

Status of Progress of the installation of ALPS treated water dilution/discharge facility and related facilities



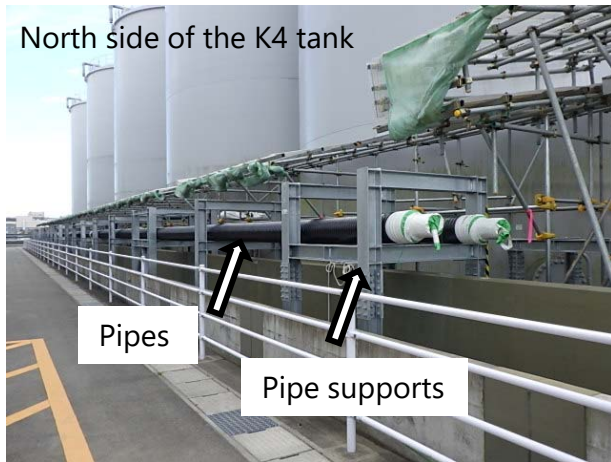
January 26, 2023

Tokyo Electric Power Company Holdings, Inc.

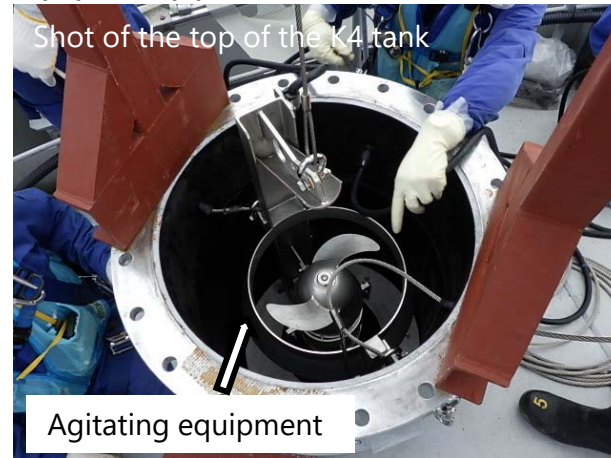
1. Status of construction

■ Measurement/confirmation facility and transfer facility

The installation of pipe supports and pipes for the measurement/confirmation facility and the transfer facility began on August 4 from the area around K4 tank area. Pre-service inspection was started on January 16.



North side of the K4 tank
Installing circulation pipes and pipe supports



Shot of the top of the K4 tank
Installing agitating equipment

Installing the piping supports/pipes
【 Measurement/confirmation facility 】

- Supports
Approx. 531 out of approx. 540m
- Pipes
Approx. 976 out of approx. 1,000m

【Transfer facility】

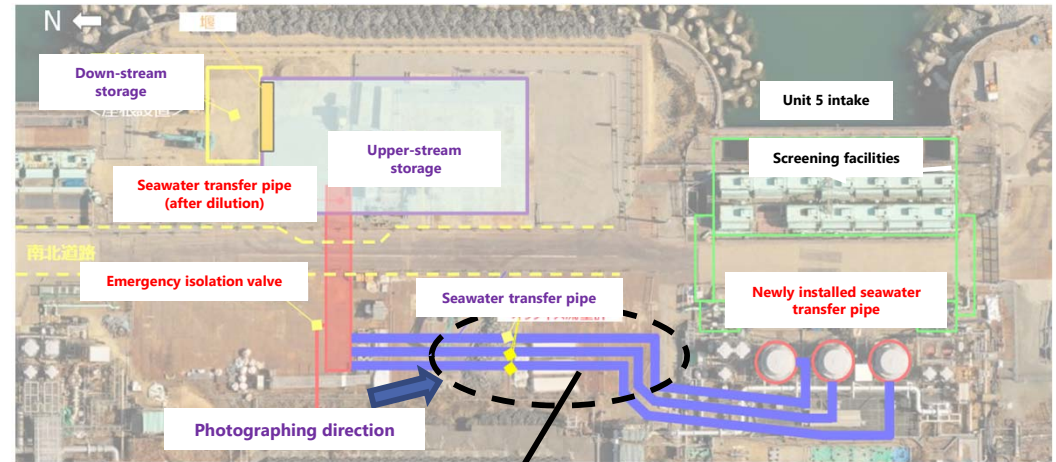
- Supports
Approx. 1,038 out of approx. 1,500m ※1
 - Pipes
Approx. 869 out of approx. 1,500m ※1
- ※1 Descriptions have been revised
<As of January 20>

Installing agitating equipment

30 out of 30 units
(hung inside the tank)
<As of January 20 >

■ Dilution facilities

The foundation shafts for the seawater transfer pipes have been installed. The frame of the foundation is currently being built.



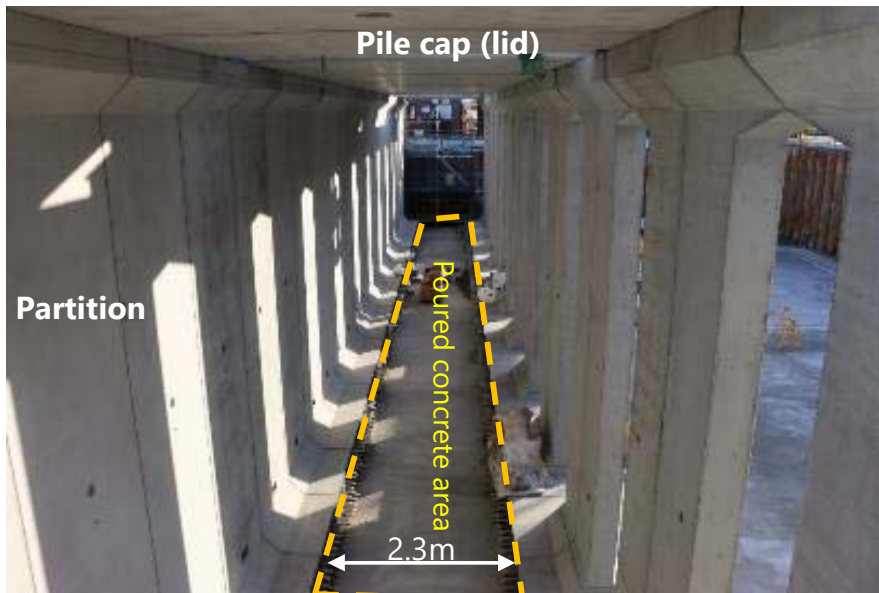
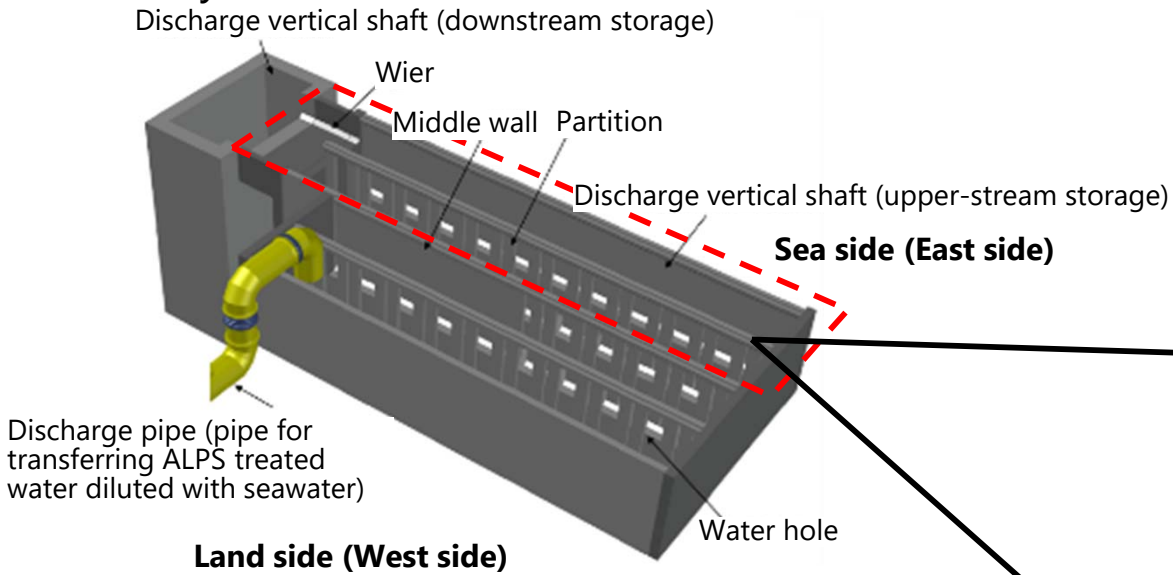
Building the seawater transfer pipe foundation

【Dilution facilities】

- Installing the foundation shafts for pipe foundation
65 out of 65 complete
- Support facility
0 out of 320 m complete
- Pipe facility
0 out of 320 m complete
<as of Jan. 20>

1. Progress in construction (cont.)

- Dilution facility: Discharge vertical shaft (upper-stream storage)
The installation and assembly of the block (manufactured outside of the premises) was started on January 12.



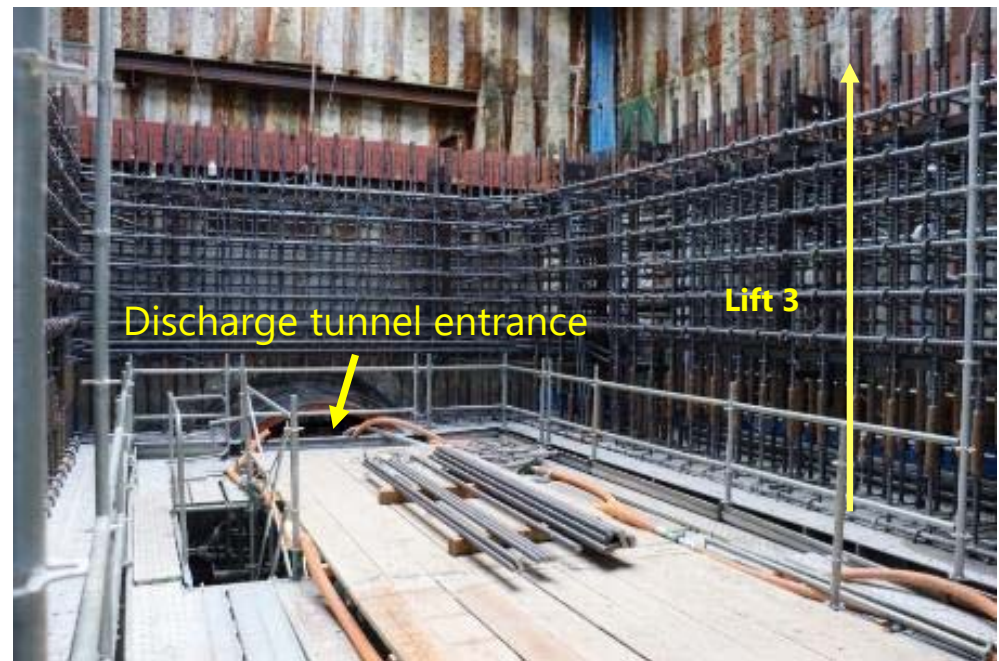
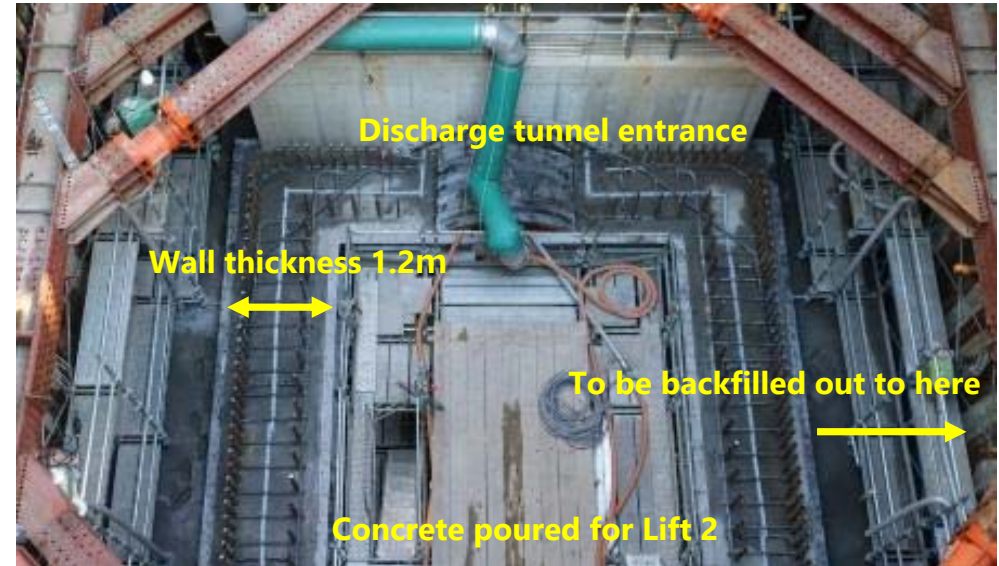
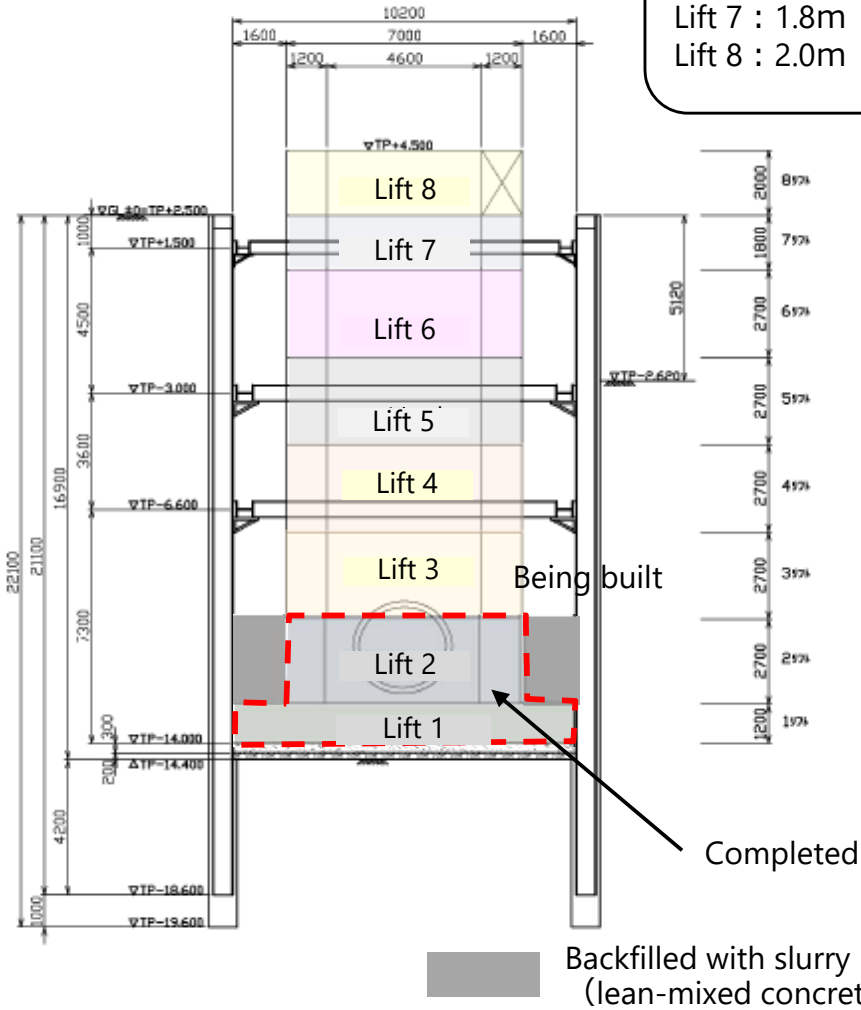
1. Progress in construction (cont.)

- Discharge facility: Discharge vertical shaft (down-stream storage)
Construction of the frame was started on December 18.

【Discharge facility】

- Down-stream storage: Frame building
2 out of 8 lifts complete
<as of Jan. 20>

Height
Lift 1 : 1.2m
Lifts 2 through 6 : 2.7m
Lift 7 : 1.8m
Lift 8 : 2.0m

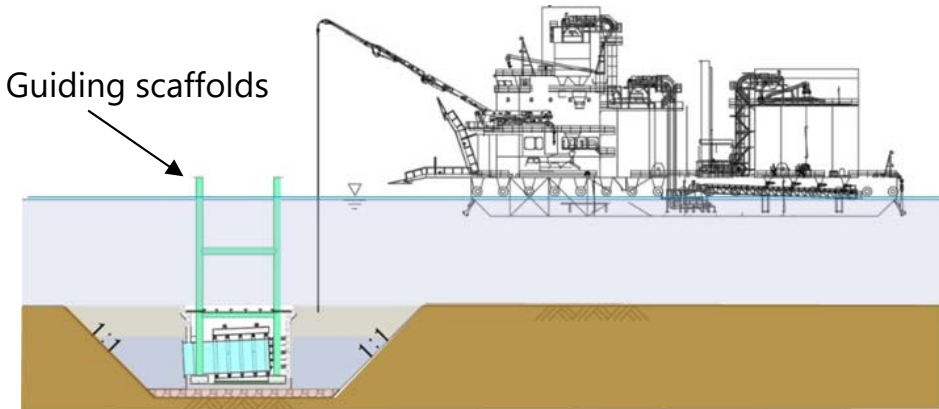
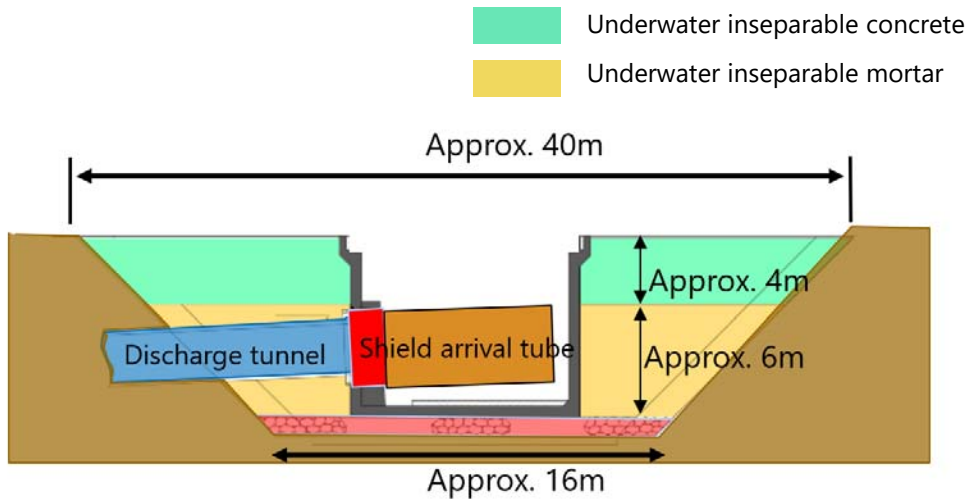


1. Status of construction (cont.)

■ Discharge facility: Discharge outlet caisson

Underwater inseparable mortar (area where the shield machine passes) and underwater inseparable concrete will be poured in the area around the discharge outlet caisson. The pouring of underwater inseparable mortar started on December 8 and was completed on January 7. The underwater inseparable concrete is currently being poured.

Once the area is backfilled, the temporary guiding scaffolds equipped with the caisson (see diagram on the bottom left) will be removed.



Cross section figure for back filling work



【Discharge facility】

- Discharge outlet caisson: Backfilling approx. 3,730m³ out of approx. 5,400m³ complete <as of January 23>

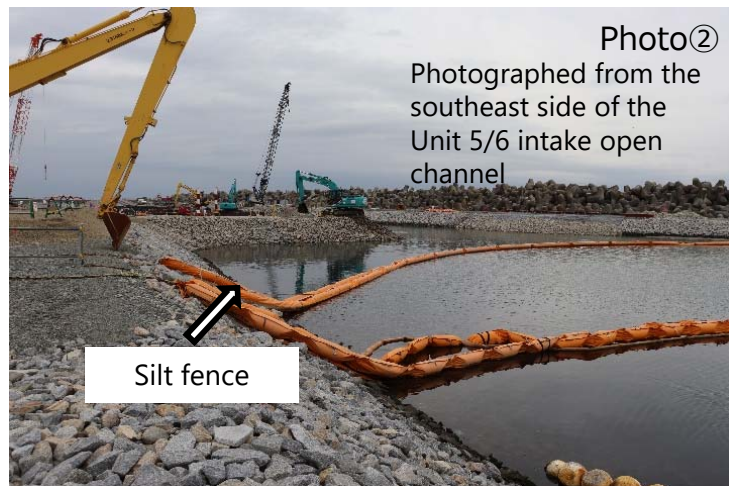
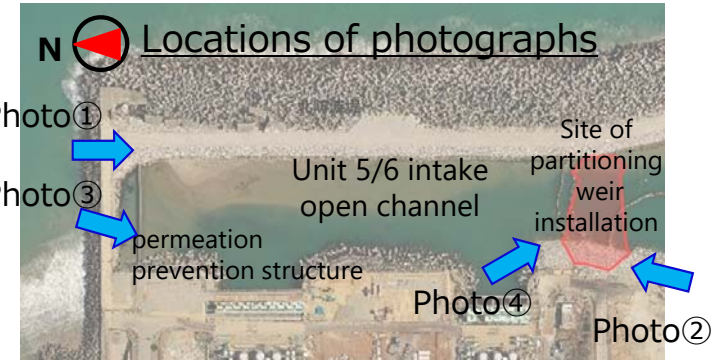
Concrete plant ship

Backfilling

1. Status of construction (cont.)

■ Other (building a partition weir, etc.)

In the Units 5 and 6 sea-side construction area, the heavy machinery scaffolding was completed on December 29. The scaffolding has been in use for building the upper-stream storage since January 5. The removal of silt from the open intake channel (dredging) and the building of the partition weir are being done simultaneously. Once the partition weir is complete, the permeation prevention wall will be removed.



Work area on the sea side of Units 5/6

(Reference) Results of seawater monitoring during the discharge outlet caisson installation



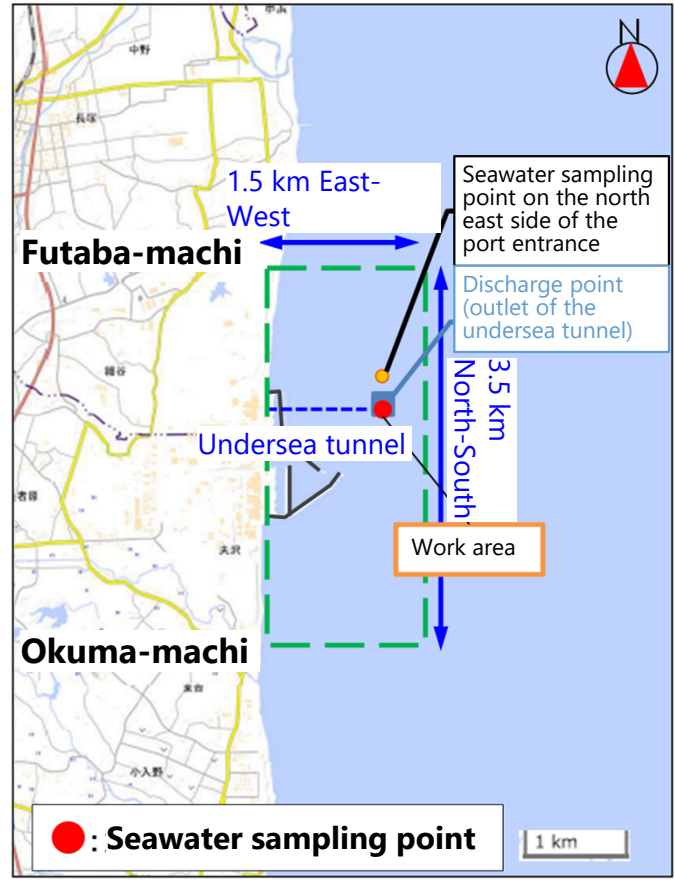
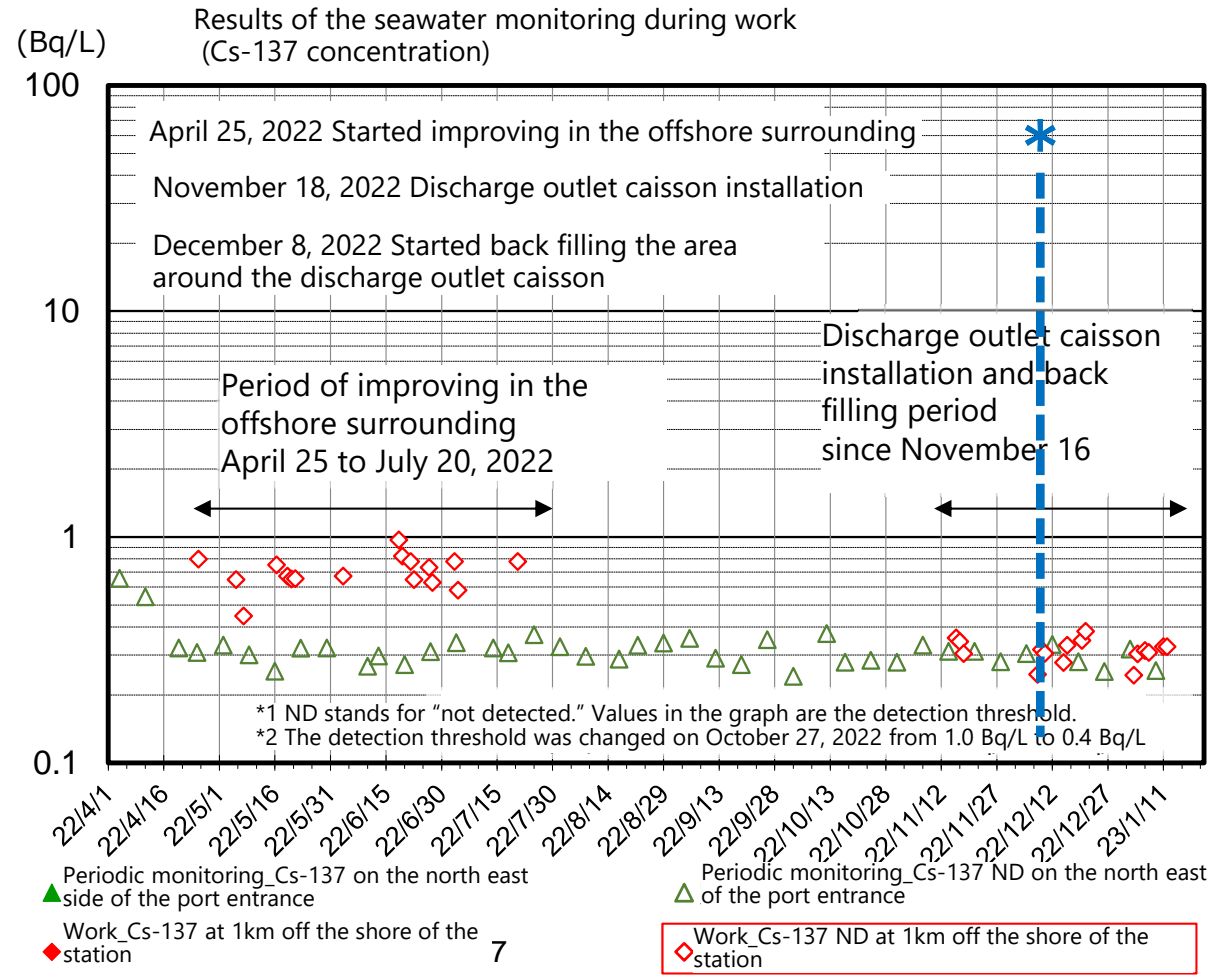
➤ Overview

Seawater was sampled during the discharge outlet caisson installation, etc. *1 conducted offshore, and results confirmed that cesium concentration had not risen due to the work.

➤ Results

*1 Discharge outlet caisson installation, work to remove the seabed sediment before installation

Cesium up to the most recent samples taken January 12, 2023 have not been detected (ND) and there have been no significant fluctuations in seawater cesium concentrations. We will continue to appropriately monitor the seawater during the plant offshore work.



Area* where fishing is not routinely conducted
 1.5 km East-West 3.5 km North-South
 *Area where common fishery rights are not set

(Reference) Results of turbidity measurement during discharge outlet caisson installation

- Overview

Turbidity measurements were taken using a turbidity meter at four locations at the work area boundary during the discharge outlet caisson installation, etc. *1 conducted offshore, and results confirmed that turbidity had not increased due to the work outside of the work area.
- Results

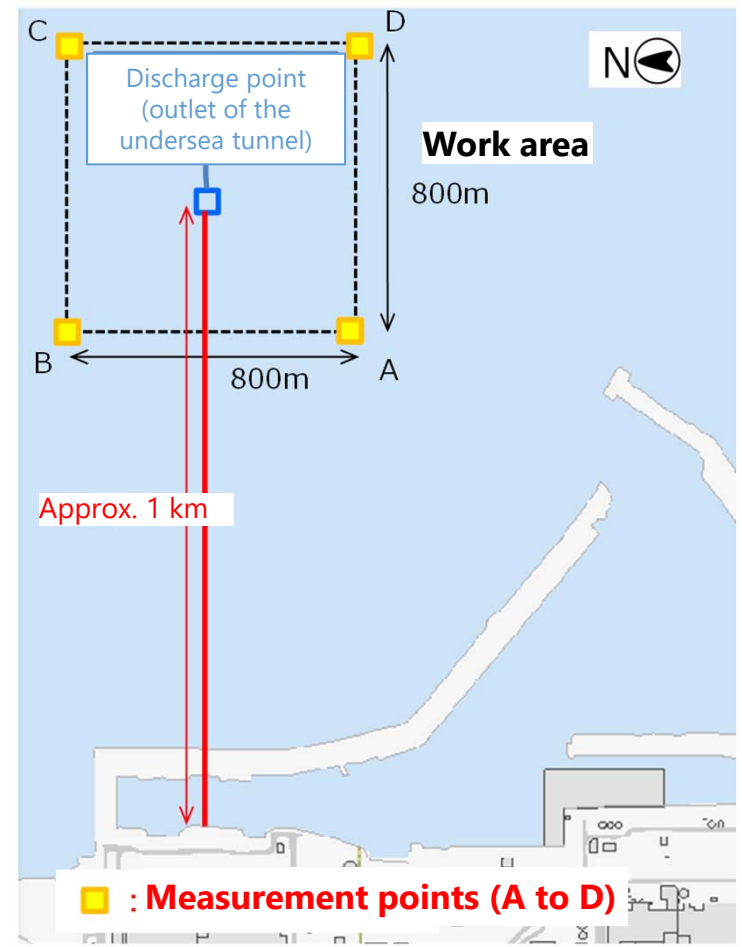
The turbidity measurements taken until January 12, 2023 were all below the control value*2. Visual inspection of turbidity has found that turbidity had not increased due to the work outside of the work area. We will continue to measure turbidity during the plant offshore work appropriately.

*1 Discharge outlet caisson installation, work to remove the seabed sediment before installation

*2 Control value
 Turbidity is converted to SS (suspended solids; mg/L). It is confirmed that SS does not exceed the threshold of BG value (measurement before work started) + 10mg/L.

Work date (measurement date)	Turbidity measurement results							
	A		B		C		D	
Dec 15, 2022	○	(4.6)	○	(8.5)	○	(4.1)	○	(3.0)
Dec 16, 2022	○	(3.0)	○	(2.2)	○	(1.8)	○	(2.0)
Dec 20, 2022	○	(2.9)	○	(2.3)	○	(1.8)	○	(2.9)
Dec 21, 2022	○	(2.1)	○	(2.5)	○	(1.8)	○	(2.2)
Jan 3, 2023	○	(1.7)	○	(1.8)	○	(1.6)	○	(1.5)
Jan 4, 2023	○	(2.1)	○	(1.6)	○	(1.6)	○	(1.6)
Jan 6, 2023	○	(2.1)	○	(2.2)	○	(2.4)	○	(2.0)
Jan 7, 2023	○	(1.8)	○	(1.7)	○	(1.8)	○	(1.5)
Jan 11, 2023	○	(2.2)	○	(1.6)	○	(1.6)	○	(1.5)
Jan 12, 2023	○	(2.3)	○	(4.4)	○	(2.8)	○	(2.7)

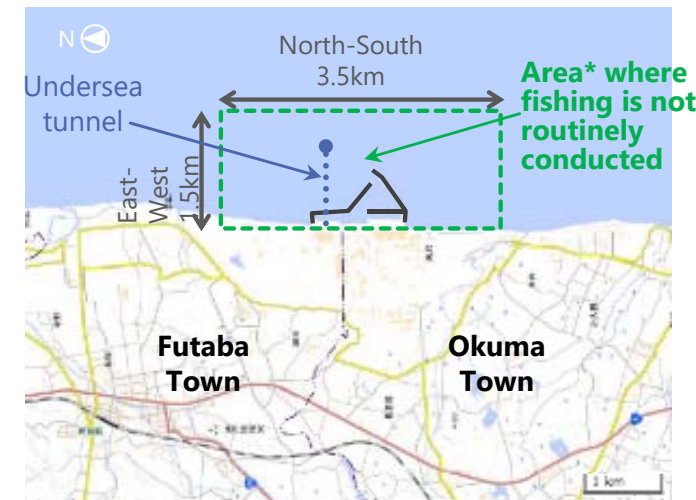
Criteria: Less than control value ○; More than control value ×



(Reference) Overview of the ALPS treated water dilution/discharge facility and related facilities



Source: Developed by Tokyo Electric Power Company Holdings, Inc. based on the map developed by the Geospatial Information Authority of Japan (electronic territory web)
<https://maps.gsi.go.jp/#13/37.422730/141.044970/&base=std&ls=std&disp=1&vs=c1j0h0k0l0u0t0z0r0s0m0f1>



*Area where common fishery rights are not set

Measurement/confirmation facility (K4 tank group)

Comprised of three sets of tank groups each with the role of receiving, measurement/confirmation, and discharge. In the measurement/confirmation stage, water that has been made homogenized through circulation and agitating is sampled and analyzed (approx. 10,000m³ × 3 groups)

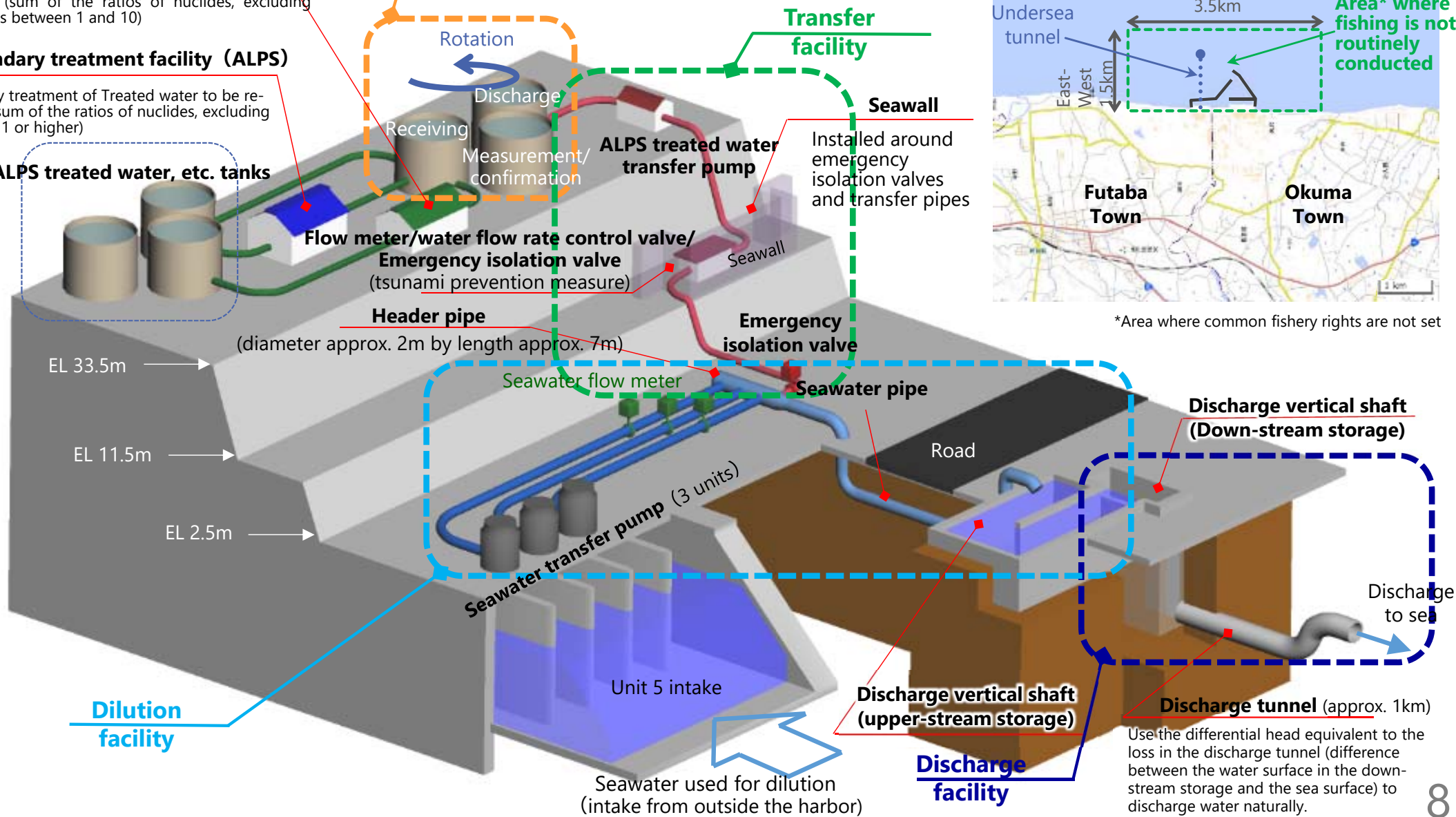
Secondary treatment facility (newly installed reverse osmosis membrane facility)

Secondary treatment of treated water to be re-purified (sum of the ratios of nuclides, excluding tritium, is between 1 and 10)

Secondary treatment facility (ALPS)

Secondary treatment of Treated water to be re-purified (sum of the ratios of nuclides, excluding tritium, is 1 or higher)

ALPS treated water, etc. tanks



Use the differential head equivalent to the loss in the discharge tunnel (difference between the water surface in the down-stream storage and the sea surface) to discharge water naturally.

(Reference) Review of the process due to the change in construction order of discharge facility

	FY2022									FY2023					
	7	8	9	10	11	12	1	2	3	1Q	2Q	3Q			
Measurement/ confirmation facility		Install circulation pumps, agitating equipment and pipes													
Transfer facility / dilution facility		Install ALPS treated water transfer pumps, seawater transfer pumps and pipes													
Discharge facility															
Others		Build partitioning weir, etc.													
System tests															

: Construction and assembly on the field

: Test-related

: Changes

move forward

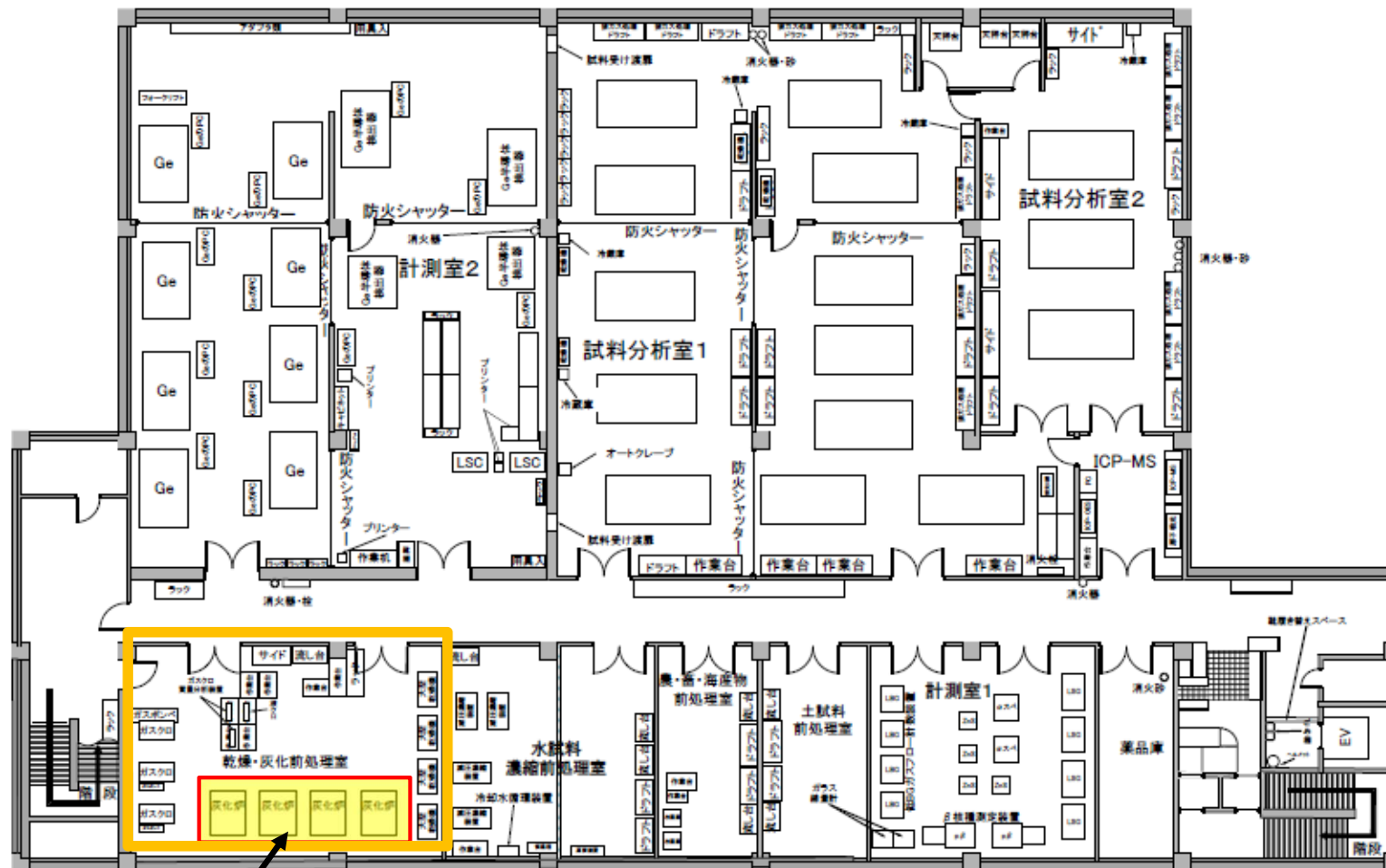
Change

Include removal of guiding scaffolds and discharge outlet caisson

※The schedule may be revised based on progress made and other factors.

2. Installation of electrolytic accumulation devices

- The four incinerators in the drying and incineration pre-processing room in the chemical analysis building were removed to install the electrolytic accumulation devices*.
- 8 electrolytic accumulation devices have been delivered to the site as of December 2022. Their operation will start by March 2023 after accumulation tests.



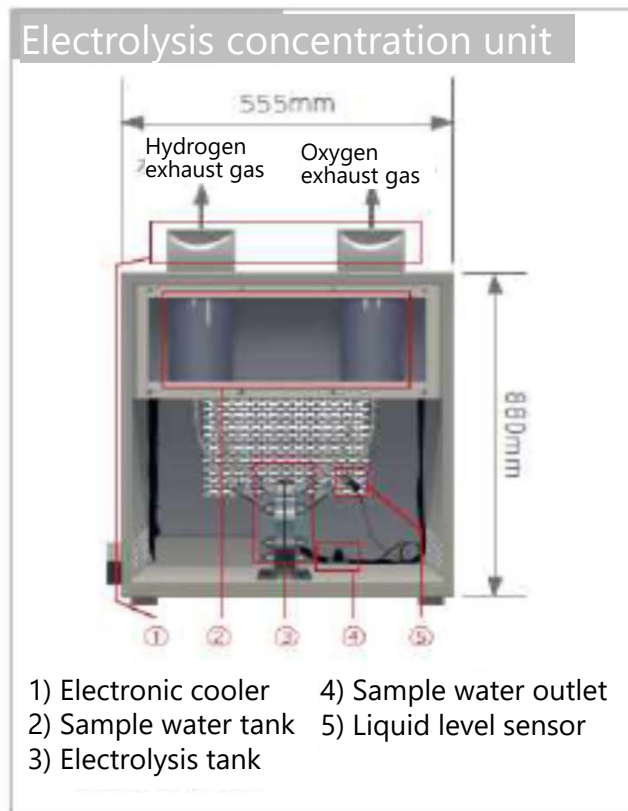
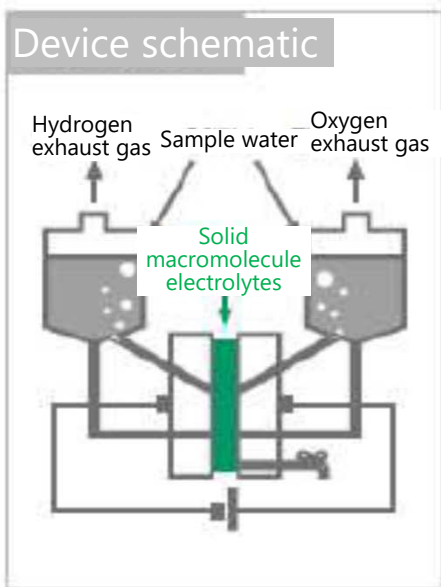
Electrolytic accumulation devices to be installed here

Chemical analysis building B1F

*Pre-processing device to analyze tritium in extremely low concentrations

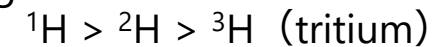
2. Installation of electrolytic accumulation devices (cont.)

- To detect tritium that may exist in background levels in surface seawater, the tritium needs to be concentrated through electrolysis of the water*.
- The number of days required for analysis takes a month to 45 days more because of the electrolysis but this allows measurement with a lower detection limit.
- This method will be introduced in tritium analysis conducted at Fukushima Daiichi NPS (analysis of free water tritium in marine organisms).



(*) Concentration through electrolysis

Water releases hydrogen and oxygen gas through electrolysis. The reaction rate of becoming hydrogen gas is as follows:



This means that **tritium water is less easily electrolyzed**. Tritium is concentrated through electrolysis using this characteristic.

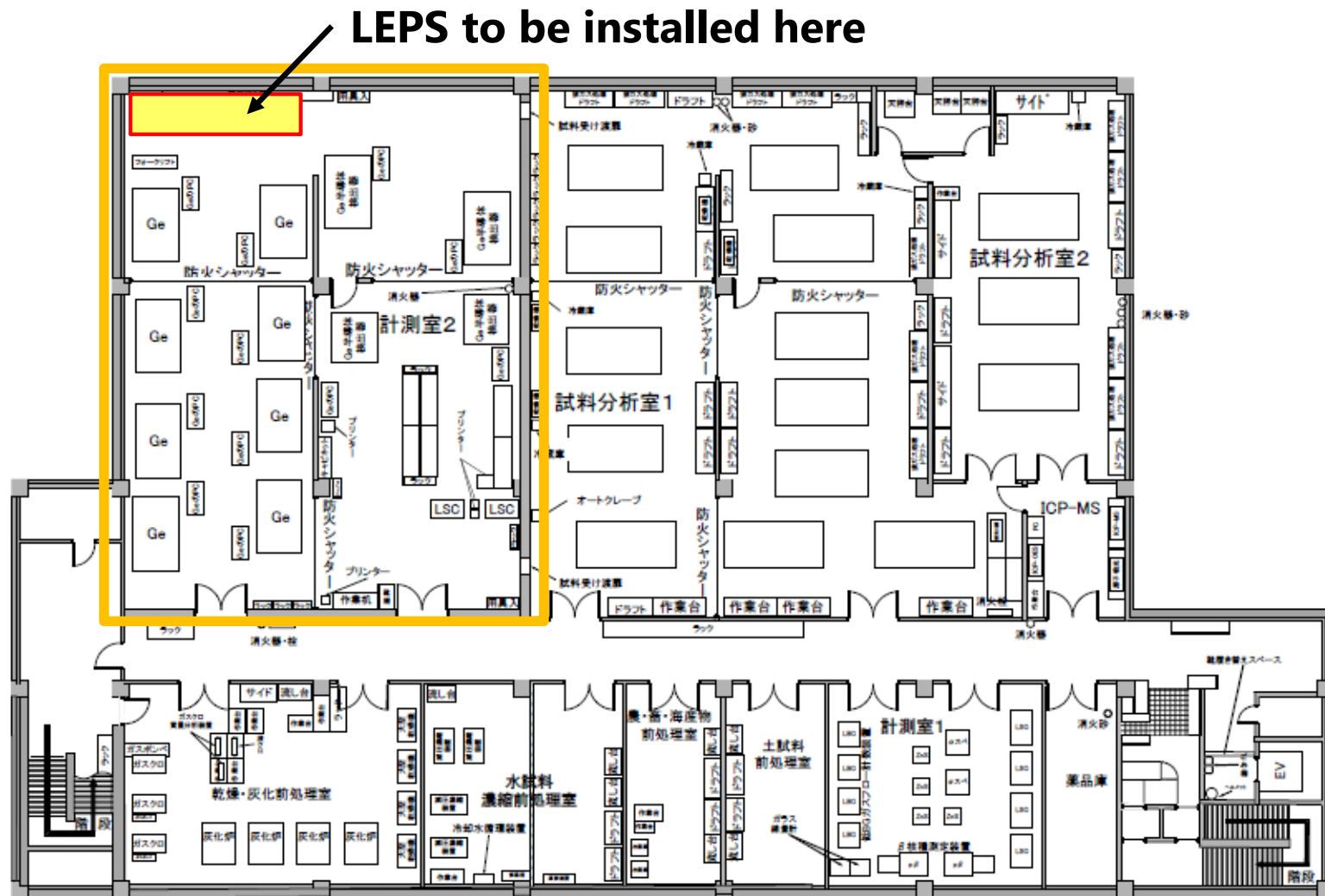
【Specifications】

- It can concentrate 1,000 mL of distilled sample water to 50 mL with around 60 hours.
- Hydrogen and oxygen are released as the electrolysis products.

*Descriptions taken from the De Nora Permelec, Ltd. website

3. Low-energy photon germanium semiconductor detector (LEPS) **TEPCO**

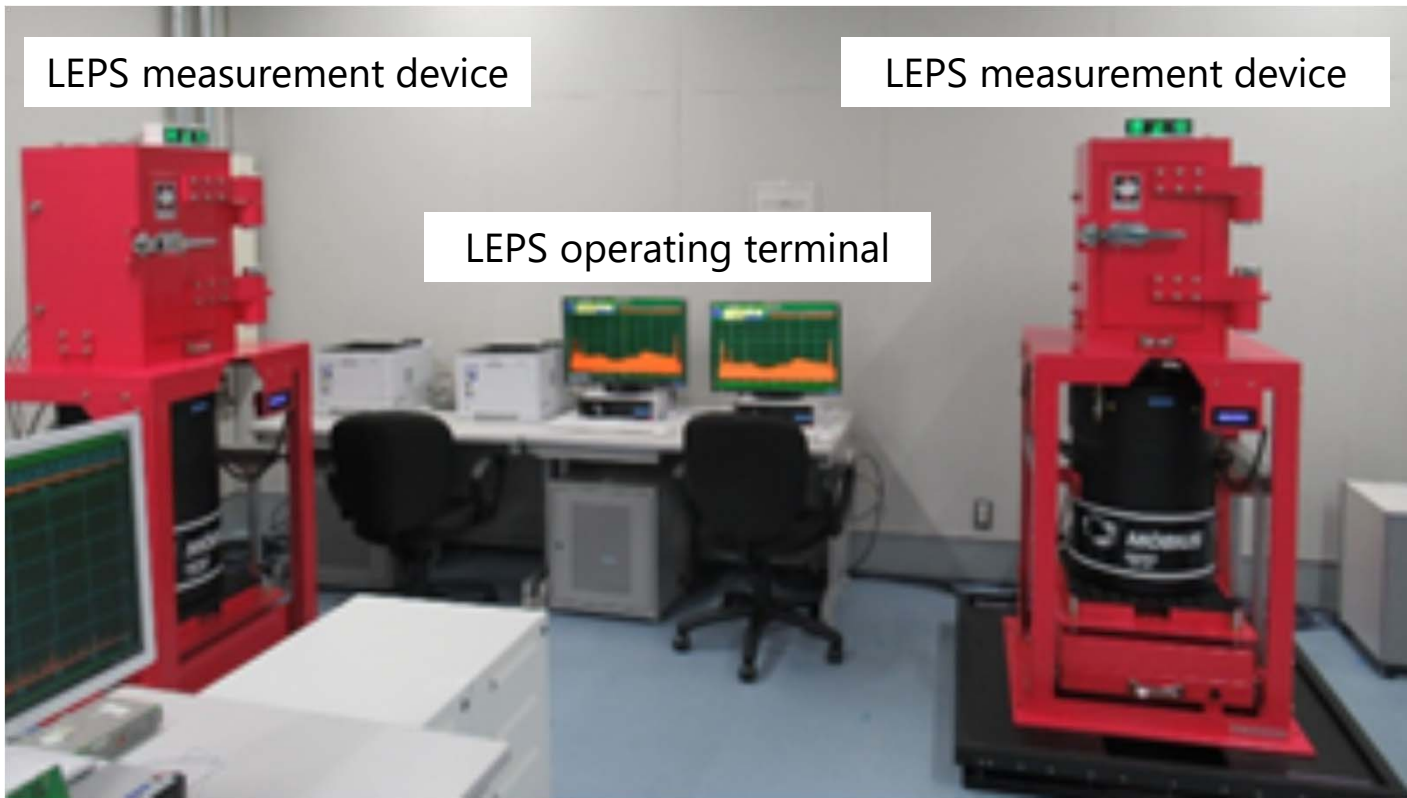
- A low-energy photon germanium semiconductor detector (LEPS) will be installed in the measurement room in the chemical analysis building. Set up of two LEPS was completed in December 2022, and the operation will start by March 2023 after verification tests.



Chemical analysis building B1F

3. Low-energy photon germanium semiconductor detector (LEPS) (cont.) **TEPCO**

- A new type of analysis for analyzing the nuclides that emit low-energy radiation such as Fe-55 (nuclides other than the 62 nuclides subject to removal by ALPS) is required in analyzing ALPS treated water analysis.
- To conduct this nuclide analysis on Fukushima Daiichi premises, LEPSs will be installed.



LEPS
(device in the chemical analysis building measurement room)



Reference: existing germanium semiconductor detector
(Photo of the device in the chemical analysis building measurement room)