharge		Approximately 7,800m^3	
Treated water flow rate		Approximately 460m^3/day (set not to exceed designed maximum on 500m^3/day)	
Dilution sea water flow rate		Approximately 340,000m^3/day (same speed as walking in the tunnel [approximated 1m/second])	
Concentration of tritium after dilution		Approximated 190Bq/liter	
Term of discharge		Approximately 17 days	

※ Comparison of concentrations before/after sea water dilution

	Before dilution		After dilution (740 times)	
29 types	0.25	⇒	0.00034	0.0035 (1/290 of government requirements)
Tritium	2.33	⇒	0.0032	

9. Analysis results for the next tank group from which the ALPS treated water will be discharged (Group C)

TEPCO

- On September 21, 2023, pre-discharge analysis results were obtained for the samples taken from the measurement/confirmation tank (Group C) (sampled on June 26, 2023). **It was confirmed that the water satisfies discharge requirements (Table 1)**.
  - Item 1: For 29 nuclides to be measured and assessed, the sum of the ratios of the concentration of each radionuclide to the regulatory concentration is 0.25, and it is confirmed to be less than 1.
  - Item 2: Analysis results of tritium concentration is 14 x 10^4 Bq/liter, and it is confirmed to be less than 1 million Bq/liter.
  - Item 1/2: The external agency consigned by TEPCO (Kaken) and the third-party consigned by the Japanese Government (JAEA)*1 obtained the same results from their analyses.
  - Item 3/4: It was confirmed that operational targets have been satisfied.

*1 ALPS treated water third-party analysis (https://fukushima.jaea.go.jp/okuma/alps/index_e.html)

Table 1． Pre-discharge analysis results of water in the measurement/confirmation tanks (Group C)

Items		Requirement basis	Operational Target	Analysis Results
①	Nuclide to be measured and assessed (29 nuclides)	Implementation plan	the sum of the ratios of the concentration of each radionuclide to the regulatory concentration, excerpt for tritium, is less than 1	**0.25 (< 1)**
②	Tritium		Tritium concentration is less than 1 million Bq/liter	**140,000Bq/liter (less than 1 million Bq/liter)**
③	nuclides voluntarily checked to ensure that they are not significantly present (39 nuclides)	Voluntary	No significant concentrations founds of any of the nuclides	**None of the nuclides are present in significant consternation**
④	general water quality: 44 criteria		Pre-check of water quality standerds*2	**All criteria satisfied**

*2 Water sampled from the discharge vertical shaft (upper-stream storage) once a year to confirm that legal requirements are being satisfied

[Reference] Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (1/4)

TEPCO

- For 29 nuclides to be measured and assessed, **the sum of the ratios of the concentration of each radionuclide to the regulatory concentration is 0.25**, and it is confirmed to be less than 1.

Nuclides to be measured and assessed (29 nuclides)

Analysis results of radioactivity (Bq/L)

Ratios to Regulatory Concentration Limit

Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (1/4)

Sample Name	ALPS Treated Water in the Measurement/Confirmation Tanks	Group C
Date and Time of Sampling	June 26, 2023	11:28
Storage Volume (m^3)	8941	

Summary	Nuclides to be measured and assessed (29 nuclides) : The sum of the ratios of the concentration of each radionuclide to the regulatory concentration	0.25 (Confirmed to be less than 1)

Radioactivity Analysis: Nuclides to be measured and assessed (29 nuclides)

No.	Nuclide	Analysis Results						Ratios to Regulatory Concentration Limit		Regulatory Concentration Limit *2 (Bq/L)	Analysis Method *4
		TEPCO			KAKEN Co.,Ltd.			TEPCO	KAKEN Co.,Ltd.		
		Analysis Value (Bq/L)	Uncertainty *1 (Bq/L)	Detection Limit (Bq/L)	Analysis Value (Bq/L)	Uncertainty *1 (Bq/L)	Detection Limit (Bq/L)				
1	C-14	1.3E+01	± 2.3E+00	2.2E+00	1.2E+01	± 8.7E-01	8.8E-01	6.6E-03	6.0E-03	2000	Measurement
2	Mn-54	ND	-	2.3E-02	ND	-	2.7E-02	less than 2.3E-05	less than 2.7E-05	1000	Measurement
3	Fe-55	ND	-	1.4E+01	ND	-	1.2E+01	less than 6.9E-03	less than 6.1E-03	2000	Measurement
4	Co-60	2.4E-01	± 4.9E-02	2.4E-02	2.2E-01	± 3.0E-02	2.7E-02	1.2E-03	1.1E-03	200	Measurement
5	Ni-63	ND	-	8.9E+00	ND	-	5.5E+00	less than 1.5E-03	less than 9.1E-04	6000	Measurement
6	Sr-79	ND	-	8.7E-01	ND	-	1.8E+00	less than 4.3E-03	less than 9.2E-03	200	Measurement
7	Sr-90	ND	-	3.2E-02	ND	-	3.4E-02	less than 1.1E-03	less than 1.1E-03	30	Measurement
8	Y-90	ND	-	3.2E-02	ND	-	3.4E-02	less than 1.1E-04	less than 1.1E-04	300	Sr-90/Y-90 Radioactive Equilibrium Assessment
9	Tc-99	ND	-	1.9E-01	ND	-	3.8E-01	less than 1.9E-04	less than 3.8E-04	1000	Measurement
10	Ru-106	ND	-	2.1E-01	ND	-	2.7E-01	less than 2.1E-03	less than 2.7E-03	100	Measurement
11	Sb-125	ND	-	8.8E-02	ND	-	1.2E-01	less than 1.1E-04	less than 1.5E-04	800	Measurement
12	Te-125m	ND	-	3.1E-02	ND	-	4.1E-02	less than 3.4E-05	less than 4.6E-05	900	Sb-125/Te-125m Radioactive Equilibrium Assessment
13	I-129	1.8E+00	± 9.2E-02	1.4E-02	1.7E+00	± 3.3E-01	1.3E-01	2.0E-01	1.9E-01	9	Measurement
14	Cs-134	ND	-	3.0E-02	ND	-	[illegible]	less than 4.9E-04	less than 8.0E-04	60	Measurement
15	Cs-137	4.5E-01	± 8.0E-02	2.6E-02	4.5E-01	± 5.2E-02	4.3E-02	5.0E-03	5.0E-03	90	Measurement
16	Ce-144	ND	-	[illegible]	ND	-	2.4E-01	less than 1.8E-03	less than 1.2E-03	200	Measurement
17	Pm-147	ND	-	3.2E-01	ND	-	3.3E-01	less than 1.1E-04	less than 1.1E-04	3000	Eu-154 Relative Ratio Assessment
18	Sm-151	ND	-	1.2E-02	ND	-	1.3E-02	less than 1.5E-06	less than 1.6E-06	8000	Eu-154 Relative Ratio Assessment
19	Eu-154	ND	-	7.1E-02	ND	-	7.5E-02	less than 1.8E-04	less than 1.9E-04	400	Measurement
20	Eu-155	ND	-	2.4E-01	ND	-	1.6E-01	less than 8.1E-05	less than 5.3E-05	3000	Measurement
21	U-234	ND	-	3.0E-02	ND	-	2.6E-02	less than 7.4E-03 *3	less than 6.6E-03 *3	20	Gross Alpha
22	U-238									20	Gross Alpha
23	Np-237									9	Gross Alpha
24	Pu-238									4	Gross Alpha
25	Pu-239									4	Gross Alpha
26	Pu-240									4	Gross Alpha
27	Am-241									5	Gross Alpha
28	Cm-244									7	Gross Alpha
29	Pu-241	ND	-	8.1E-01	ND	-	7.2E-01	less than 4.1E-03	less than 3.6E-03	200	Pu-238 Relative Ratio Assessment
The sum of the ratios of the concentration of each radionuclide to the regulatory concentration (sum of the ratios to regulatory concentration limit)								less than 2.5E-01	less than 2.4E-01		

・ND indicates that analysis result is less than the detection limit.
・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 Regulatory concentration limits stipulated in the Regulations of the Safety and Physical Protection of Specific Nuclear Fuel Material at Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company, Incorporated.
(Attached Chart 1, Row 6: Concentration limits in the water outside of the environmental monitoring area [in this chart Bq/cm³ has been converted into Bq/L])
*3 The ratio to regulatory concentration limit for alpha-radionuclides has been assessed using the lowest regulatory concentration limit for all the target nuclides.
*4 Analysis methods are as follows:
Measurement - The concentrations of each radionuclide have been calculated by directly measuring/analyzing radioactivity intensity and the quantity of the element.
Gross Alpha - The total amount of alpha-radionuclides in the specimen are calculated by directly measuring alpha rays.
Radioactive Equilibrium Assessment - Calculated using a physical phenomenon in which the amount of radioactivity of one radionuclide and another radionuclide produced by the decay of that radionuclide exist in a certain ratio.
Relative Ratio Assessment - Calculated based on the assessment values of radionuclides that existed inside the reactor while considering radionuclide decay and migration into ALPS treated water.

※Excerpt from Treated Water Portal Site

[Reference] Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (2/4)

TEPCO

- Analysis results of **tritium concentration is 14 x 10^4 Bq/liter**, and it is confirmed to be less than 1 million Bq/liter.

Tritium Concentration (Bq/liter)

Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (2/4)

Summary	14 (x10^4Bq/L)	(confirmed to be less than 1 million Bq/L)

Radioactivity Analysis: Tritium

No.	Nuclide	Analysis Results						Analysis Objective	Analysis Method *3
		TEPCO			KAKEN Co.,Ltd.				
		Analysis Value (Bq/L)	Uncertainty *1 (Bq/L)	Detection Limit (Bq/L)	Analysis Value (Bq/L)	Uncertainty *1 (Bq/L)	Detection Limit (Bq/L)		
1	H-3	1.4E+05	± 7.8E+03	1.9E+01	1.4E+05	± 7.9E+03	1.3E+02	*2	Measurement

・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 To confirm that tritium concentration is less than 1E+06Bq/L (Less than 1 million Bq/L).
*3 Analysis method is as follows:
Measurement - The concentration of radionuclide has been calculated by directly measuring/analyzing radioactivity intensity and the quantity of the element.

※Excerpt from Treated Water Portal Site

[Reference] Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (3/4)

TEPCO

- For nuclides voluntarily checked to ensure that they are not significantly present (39 nuclides), **it is confirmed that no significant concentrations founds of any of the nuclides.**

Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (3/4)

Summary	No significant concentrations found of any of the nuclides

Radioactivity Analysis: Nuclides voluntarily checked to ensure that they are not significantly present (39 nuclides)

No.	Nuclide	TEPCO		KAKEN Co.,Ltd.		Confirmation Method *2
		Assessment *1	Detection Limit (Bq/L)	Assessment *1	Detection Limit (Bq/L)	
1	Fe-59	○	4.7E-02	○	5.2E-02	Measurement
2	Co-58	○	2.4E-02	○	3.1E-02	
3	Zn-65	○	4.6E-02	○	5.1E-02	
4	Rb-86	○	2.4E-01	○	3.7E-01	
5	Sr-89	○	3.5E-02	○	4.1E-02	
6	Y-91	○	2.5E+00	○	2.2E+00	
7	Nb-95	○	3.1E-02	○	3.7E-02	
8	Ru-103	○	2.9E-02	○	3.0E-02	
9	Ag-110m	○	2.6E-02	○	3.6E-02	
10	Cd-113m	○	8.5E-02	○	5.6E-02	
11	Cd-115m	○	1.3E+00	○	1.9E+00	
12	Sn-123	○	3.8E+00	○	1.1E+00	
13	Sn-126	○	1.8E-01	○	1.1E-01	
14	Sb-124	○	5.1E-02	○	5.7E-02	
15	Te-123m	○	6.3E-02	○	3.1E-02	
16	Te-127	○	2.9E+00	○	2.6E+00	
17	Te-129m	○	7.3E-01	○	1.0E+00	
18	Te-129	○	3.7E-01	○	3.4E-01	
19	Cs-136	○	2.4E-02	○	3.3E-02	
20	Ba-140	○	1.0E-01	○	1.3E-01	
21	Ce-141	○	1.1E-01	○	8.4E-02	
22	Pm-146	○	4.2E-02	○	3.8E-02	
23	Pm-148m	○	2.4E-02	○	2.8E-02	
24	Pm-148	○	1.0E-01	○	4.7E-01	
25	Eu-152	○	1.3E-01	○	1.3E-01	
26	Gd-153	○	1.8E-01	○	1.3E-01	
27	Tb-160	○	7.8E-02	○	9.2E-02	
28	Am-243	○	3.0E-02	○	2.6E-02	Measurement (substituted with gross alpha)
29	Cm-242	○	3.0E-02	○	2.6E-02	
30	Cm-243	○	3.0E-02	○	2.6E-02	
31	Rh-103m	○	2.9E-02	○	3.0E-02	Ru-103/Rh-103m Radioactive Equilibrium Assessment
32	Rh-106	○	2.1E-01	○	2.7E-01	Ru-106/Rh-106 Radioactive Equilibrium Assessment
33	Sn-119m	○	6.8E-03	○	4.1E-03	Sn-126 Relative Ratio Assessment
34	Te-127m	○	2.9E+00	○	2.7E+00	Te-127 Relative Ratio Assessment
35	Cs-135	○	1.7E-07	○	2.8E-07	Cs-137 Relative Ratio Assessment
36	Ba-137m	○	2.5E-02	○	4.0E-02	Cs-137/Ba-137m Radioactive Equilibrium Assessment
37	Pr-144m	○	5.5E-03	○	3.6E-03	Ce-144/Pr-144m Radioactive Equilibrium Assessment
38	Pr-144	○	3.6E-01	○	2.4E-01	Ce-144/Pr-144 Radioactive Equilibrium Assessment
39	Am-242m	○	2.0E-04	○	1.8E-04	Am-241 Relative Ratio Assessment

*1 "○" indicates that the absence of significant concentrations was confirmed by the following, and "×" indicates that significant concentrations of nuclide was confirmed.
- Concentration of nuclide measured was below detection limit
- For nuclide that has been assessed using radioactive equilibrium, etc., if its target nuclide is detected and the assessment value of the target nuclide is extremely small compared to the regulatory concentration limit, or in other words, if it is less than 1/100 of the regulatory concentration limit which is the value set as the detection limit, then it shall be deemed to be below the detection limit.

Nuclide	Assessment Values (Bq/L)		Regulatory Concentration Limit *3
	TEPCO	KAKEN Co.,Ltd.	
Rh-103m	–	–	2.0E+05
Rh-106	–	–	3.0E+05
Sn-119m	–	–	2.0E+03
Te-127m	–	–	3.0E+02
Cs-135	3.0E-06	3.0E-06	6.0E+02
Ba-137m	4.3E-01	4.3E-01	8.0E+05
Pr-144m	–	–	4.0E+04
Pr-144	–	–	2.0E+04
Am-242m	–	–	5.0E+00

- A hyphen "–" indicates that the concentration of the target nuclide was below the detection limit.
- 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.

*2 Analysis Methods are as follows:
Measurement - The concentrations of each radionuclide have been calculated by directly measuring/analyzing radioactivity intensity and the quantity of the element.
Measurement (substituted with gross alpha) - The total amount of alpha-radionuclides in the specimen are calculated by directly measuring alpha rays.
Radioactive Equilibrium Assessment - Calculated using a physical phenomenon in which the amount of radioactivity of one radionuclide and another radionuclide produced by the decay of that radionuclide exist in a certain ratio.
Relative Ratio Assessment - Calculated based on the assessment values of radionuclides that existed inside the reactor while considering radionuclide decay and migration into ALPS treated water.

*3 Regulatory concentration limits stipulated in the Regulations of the Safety and Physical Protection of Specific Nuclear Fuel Material at Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company, Incorporated.
(Attached Chart 1, Row 6: Concentration limits in the water outside of the environmental monitoring area [in this chart Bq/cm³ has been converted into Bq/L])

※Excerpt from Treated Water Portal Site

Nuclides voluntarily checked to ensure that they are not significantly present (39 nuclides)

Assessment results
○ : absence of significant concentration was confirmed
× : significant concentration was confirmed

[Reference] Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (4/4)

TEPCO

- For 44 general water quality measurement items (voluntary check to confirm that there are no unusual water quality), **it is confirmed that all criteria※1 satisfied**.

※1 In accordance with Fukushima Prefecture's "Ordinance on Discharge Standards Based on the Air Pollution Control Act and Wastewater Standard based on the Water Pollution Prevention Act (attached Chart 2)", and "the Ordinance Enforcement Regulations Pertaining to the Preservation of the Living Environment in Fukushima (attached Chart 5)".

General water quality measurement items (44 criteria)

Analysis results

Pre-discharge Analysis Results of ALPS Treated Water in the Measurement/Confirmation Tanks (4/4)

Summary	Criteria satisfied

General Water Quality Analysis: Voluntary check to confirm that there are no unusual water quality (44 criteria)

No.	Measurement Items	Unit	Analysis Result	Criteria *1
1	Hydrogen Ions (pH)	–	8.4	Sea Area 5.0~9.0
2	Suspended Solids (SS)	mg/L	<1	Maximum: 70 or less Average: 50 or less
3	Chemical Oxygen Demand (COD)	mg/L	<0.5	Maximum: 40 or less Average: 30 or less
4	Boron	mg/L	0.4	Sea Area 230 or less
5	Soluble Iron	mg/L	<1	10 or less
6	Copper	mg/L	<0.1	2 or less
7	Nickel	mg/L	<0.1	2 or less
8	Chrome	mg/L	<0.1	2 or less
9	Zinc	mg/L	<0.1	2 or less
10	Biochemical Oxygen Demand (BOD)	mg/L	<1	Maximum: 40 or less Average: 30 or less
11	Coliform Count	pcs/cm^3	0	3000 or less
12	Cadmium	mg/L	<0.01	0.03 or less
13	Cyanide	mg/L	<0.05	0.5 or less
14	Organic Phosphorus	mg/L	<0.1	1 or less
15	Lead	mg/L	<0.01	0.1 or less
16	Hexavalent Chromium	mg/L	<0.05	0.2 or less
17	Arsenic	mg/L	<0.01	0.1 or less
18	Mercury	mg/L	<0.0005	0.005 or less
19	Alkyl Mercury	mg/L	<0.0005	Not Detected
20	Polychlorinated Biphenyl	mg/L	<0.0005	0.003 or less
21	Trichlorethylene	mg/L	<0.03	0.1 or less
22	Tetrachloroethylene	mg/L	<0.01	0.1 or less
23	Dichloromethane	mg/L	<0.02	0.2 or less
24	Carbon Tetrachloride	mg/L	<0.002	0.02 or less
24	Carbon Tetrachloride	mg/L	<0.002	0.02 or less
25	1,2-Dichloroethane	mg/L	<0.004	0.04 or less
26	1,1-Dichloroethylene	mg/L	<0.1	1 or less
27	Cis-1,2-Dichloroethylene	mg/L	<0.04	0.4 or less
28	1,1,1-Trichloroethane	mg/L	<0.3	3 or less
29	1,1,2-Trichloroethane	mg/L	<0.006	0.06 or less
30	1,3-Dichloropropene	mg/L	<0.002	0.02 or less
31	Thiuram	mg/L	<0.006	0.06 or less
32	Simazine	mg/L	<0.003	0.03 or less
33	Thiobencarb	mg/L	<0.02	0.2 or less
34	Benzene	mg/L	<0.01	0.1 or less
35	Selenium	mg/L	<0.01	0.1 or less
36	Fenitrothion	mg/L	<0.003	0.03 or less
37	Phenols	mg/L	<0.1	1 or less
38	Fluorine	mg/L	<0.5	Sea Area 10 or less
39	Soluble Manganese	mg/L	<1	10 or less
40	Ammonia, Ammonium Compounds	mg/L	<1	100 or less
41	Nitrite Compounds and Nitrate Compounds	mg/L	12	
42	1,4-Dioxane	mg/L	<0.05	0.5 or less
43	n-Hexane Extractables (Mineral Oils)	mg/L	<0.5	1 or less
44	n-Hexane Extractables (Animal and Vegetable Oils and Fats)	mg/L	<1	10 or less

・A "less than" symbol (<) indicates that the quantity is below quantitation limit.

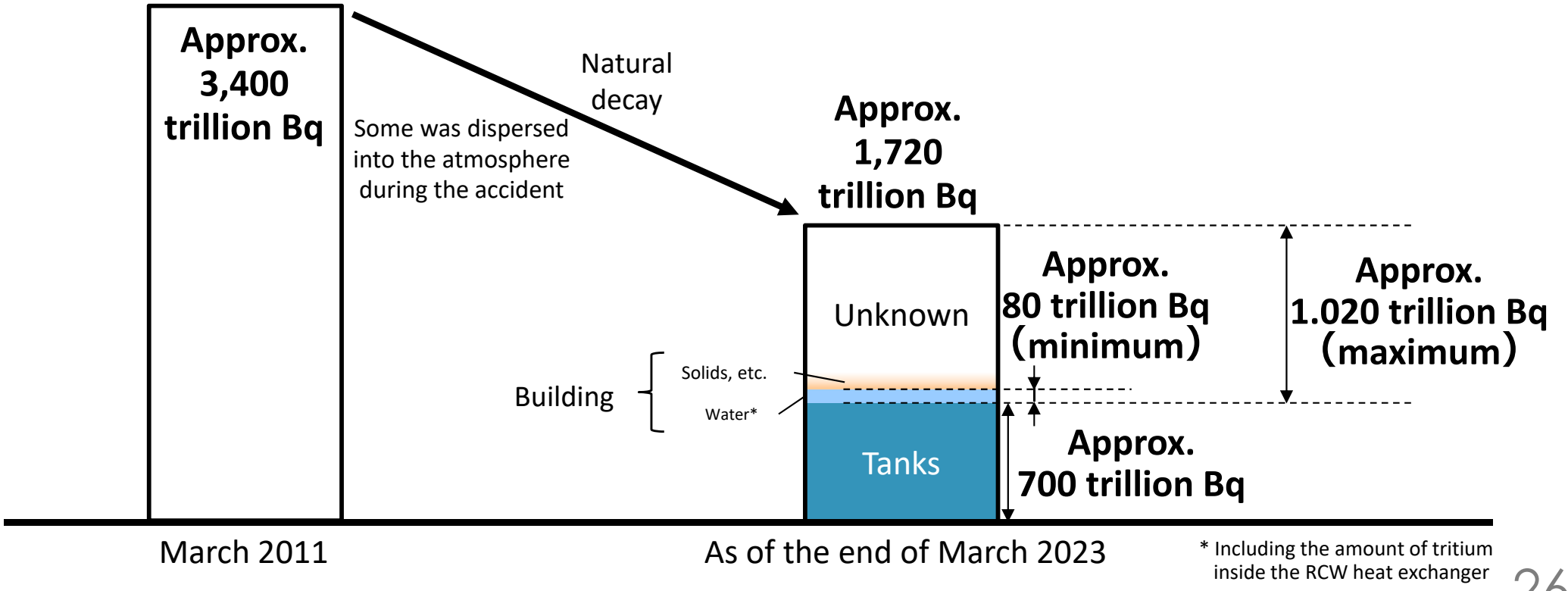
*1 In accordance with Fukushima Prefecture's "Ordinance on Discharge Standards Based on the Air Pollution Control Act and Wastewater Standard based on the Water Pollution Prevention Act (attached Chart 2)", and "the Ordinance Enforcement Regulations Pertaining to the Preservation of the Living Environment in Fukushima (attached Chart 5)".

※Excerpt from Treated Water Portal Site

[Reference] The total amount of tritium at the Fukushima Daiichi Nuclear Power Station

4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

- Tritium is produced during the operation of nuclear power stations, but the Fukushima Daiichi Nuclear Power Station has been shut down since the accident, so **no new tritium has been produced since March 2011**.
- Therefore, the maximum amount of tritium on site is the maximum amount that existed as of March 2011 (approximately 3,400 trillion Bq), and if we consider natural decay, **as of the end of FY2022, there should have been approximately 1,720 trillion Bq on site**.
- As part of the Unit 1 reactor building dose reduction work in February 2023, water with tritium concentrations of 29.4 million Bq/liter was found inside the Unit 1 RCW heat exchanger, but the amount of tritium contained in the approximate 20m³ of water inside heat exchanger was only **approximately 0.6 trillion Bq**, which is much less than the amount of tritium stored in tanks. Furthermore, in addition to this, even if we consider uncertainty and possible amounts at Units 2/3, they would only amount to several trillion becquerels and most certainly would not exceed 10 trillion Bq.



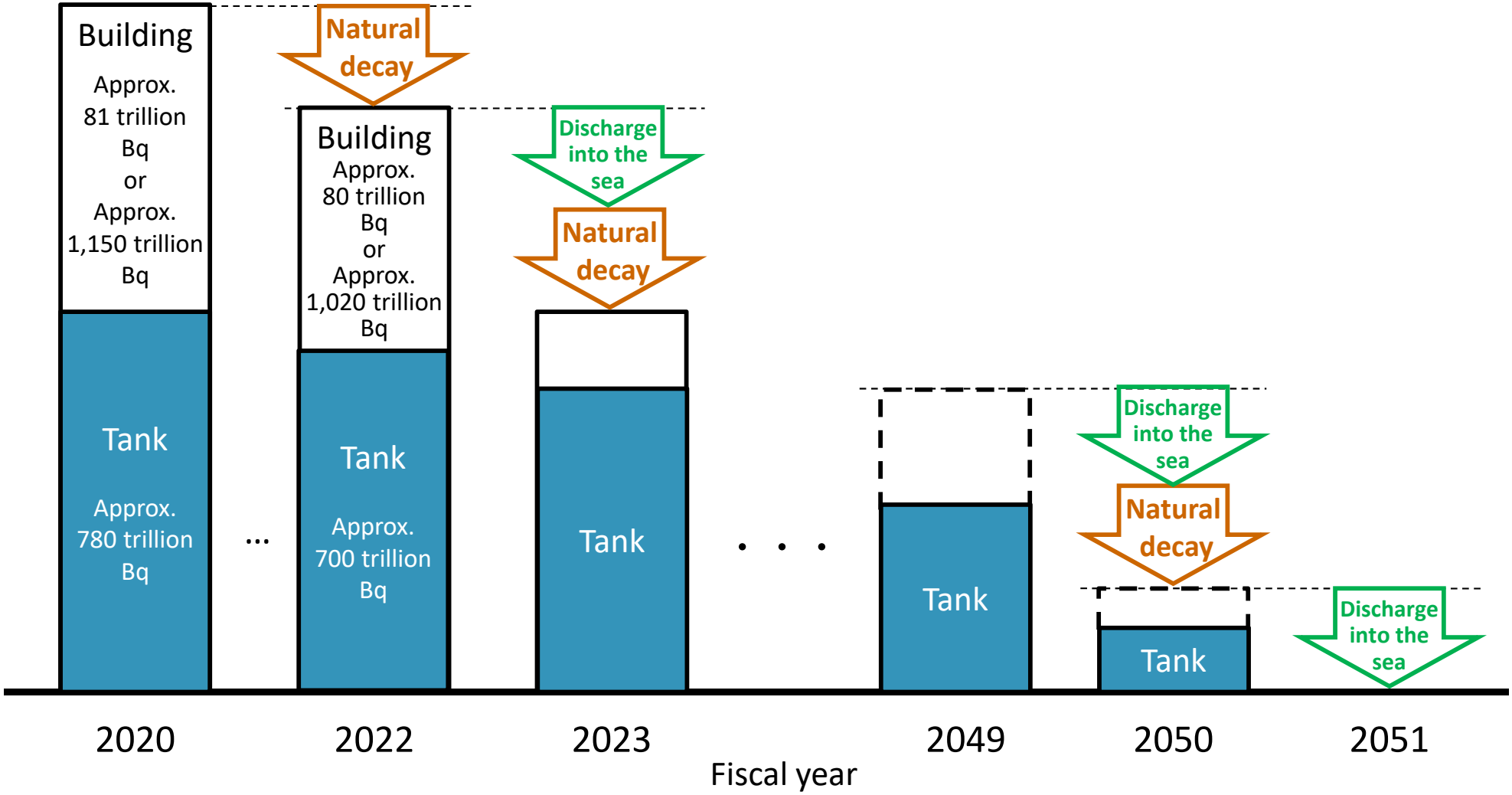
* Including the amount of tritium inside the RCW heat exchanger

4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

[Reference] Discharge simulation

- **In addition to the reduction due to the discharge,** the amount of tritium decreases approximately 5% annually as a result of natural decay.
- When creating our discharge simulation, we considered this change and **set of the amount of tritium to be discharged annually as small as possible so that the amount of tritium in tanks on site will reach zero by the end of 2051.**

Concept drawing of the trends of the total volume of tritium at the power station over time in the discharge simulation



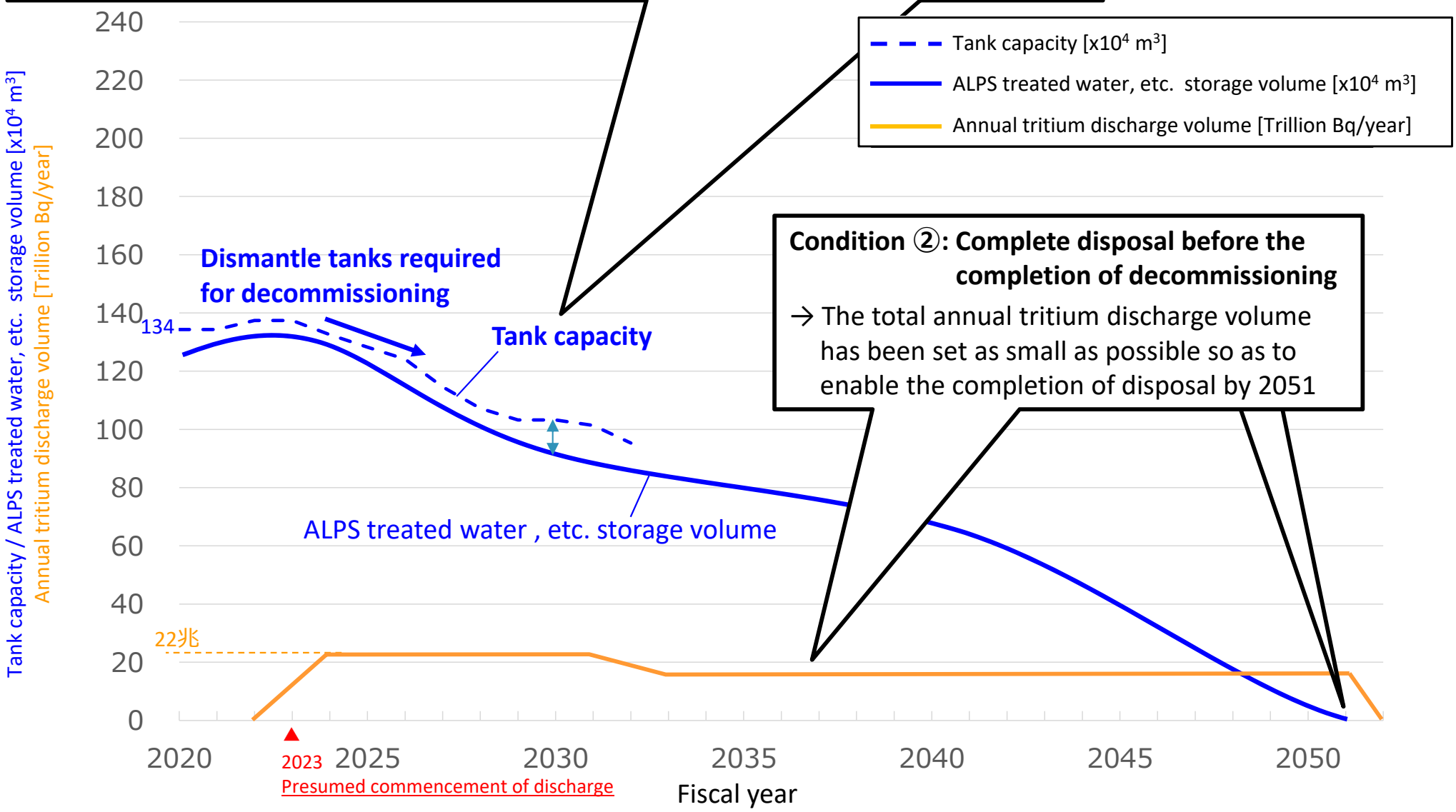
[Reference] Things to consider when examining of the total annual tritium discharge volume

4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

TEPCO

Condition ①: Reduce the number of tanks and gain space on site through such reduction to build facilities required to proceed with decommissioning

→ We need to secure space needed on site for decommissioning while ensuring enough tank volume for storing ALPS treated water, etc.



Condition ②: Complete disposal before the completion of decommissioning

→ The total annual tritium discharge volume has been set as small as possible so as to enable the completion of disposal by 2051

[Reference] Simulation conditions in light of the most recent status

4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

TEPCO

Common conditions

Annual tritium discharge volume (Less than 22 trillion Bq/year)	Discharge volume set so that discharge is completed by FY2051 to the extent that there is no impact on site usage plans
Simulated discharge commencement fiscal year	FY2023 (simulation for each fiscal year)
ALPS treated water flow volume	Max: Approximately 460m³/day
Diluting seawater flow volume	Approximately 340,000m³/day (seawater transfer pumps: 2)
ALPS treated water discharge order	The approximate 30,000m³ of water in the K4 tank, which is being used as the measurement/confirmation facility, will be discharged first starting with water with low concentrations of tritium. Thereafter, the water in other tanks and newly generated ALPS treated water will be discharged starting with water with low concentrations of tritium as much as possible.
Tritium decay	Half-life considered to be 12.32 years (approximate 5.5% decrease annually). Decay of the newly generated tritium also considered.
Amount of ALPS treated water generated	FY2023: 120m³/day, FY2024: 110m³/day, FY2025: 100m³/day, FY2026: 90m³/day, FY2027: 80m³/day, FY2028 - FY2051: 70m³/day
Number of discharge days	292 days/year (Operating rate: 80%)

Parameters

Scenario	**A (Largest amount of tritium)**	**B (Least amount of tritium based on current information)**
Tritium concentrations of daily treated ALPS treated water	589,000 Bq/liter (maximum volume during FY2022: December 23, 2022)	254,000 Bq/liter (minimum volume during FY2022: April 8, 2022)
Total amount of tritium inside buildings (as of March 31, 2023)	Approximately 1,020 trillion Bq (the 3,400 trillion Bq that existed when the accident occurred all still remains in buildings/tanks)	Approximately 80 trillion Bq (estimated from the amount of stagnant water in buildings and tritium concentrations in that water)

[Reference] Simulation results (1/2)
Scenario A: Largest amount of tritium

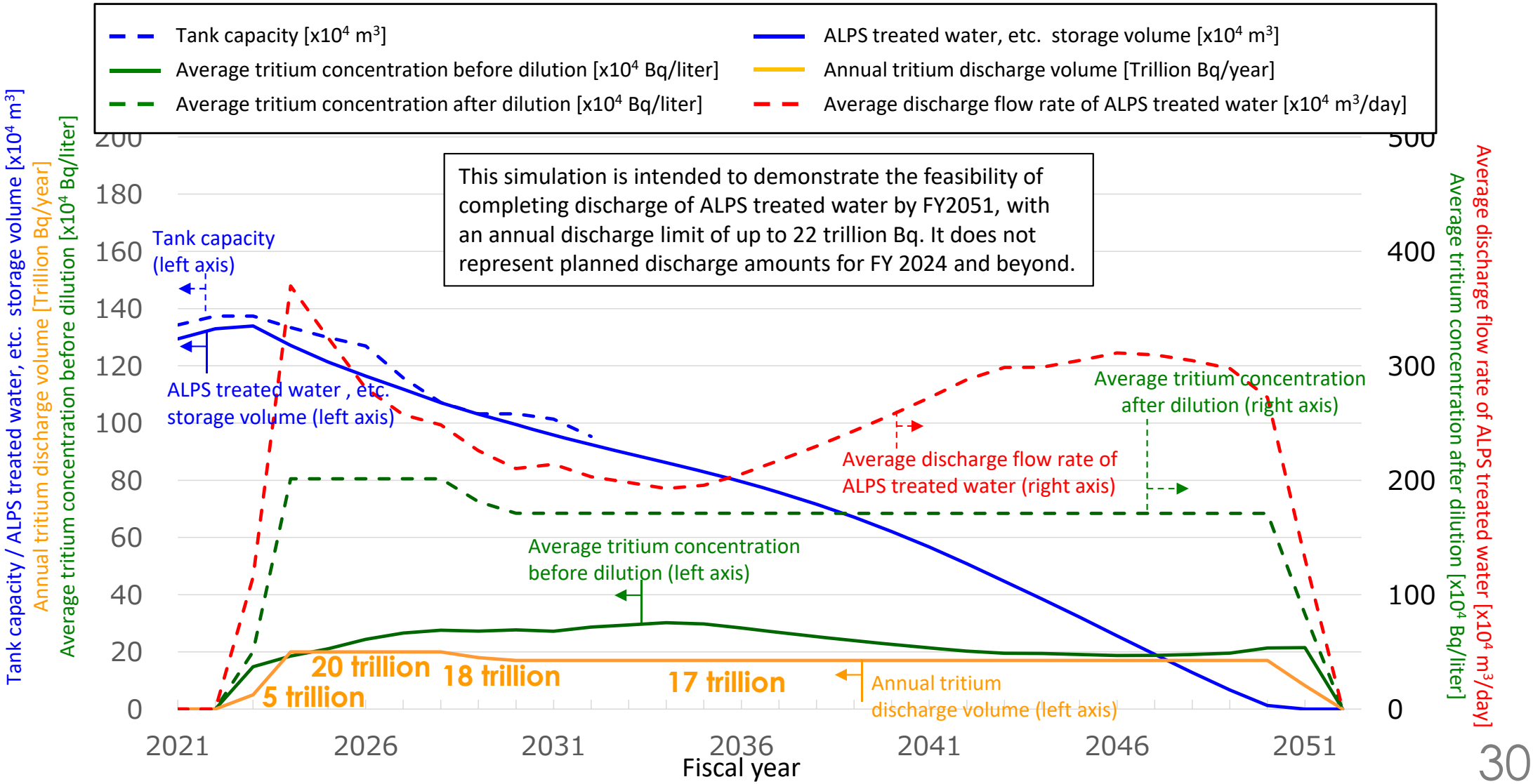
4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

(Annual tritium discharge volume)

- 2023FY : 5 trillion Bq/year (carefully discharge small amounts)
- 2024 - 2028FY : 20 trillion Bq/year
- 2029FY : 18 trillion Bq/year
- 2030FY - : 17 trillion Bq/year

(Reference: simulation conditions published in August 2021)

- 2023FY : 11 trillion Bq/year
- 2024 - 2029FY : 22 trillion Bq/year
- 2030 - 2032FY : 18 trillion Bq/year
- 2033FY - : 16 trillion Bq/year



4th Advisory Committee for ensuring safety of Fukushima nuclear power plant(第4回 福島県原子力発電所安全確保技術検討会)
(August 24, 2023) Partially excerpt and processing

[Reference] Simulation results (2/2)

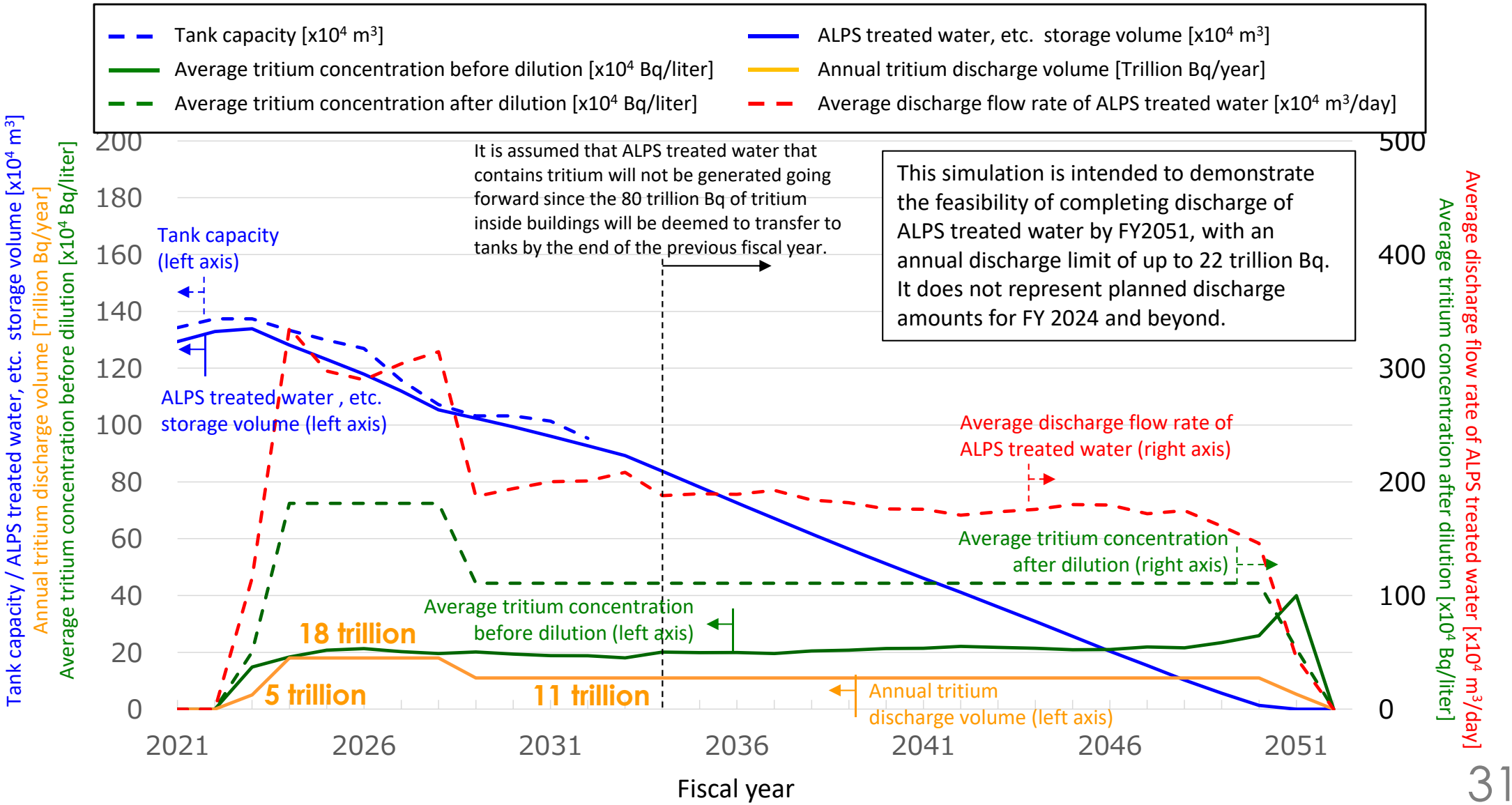
Scenario B: Least amount of tritium based on current information

(Annual tritium discharge volume)

- 2023FY : 5 trillion Bq/year (carefully discharge small amounts)
- 2024 - 2028FY : 18 trillion Bq/year
- 2029FY - : 11 trillion Bq/year

(Reference: simulation conditions published in August 2021)

- 2023FY : 8 trillion Bq/year
- 2024 - 2028FY : 16 trillion Bq/year
- 2029FY - : 11 trillion Bq/year



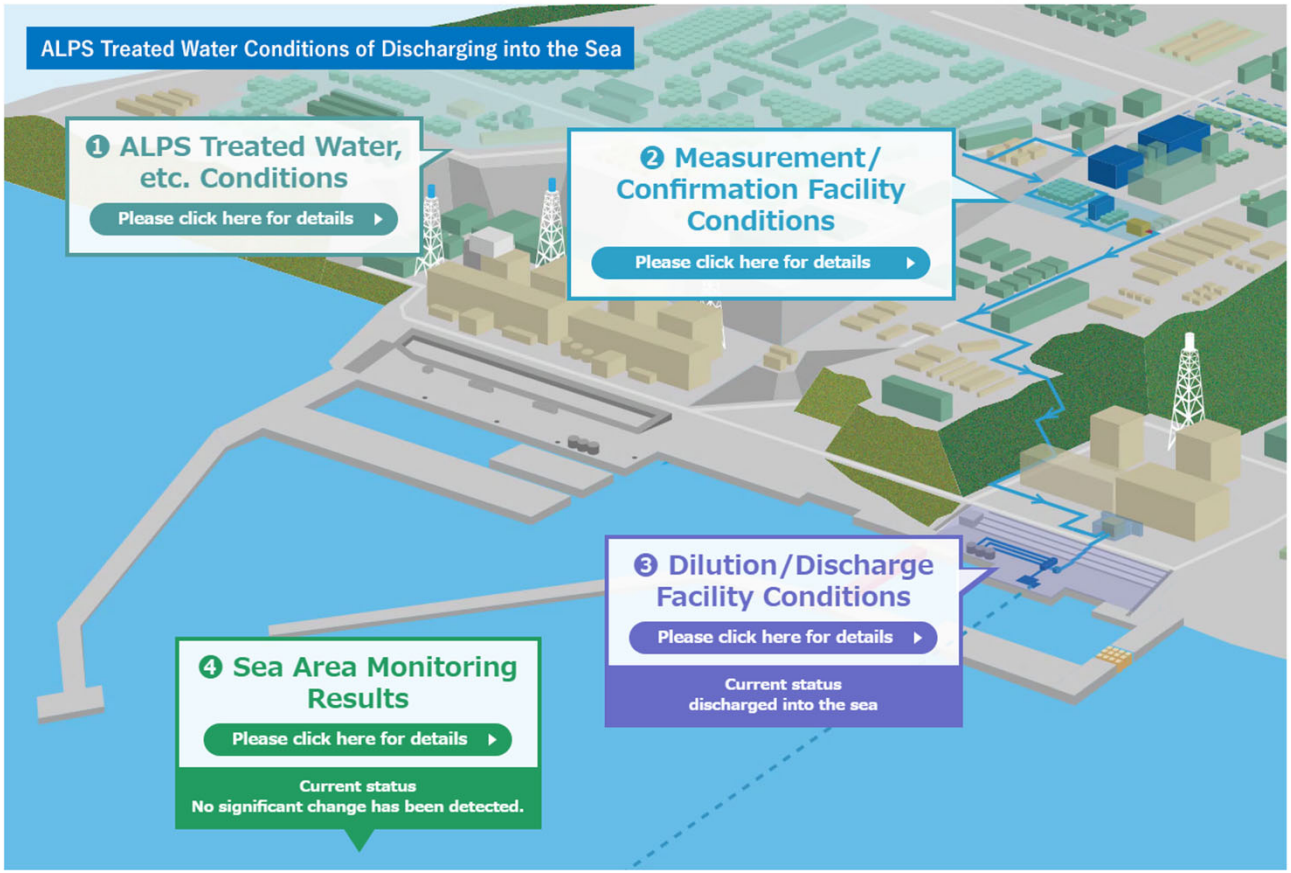
[Reference] Treated Water Portal Site Page “ALPS Treated Water Conditions of Discharging into the Sea”

- On the Treated Water Portal Site, a page summarizing the status of each of the facilities related to the discharge of ALPS treated water into the sea is available.

Screen image of “Treated Water Portal Site”

Enlarge

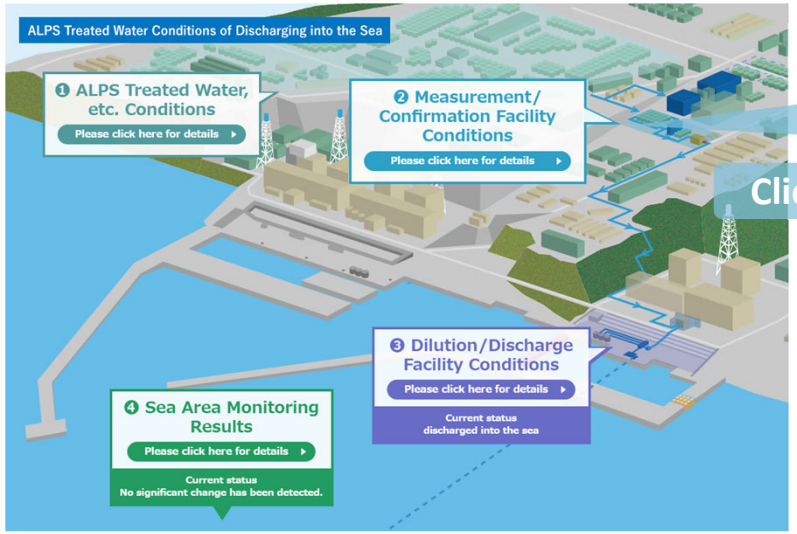
Screen image of “ALPS Treated Water Conditions of Discharging into the Sea”



[Reference]
Webpage for “Measurement/Confirmation Facility Conditions"

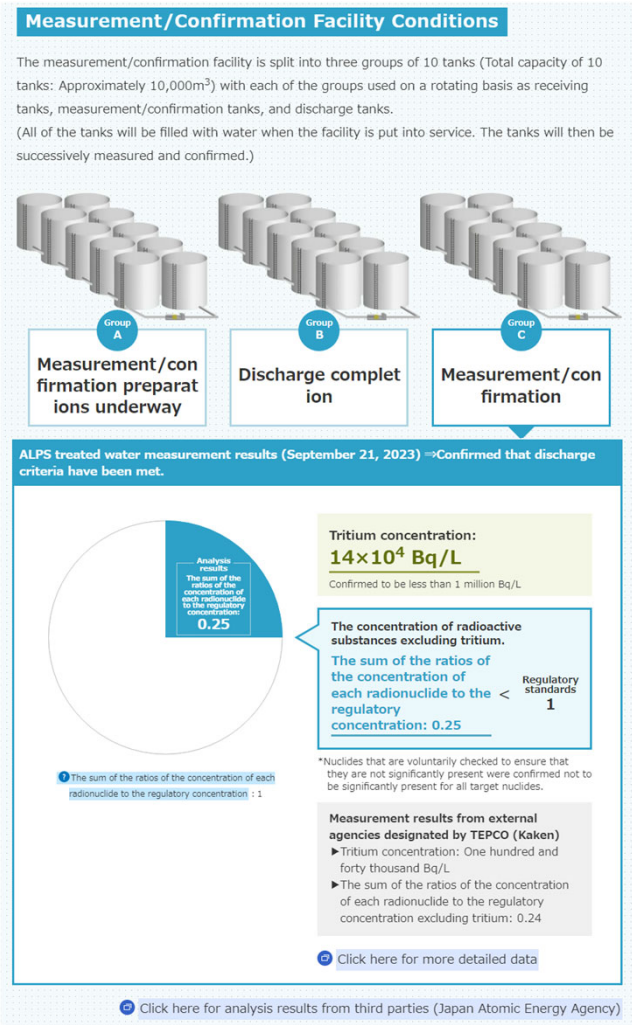
- Status of Measurement/confirmation facility and the analysis results for ALPS treated water in tank groups A,B, and C are displayed (tritium concentration and the sum of the ratios of the concentration of each radionuclide to the regulatory concentration limit).

Screen image of
"ALPS treated water Conditions of Discharging into the Sea"



Click

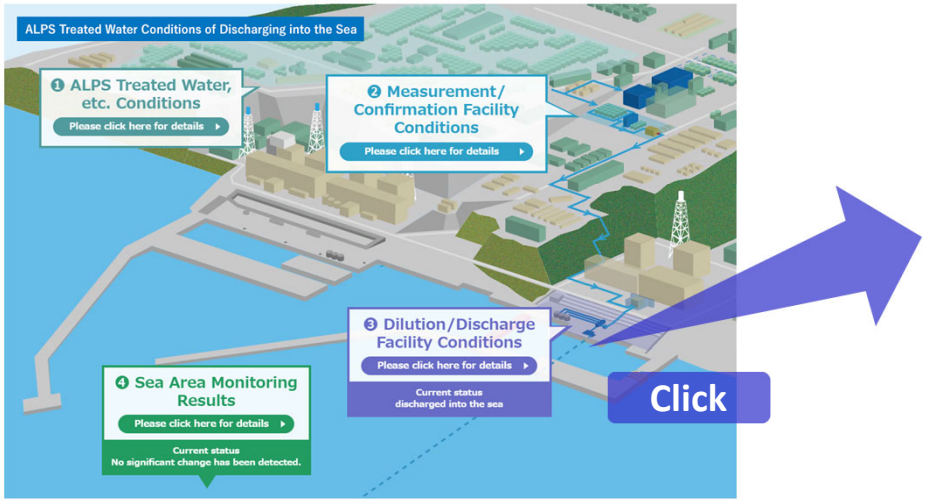
Screen image of
“Measurement/Confirmation Facility Conditions"



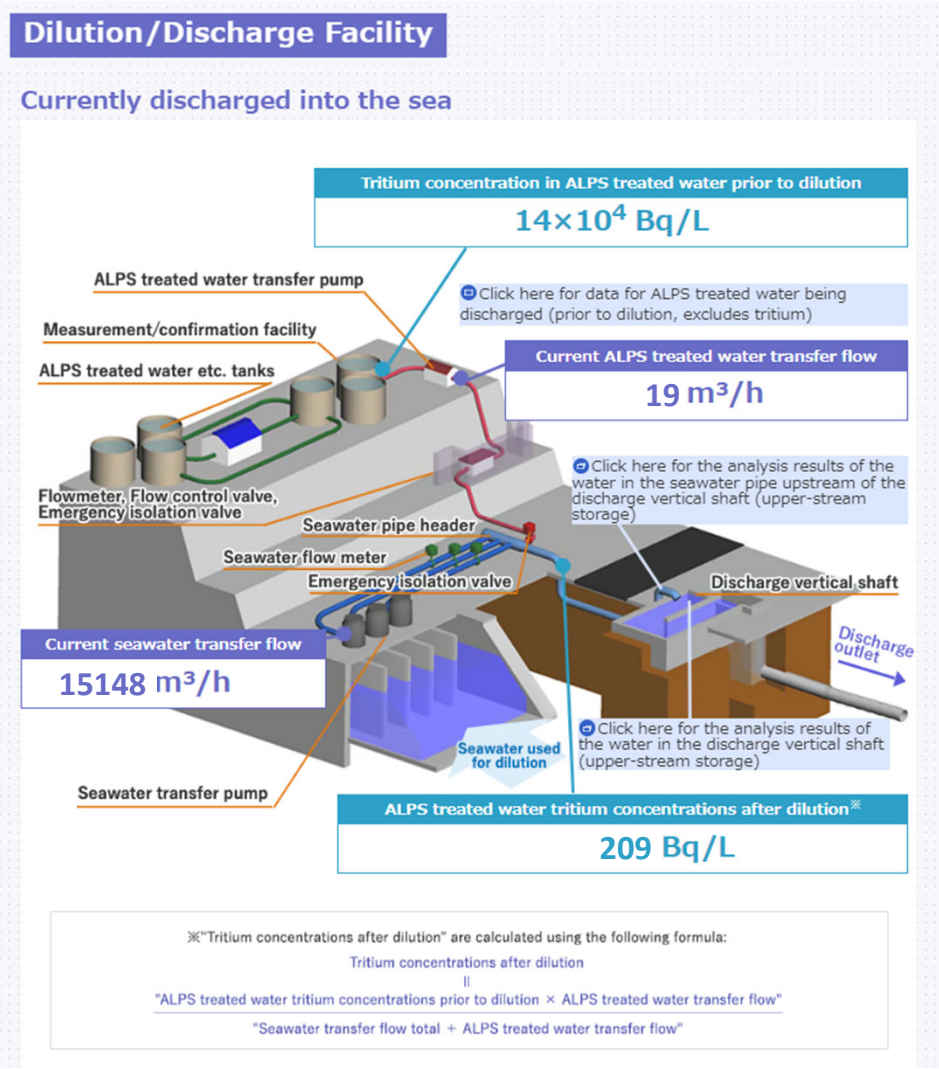
[Reference] Webpage for "Dilution/Discharge Facility Conditions"

- This page enables users to view real-time data, such as seawater and ALPS treated water flow, at a glance.

Screen image of
"ALPS treated water Conditions of Discharging into the Sea"



Screen image of
"Dilution/Discharge Facility Condition"



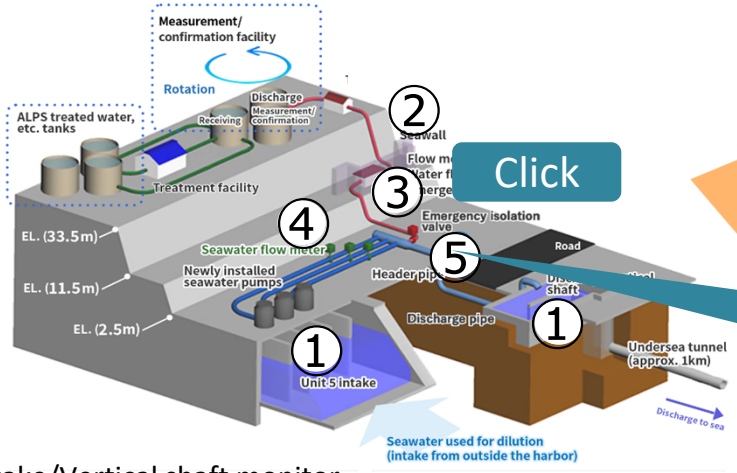
※Data will be updated once an hour.

[Reference] Further disclosure of real-time monitoring data

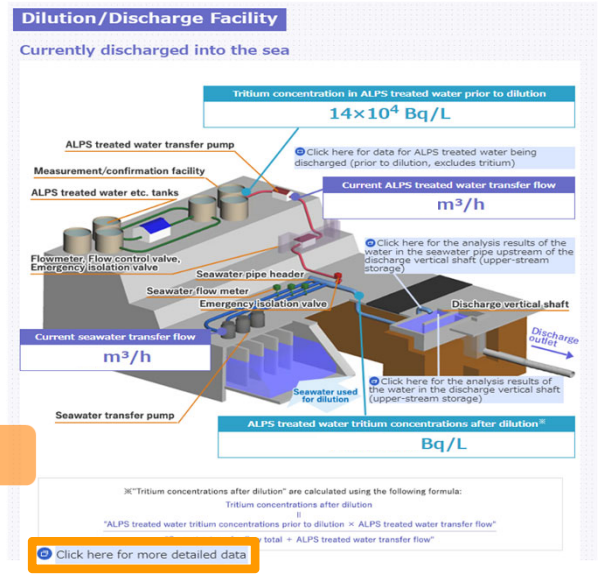
- Since the commencement of the discharge, TEPCO is disclosing various data relating to the discharge of ALPS treated water into the sea on their website in more detail than the “Dilution/Discharge Facility Conditions” page.

Screen image of webpage for real-time data

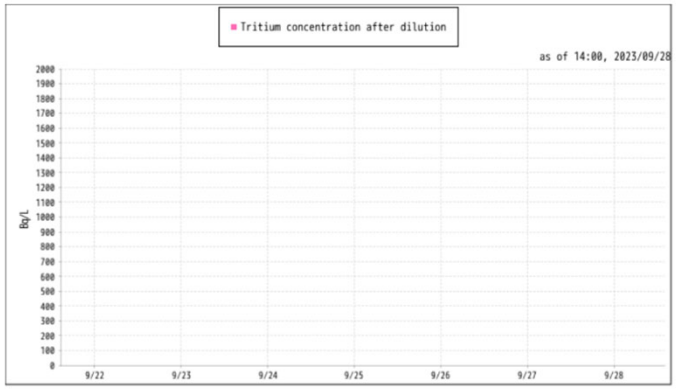
Discharging from ALPS treated water dilution/discharge facilities at the Fukushima Daiichi Nuclear Power Station



Screen image of “Treated Water Portal Site"



(5) Tritium concentration after dilution (Calculated Value)



Tritium Concentration after dilution	Total tritium discharge volume (Accumulated)	Total ALPS treated water discharge volume (Accumulated)
	1248033127921	7788

① Intake/Vertical shaft monitor
(Unit 5 intake/upper-stream storage)
② Radiation monitor (ALPS treated water transfer pump outlet)
③ ALPS treated water transfer line flow rate
④ Seawater flow rate
⑤ Tritium concentration in ALPS treated water that has been diluted with seawater (calculated value)

“Total discharge volume” displayed and used for management in monitoring/control devices is the value which conservatively considers analysis and flowmeter uncertainty. (Refer to the next slide)

[Reference] Total tritium discharge volumes

- The "total discharge volume used for management in monitoring/control devices" is managed by considering the uncertainty of tritium concentration analyses in the measurement/confirmation facility, and ALPS treated water flow meters. These values can be viewed on our live data webpage.
  (**Initial discharge: Approximately 1.2 trillion Bq**)
- The "actual total discharge volume" is calculated using the tritium concentrations measured in the measurement/confirmation facility prior to discharge after agitating the water in the tanks, and the amount of treated water.
  (**Initial discharge: Approximately 1.1 trillion Bq**)

Total Discharge Volume Managed Using Monitoring/Control Devices (Initial discharge: Approximately 1.2 trillion Bq) :

Conservatively assessed tritium concentrations in the measurement/confirmation facility **(**Bq/liter) × **Conservatively assessed** volume of treated water discharged ($m^{3)}$ × 1000(liter/m^3)

Actual Total Discharge Volume (Initial discharge: Approximately 1.1 trillion Bq) :

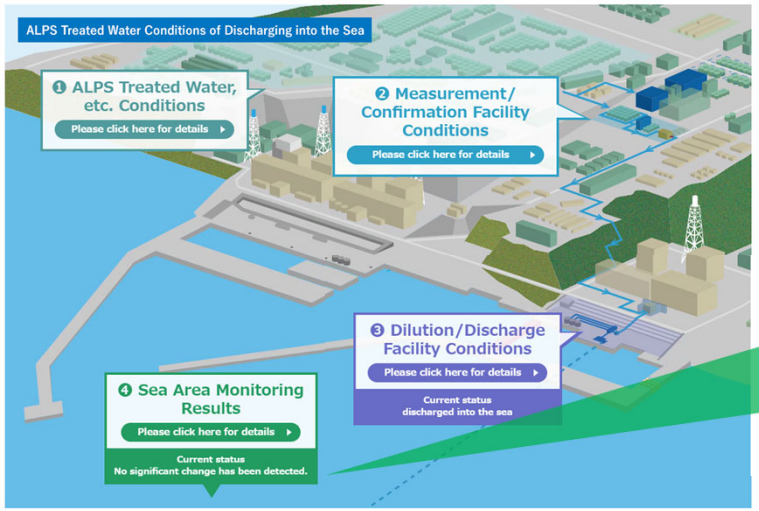
Tritium concentrations in the measurement/confirmation facility (Bq/liter) × Volume of treated water discharged ($m^{3)}$ × 1000 (liter/$m^{3)}$

・Conservatively assessed tritium concentrations in the measurement/confirmation facility:
  Tritium concentrations in the measurement/confirmation facility × 1.1 (Assumes maximum analysis uncertainty is 10%)
・Conservatively assessed volume of treated water discharged:
  Σ（ALPS treated water flow meter reading [m^3/h] + Flowmeter uncertainty: 0.84[m^3/h]） (Added in 1 second units)

[Reference] Webpage for “Sea Area Monitoring Results”

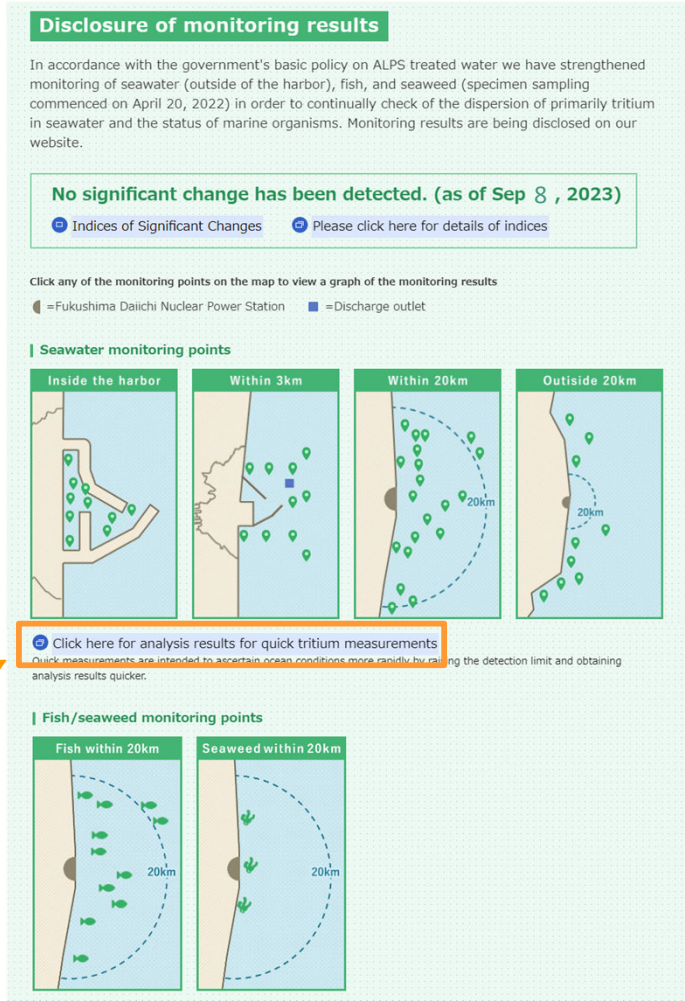
- TEPCO has strengthened monitoring of seawater (outside of the harbor), fish, and seaweed in order to continually check dispersion, primarily of tritium, and the status of marine organisms. Monitoring results are being disclosed on the website.
- In addition, tritium concentrations are measured at 14 locations with the detection limit raised to 10Bq/liter so that it can be quickly ascertained that there are no situations in which the discharged water has not diffused sufficiently.

Screen image of
"ALPS treated water Conditions of Discharging into the Sea"



Click

Screen image of “Sea Area Monitoring Results”

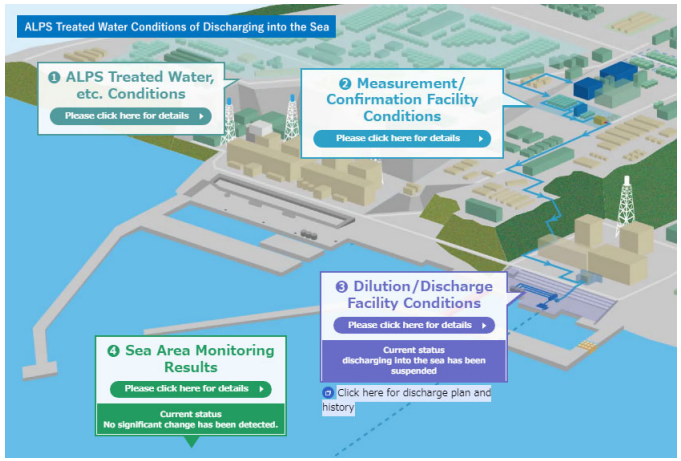


Click to check the results of quick tritium measurements

[Reference] Information localization

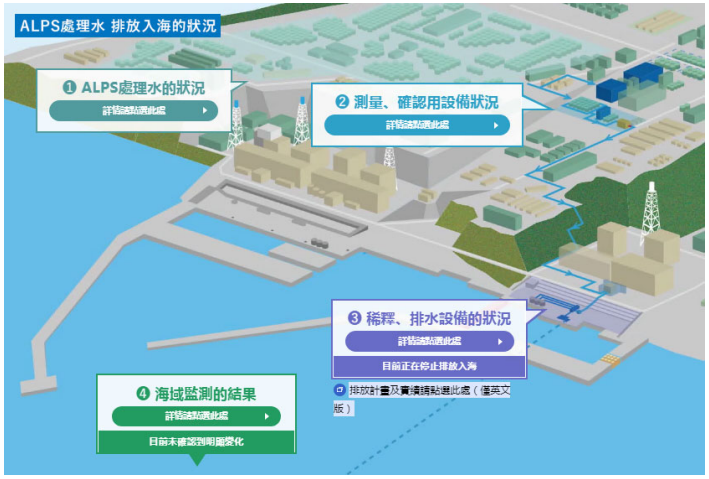
- The Treated Water Portal Site is not just for the people of Japan and has been translated into English, Chinese (simplified/Taiwan traditional/Hong Kong traditional) and Korean in order to provide information to the people of the international community.

English



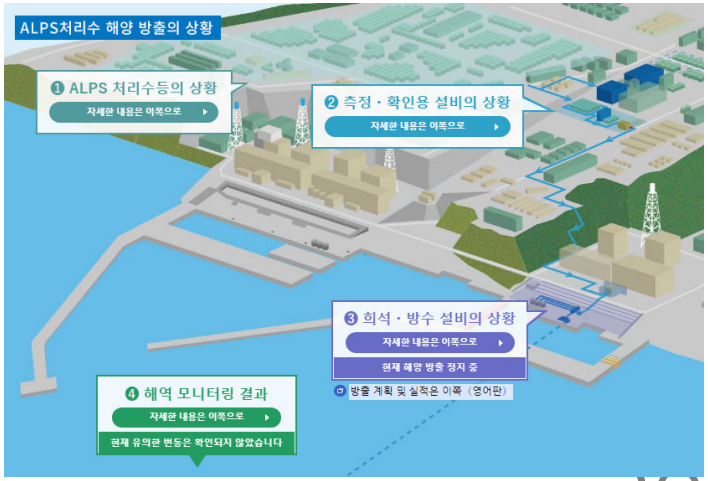
Simplified Chinese

Traditional Chinese, Taiwan



Traditional Chinese, Hong Kong

Korean



[Reference]
Results of Quick Tritium Measurement by Each Organization

- The results of quick tritium measurement conducted by TEPCO and each organization (Ministry of the Environment, Fisheries Agency and Fukushima prefecture) are summarized and being published. (English version will be available soon)

各機関の迅速測定結果（令和５年９月21日現在）

【最新状況】（土･日･祝日公表分は原則として翌営業日に更新、下線は更新箇所）

■東京電力 詳しくはこちら（東京電力 トリチウムの迅速測定の分析結果）

【海水】

【発電所から３㎞以内】

９月20日に福島第一原子力発電所から3km以内10地点にて採取した海水のトリチウム濃度の迅速な測定を行った結果、すべての地点においてトリチウム濃度は検出下限値未満（5.9～8.2ベクレル/リットル未満）であり、当社の運用指標である700ベクレル/リットル（放出停止判断レベル）や350ベクレル/リットル（調査レベル）を下回っていることを確認しました。

■環境省 詳しくはこちら（環境省ホームページ）

【海水】

９月13日～15日に福島県沿岸の11測点にて採取した海水試料を分析（迅速測定）した結果、すべての測点において、海水のトリチウム濃度は検出下限値未満（7～8ベクレル/リットル未満）であり、人や環境への影響がないことを確認しました。（環境省）

■水産庁 詳しくはこちら（水産庁ホームページ）

【水産物】

９月20日朝にALPS処理水放出口の北側約４kmで採取されたヒラメ及び同放出口の南側５kmで採取されたホウボウのトリチウム迅速分析の結果、いずれの検体も放出前と同様に検出下限値未満（約7.9、7.8ベクレル／kg 未満）であることを確認しました。（水産庁）

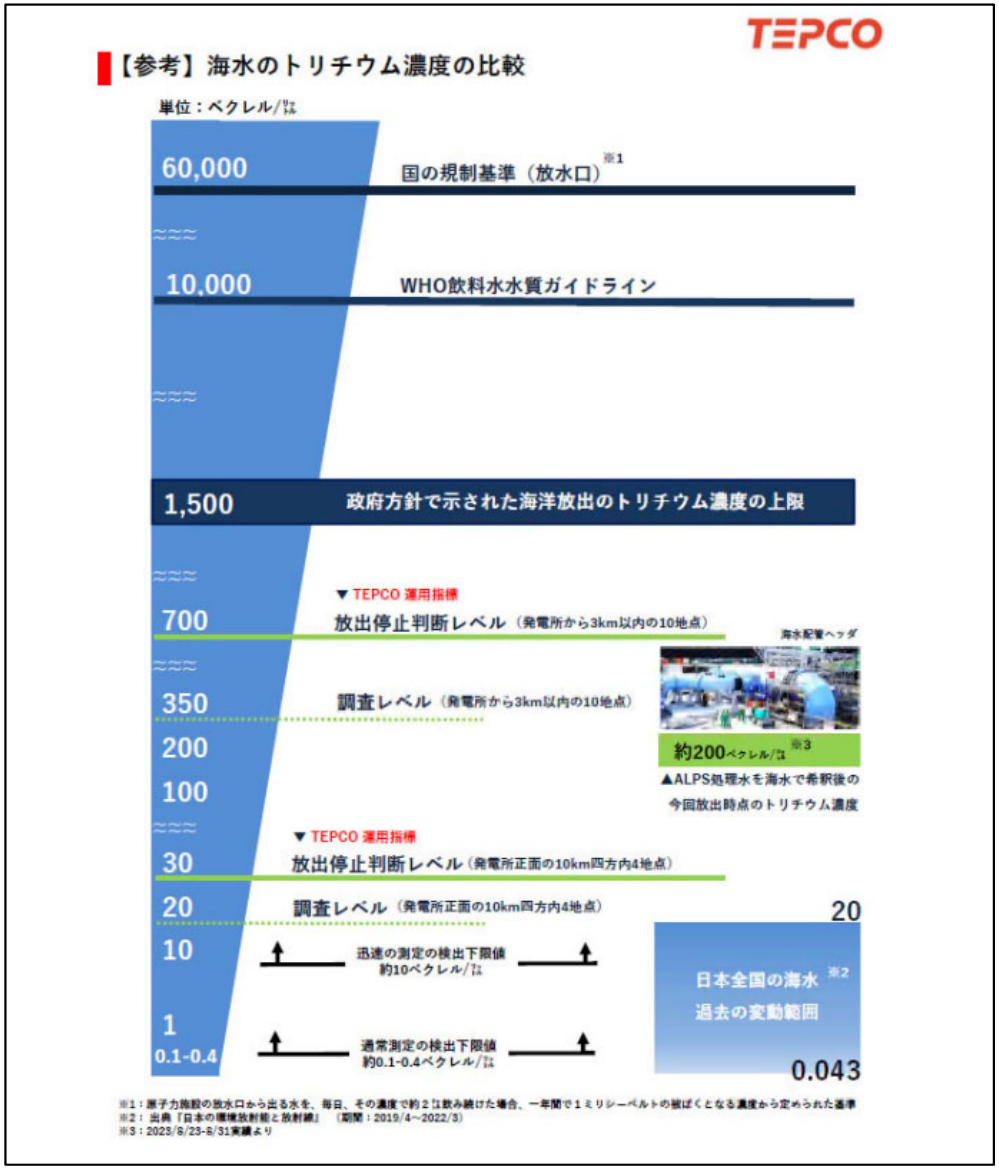
■福島県 詳しくはこちら（福島県ホームページ）

【海水】

９月19日(火)採取：全９測点で検出下限値未満（5.0～6.3Bq/L未満）であり、人や環境への影響がないことを確認しました。（福島県）

<参考>
放出前の福島県沖の海水中トリチウム濃度は0.1～1ベクレル／リットル程度
WHO飲料水ガイドライン 10,000ベクレル／リットル

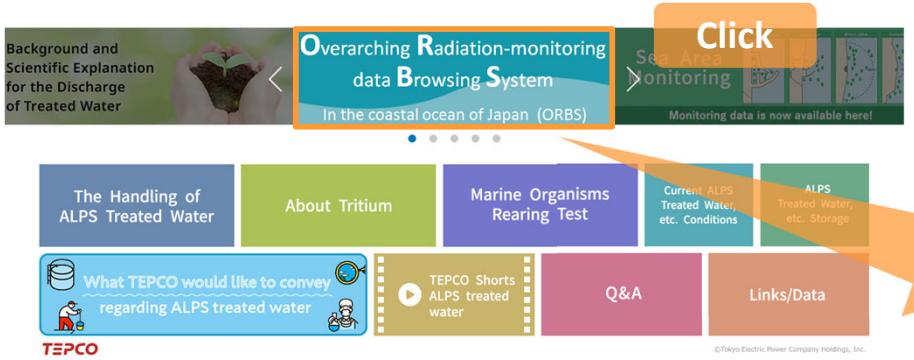
○本資料は、各機関・当社が実施した海域モニタリング（迅速測定）の結果を、各機関の公表内容をもとにとりまとめたものです。各機関の測定結果に関するお問い合わせは、各機関にお願いいたします。



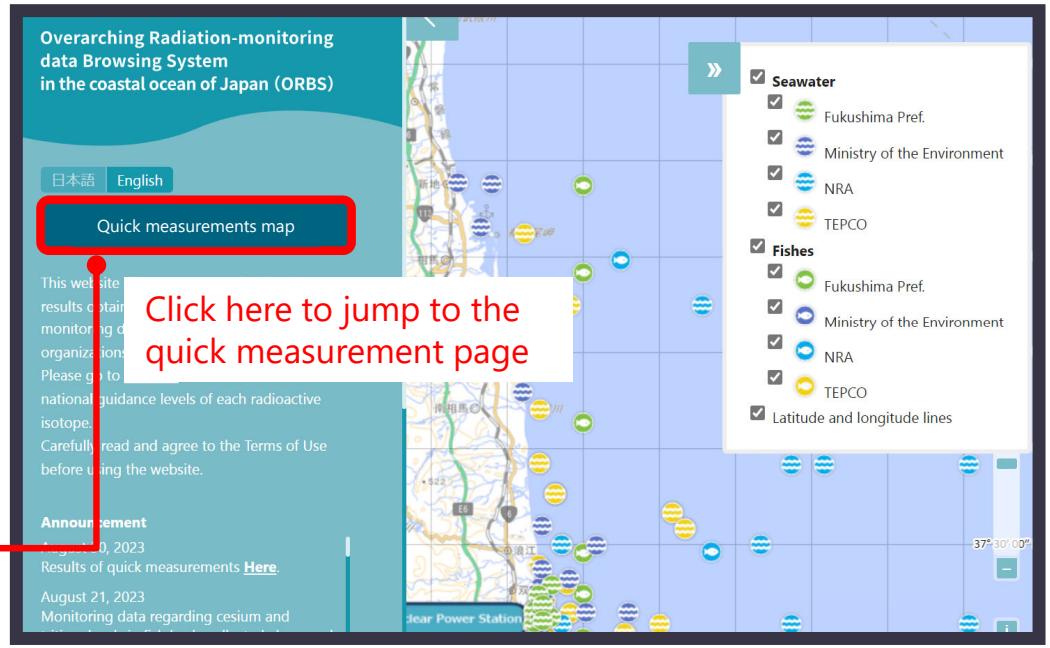
[Reference] Overarching Radiation-monitoring data Browsing System （ORBS）

- The Overarching Radiation-monitoring data Browsing System in Japan is a website that gathers sea area monitoring measurements taken from various locations that have been disclosed by TEPCO as well as related ministries/agencies and local governments, etc., and displays them in a map format for easy viewing, thereby providing objective and comprehensive data on sea conditions.
- Monitoring data on the concentrations of cesium and tritium in seawater and fish sampled by Fukushima Prefecture, the Nuclear Regulation Authority, the Ministry of the Environment, and TEPCO are available for viewing. Thereafter more data will be added so that visitors to the website can access information on other nuclides in the sea, as well as the monitoring results from fish and seaweed.

Screen image of “Treated Water Portal Site”



Screen image of Overarching Radiation-monitoring data Browsing System



On September 19, a special page was added which allows you to see results of quick tritium measurement conducted by the Ministry of the Environment, Fisheries Agency, Fukushima Prefecture and TEPCO since August 24, 2023 in a map format.