February 13, 2024 Briefing for the Nuclear Reform Monitoring Committee

Fukushima Daiichi Nuclear Power Station Decommissioning Initiatives

TEPCO

【Issues covered】

1. Unit 2 PCV Internal Investigation/Trial Retrieval Preparation Status
2. ALPS-treated water ocean discharge status
3. Body contamination of workers during the cleaning of additionally installed ALPS pipes
4. Communicating with society

Fukushima Daiichi Decontamination &
Decommissioning Engineering Company

1. UNIT 2 PCV INTERNAL INVESTIGATION/TRIAL RETRIEVAL PREPARATION STATUS

【Reference】 Primary steps of trial retrieval (internal investigation/debris sampling)

TEPCO

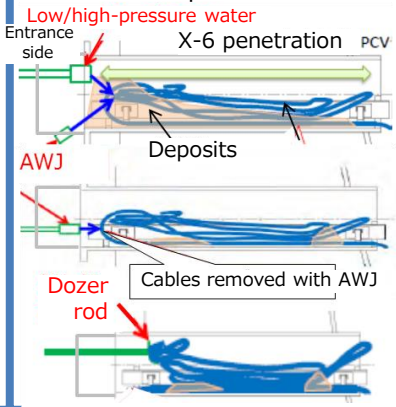
Approved

1. Isolation chamber installation

2. Opening of the X-6 penetration hatch

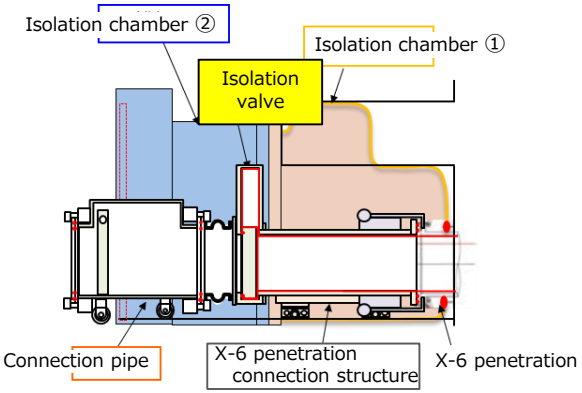
3. Removal of deposits from inside the X-6 penetration

Removal of deposits and cables inside the X-6 penetration



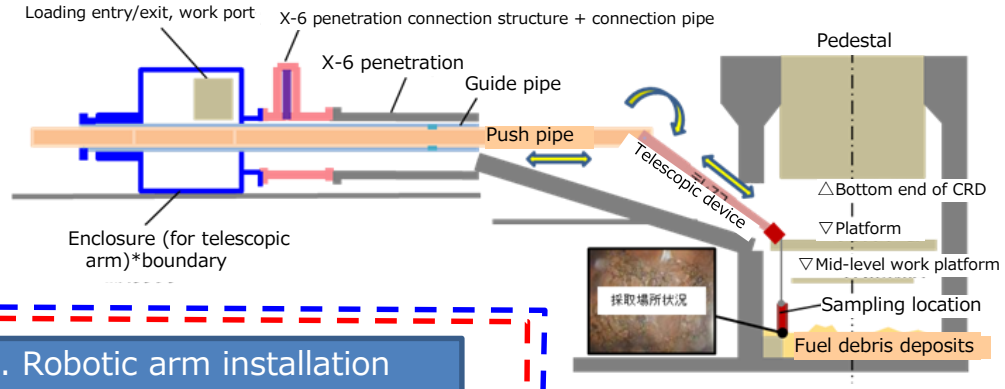
- Push deposits with 【Low/High pressure water】
- Remove cables with 【AWJ】
- Push cables with 【dozer rod】

4. X-6 penetration connection structure and connection pipe insulation

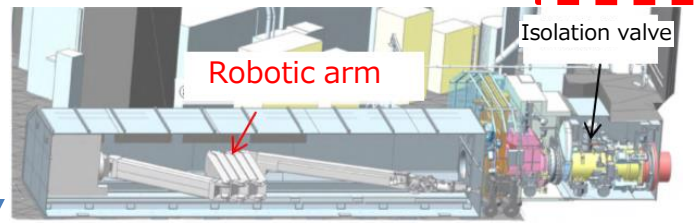


To be submitted

5. Installation of telescopic device
6. Trial retrieval (Sample debris using telescopic device)

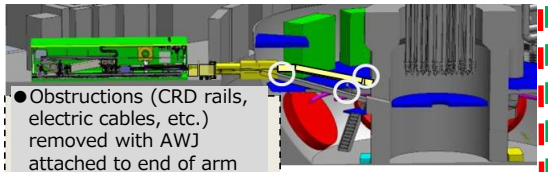


7. Robotic arm installation



8. Use robotic arm to perform internal investigation and sample debris

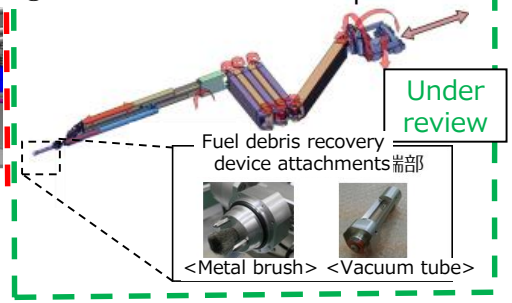
①Internal investigation



- Obstructions (CRD rails, electric cables, etc.) removed with AWJ attached to end of arm

②Use robotic arm to sample debris

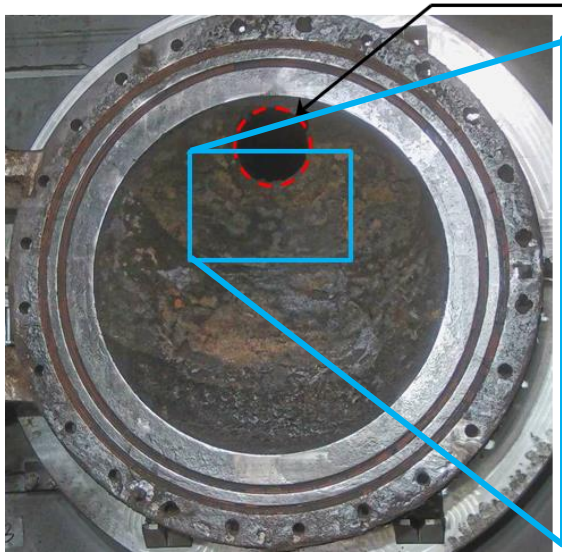
Under review



(Note)
- Isolation valve: Valves use to partition the inside from the outside of the PCV
- AWJ (Abrasive Water Jet): Cutting device that mixes abrasives with high-pressure water to improve cutting performance

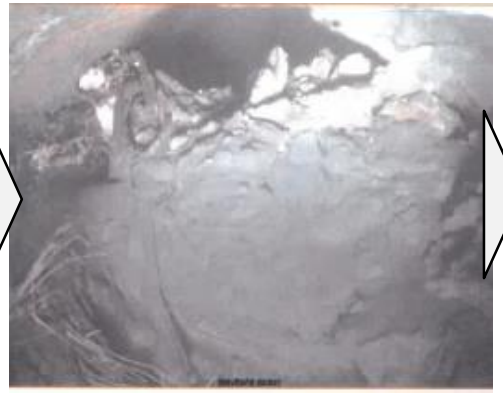
Field work progress (deposit removal)

- After opening the X-6 penetration hatch, a dozer rod is being used to push deposits after which low-pressure water is being sprayed to remove them. The deposits are gradually being removed and we have found cables.
- There are still mud-like deposits at the bottom of the penetration so we will use high-pressure water/AWJ to remove them. However, this will take more time than anticipated, and it is possible that we may not be able to remove all of the deposits.



External view of the X-6 penetration (after opening the hatch)

Prior to commencing work on January 17 (prior to spraying the deposits with low-pressure water)



After work on January 19

After work on January 22

Schedule

- We plan to begin the trial retrieval of fuel debris by October 2024 at the latest.
- we will continue to steadily move forward and prioritize safety during the removal of deposits and the trial retrieval of fuel debris

	FY2023	FY2024				FY2025
	Q4	Q1	Q2	Q3	Q4	
Deposit removal						
Telescopic device manufacturing/installation preparations						
Trial retrieval (fuel debris sampling using the telescopic device)						
Robotic arm testing, additional development as required by testing results						
Robotic arm installation preparations/robotic arm access route construction						
Use of robotic arm for internal investigations/fuel debris sampling						

2. ALPS-TREATED WATER OCEAN DISCHARGE STATUS

Ocean monitoring status and the discharge method for the fourth discharge and onward

Ocean monitoring status

- Since the commencement of discharge, seawater samples have been taken at 10 locations around the discharge outlet (within a 3km radius from the power station) and four locations outside of the area around the discharge outlet (within a 10km square offshore of the power station) to measure tritium concentrations. All results have been below indicators (discharge suspension determination level, investigation level).
- The frequency of the rapid measurements taken in the vicinity of the discharge outlet will be increased from once a week to every day for a certain amount of time after the commencement of discharge, and the results will be quickly disclosed to the public.

Discharge method for the fourth discharge and onward

- Since the opinion was voiced that feelings of uneasiness would remain if "post-dilution tritium concentrations" were calculated using just pre-dilution concentrations and flow rate during ocean discharge, after dilution, the ALPS-treated water was kept in the upstream storage prior to discharge so that tritium measurements could be taken (Step 1), and after the commencement of discharge, samples were taken daily from downstream of the seawater pipe header (Step 2).
- This process was employed for the first three discharges and no significant difference was seen between the calculated value and actual measurements thereby verifying that the water is being diluted as designed. And, we believe we have achieved the objective of this two-step discharge method.
- Therefore, we will temporarily suspend the use of this two-step discharge method that was used for the first three discharges, and from the fourth discharge onward, for the time being, once a year we shall implement Step 1 just to confirm that there have been no changes to the status of current equipment, which is smoothly discharging treated water, in consideration of the fact that the simple inspection cycle for seawater transfer pumps is one year.

ALPS-treated water dilution/discharge facility inspection status

- After the third discharge, the following equipment was inspected and no abnormalities were found.

Facility name	Patrol inspection content	Contents of inspections performed after the third discharge was completed
Measurement/ confirmation facility	**External visual inspection（Measurement/confirmation tank)** Visual check for equipment abnormalities	**Inspection based on long-term inspection plan（Agitator, MO valve)** Insulation resistance measurement, MO valve seat path check
Transfer facility	**External visual inspection（ALPS-treated water transfer pump/transfer pipes)** Visual check for equipment abnormalities Inspection device used to check for abnormal noises	**External visual inspection（ALPS-treated water transfer pump/transfer pipes)** Visual check for equipment abnormalities **Misc.** Strainer cleaning, MO valve seat path check
Dilution facility	**External visual inspection（Seawater transfer pipe/seawater pipe header)** Visual check for equipment abnormalities Inspection device used to check for abnormal noises **External visual inspection（Vertical discharge shaft (upstream storage))** Visual check for equipment abnormalities	**External visual inspection（Seawater transfer pipe/seawater pipe header)** Visual check for equipment abnormalities **External visual inspection（Vertical discharge shaft (upstream storage))** Tank drained, observed over time and repaired **Misc.** Replace the gland packing of the seawater transfer pump and inspect the flow meter
Discharge facility	**External visual inspection（Vertical discharge shaft (downstream storage))** Visual check for equipment abnormalities	**External visual inspection（Vertical discharge shaft (downstream storage))** Visual check for equipment abnormalities ※The submerged part of the discharge tunnel will be examined separately
Intake facility	**External visual inspection（partition weir)** Visual check for equipment abnormalities	**External visual inspection（partition weir)** Visual check for equipment abnormalities

FY2023 ALPS-treated water discharge status

- On August 22, 2023, the Japanese Government made its decision pertaining to the commencement period of the ocean discharge of ALPS-treated water, and TEPCO commenced ocean discharge on August 24, 2023.
- Treated water has been discharged three times since the commencement of discharge, and preparations for the fourth discharge are currently underway.

1st discharge	Measurement/confirmation facility (K4 area) Group B	: 7,788m³	Secondary treatment: None Tritium concentration: 140,000Bq/liter Total tritium volume: 1.1 trillion Bq	8/24~9/11
2nd discharge	Measurement/confirmation facility (K4 area) Group C	: 7,810m³	Secondary treatment: None Tritium concentration: 140,000Bq/liter Total tritium volume: 1.1 trillion Bq	10/5~23
3rd discharge	Measurement/confirmation facility (K4 area) Group A	: 7,753m³	Secondary treatment: None Tritium concentration: 130,000Bq/liter Total tritium volume: 1 trillion Bq	11/2~20
4th discharge	K4 area E group（Transferred to measurement/confirmation facility Group B※2) K3 area A group (Transferred to measurement/confirmation facility Group B※2)	: Approx.4,500m³ : Approx. 3,300m³	Secondary treatment: None Tritium concentration: 17~210,000Bq/liter ※1 Total tritium volume: 1.4 trillion Bq ※1	

➥ FY2023 total tritium discharge volume: Approx. 5 trillion Bq

※1 The tank group average considers the amount of decay that will have occurred as of July 1, 2023

※2 Transferred to the B group that was emptied during the first discharge.

FY2024 discharge plan (draft) (1/2)

- In light of the considerations mentioned on the aforementioned pages, as of January 2024, the FY2024 discharge plan (draft) is as follows: There will be seven discharges during the year that will result in an annual discharge of approximately 54,600m³ of [treated water] and an annual tritium discharge volume of approximately 14 trillion Bq.

Management number※1				Discharge period
24-1-5	K3 area A/B groups (Transferred to measurement/confirmation facility Group C) J4 area L group (Transferred to measurement/confirmation facility Group C)	: Approx. 4,600m³ : Approx. 3,200m³	Secondary treatment: None Tritium concentration: 18~200,000Bq/liter ※2 Total tritium volume: 1.5 trillion Bq	Apr-May
24-2-6	J4 area L group (Transferred to measurement/confirmation facility Group A) J9 area A/B groups (Transferred to measurement/confirmation facility Group A)	: Approx. 2,200m³ : Approx. 5,600m³	Secondary treatment: None Tritium concentration: 17~190,000Bq/liter ※2 Total tritium volume: 1.4trillion Bq	May-Jun
24-3-7	J9 area A/B groups (Transferred to measurement/confirmation facility Group B) K1 area C/D groups (Transferred to measurement/confirmation facility Group B)	: Approx. 2,100m³ : Approx. 5,700m³	Secondary treatment: None Tritium concentration: 16~180,000Bq/liter ※2 Total tritium volume: 1.3trillion Bq	Jun-Jul
24-4-8	K1 area C/D groups (Transferred to measurement/confirmation facility Group C) G4 south area C group (Transferred to measurement/confirmation facility Group C)	: Approx. 5,100m³ : Approx. 2,700m³	Secondary treatment: None Tritium concentration: 16~310,000Bq/liter ※2 Total tritium volume: 1.7trillion Bq	Jul-Aug

※2 The tank group average considers the amount of decay that will have occurred as of April 1, 2024

Continues on next slide

※1 The management number is made up of the fiscal year, followed by the discharge number for that fiscal year, and the total number of discharges to date. For example, “24-1-5” indicates that the data is for the first discharge of 2024, which is the fifth discharge to date.

FY2024 discharge plan (draft) (2/2)

Continued from previous slide

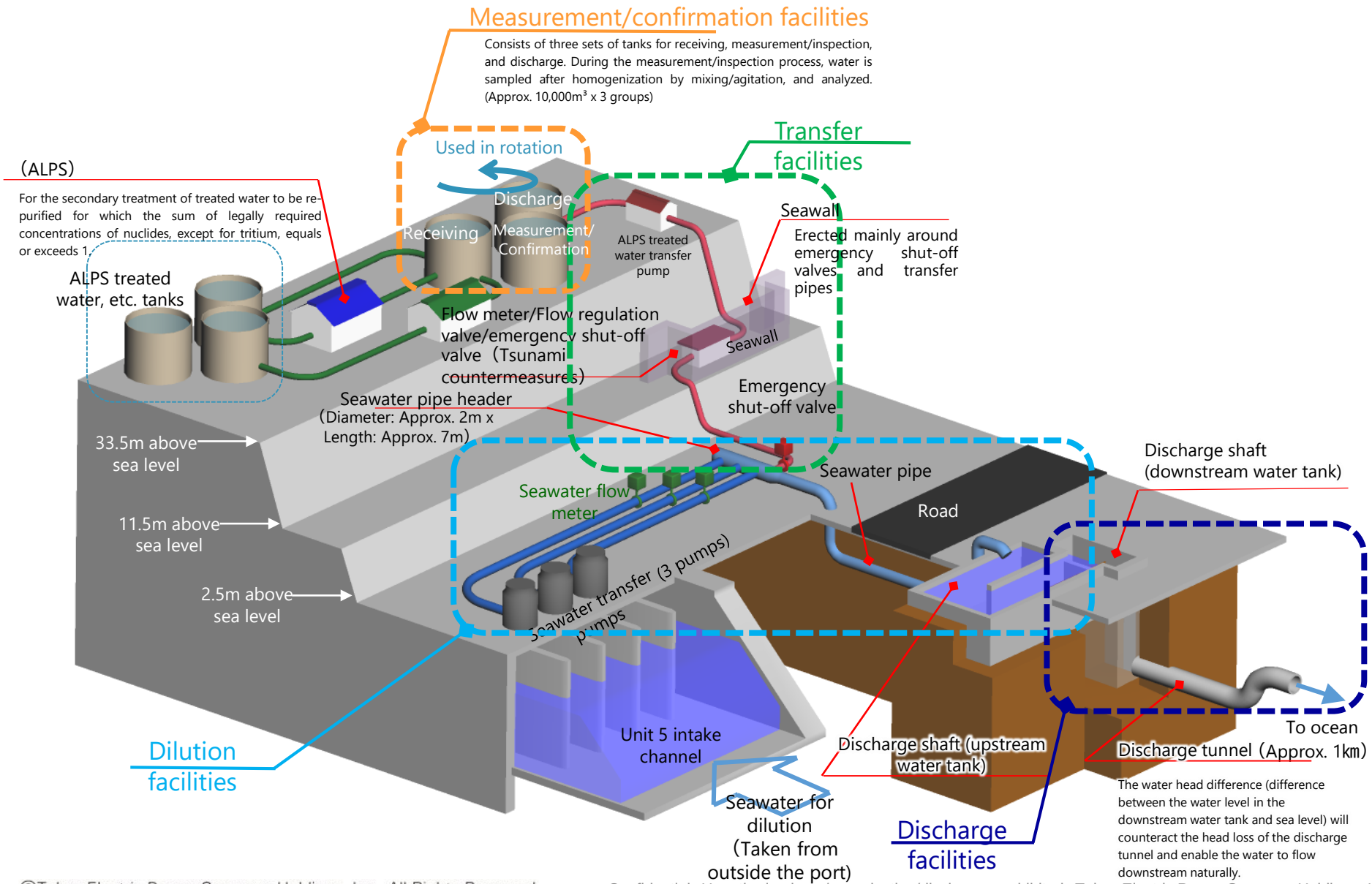
Management number※1			Discharge period
24-5-9	G4 south area C group (Transferred to measurement/confirmation facility Group A) : Approx. 7,300m³ G4 south area A group (Transferred to measurement/confirmation facility Group A) : Approx. 500 m³	Secondary treatment: None Tritium concentration: 30~350,000Bq/liter ※2 Total tritium volume: 2.4trillion Bq	Aug-Sep
24-6-10	G4 south area A group (Transferred to measurement/confirmation facility Group B) : Approx. 7,800m³	Secondary treatment: None Tritium concentration: 34~350,000Bq/liter ※2 Total tritium volume: 2.7trillion Bq	Sep-Oct
Inspection suspension (including full inspections of measurement/confirmation facility Group B tanks)			
24-7-11	G4 south area A group (Transferred to measurement/confirmation facility Group C) : Approx. 1,700m³ G4 south area B group (Transferred to measurement/confirmation facility Group C) : Approx. 6,100m³	Secondary treatment: None Tritium concentration: 34~400,000Bq/liter ※2 Total tritium volume: 3.0trillion Bq	Mar

➥ FY2024 total tritium discharge volume: Approx. 14trillion Bq

※2 The tank group average considers the amount of decay that will have occurred as of April 1, 2024

※1 The management number is made up of the fiscal year, followed by the discharge number for that fiscal year, and the total number of discharges to date. For example, “24-1-5” indicates that the data is for the first discharge of 2024, which is the fifth discharge to date.

【Reference】 Overview of ALPS treated water dilution/discharge facilities



3. BODY CONTAMINATION OF WORKERS DURING THE CLEANING OF ADDITIONALLY INSTALLED ALPS PIPES

Event history

- During the cleaning of the inside of the additionally installed ALPS crossflow filter outlet pipe (system B) on October 25, 2023, a temporary hose that had been inserted into the receiving tank for cleaning waste water broke loose allowing cleaning waste water to spray over the area.
- Workers engaged in this task in the vicinity were taken to the on-site emergency medical center and measured for contamination. It was found that two workers onto which the cleaning waste water sprayed, and two other workers that engaged in cleaning of the sprayed liquid, had suffered body contamination. Results of nasal smears confirmed that none of the workers had ingested any contamination.
- Out of the four workers that suffered body contamination, decontamination of two of the workers was successful. The contamination level of the other two workers, onto which the cleaning waste water sprayed, could not be reduced to levels allowing exit from the area (below 4Bq/square meter), so they were transported to the hospital. (The workers were released from the hospital on October 28)
- It was confirmed that none of the workers were exposed to a dose that exceeded the annual dose limits for skin (500mSv) or the effective dose stipulated in Fukushima Daiichi regulations (5mSv).

- This event occurred due to the overlapping of the following three direct causes:
  - A) A sudden change in water pressure (caused by operating a valve to close a pipe)
  - B) The temporary hose was secured at the wrong point
  - C) Insufficient field management/personal protective equipment

Improving measures to be implemented in light of the causes

TEPCO

No.	Countermeasure perspective	TEPCO's improvement measures
①	■ **Compare the protection instructions to field conditions to determine whether they match**	● The aforementioned chief contractor shall implement the following: • If it is the first time that a task will be performed, or if there've been changes to the task, such as changes to the work location or procedures, etc., then TEPCO employees shall check site conditions prior to beginning work in the field. The aforementioned chief contractor shall also perform more checks of the field not just in the event of changes, but under all circumstances. When performing these checks, the protection instructions shall be compared to site conditions from the perspectives of who is the work team leader, is everyone fulilling their roles, and is everyone wearing suitable personal protective equipment, etc.
		● Other chief contractors shall implement the following in light of this event (lateral dissemination of information) • If it is the first time that a task will be performed, or if there have been changes to the task, such as changes to the work location or procedures, etc., then the same checks shall be performed
②	■ **Strengthen safety measures during the planning stage**	● When handling substances that may have a harmful effect on the human body (highly radioactive liquids, chemical agents, etc.), safety measures (equipment countermeasures, management countermeasures, protective countermeasures) shall be implemented under the assumption that these materials may be spread over a wide area without warning. ● In particular, the risks to be assessed during these safety preassessment shall be revised (strengthen). • Multifaceted reviews shall be used to increase the sensitivity to the risks involved when handling materials that may have a harmful impact on the human body (highly radioactive waste liquid, chemical agents, etc.).
③	■ **Strengthen radiological protection education pertaining to how to deal with risky situations, such as the risk of body contamination**	● TEPCO will ask the chief contractor to repeatedly provide education about behavior when handling risky situations, such as body contamination, etc. from the perspective of radiation protection. ● TEPCO will ask vendors to reeducate workers at 1F about the impact/risk of not abiding by radiation control specifications.

Laterally disseminating information on improvement measures

- The following initiatives shall be implemented in order to laterally disseminate information on improvement measures. We will continue to do our utmost to ensure safety during decommissioning.

- Suitable management (confirm that protection instructions match field conditions during work at Fukushima Daiichi)
- Reassess rules and perform general inspections of work areas in which materials that may have a harmful impact on the human body ※ are handled.
- Improving the reliability of water treatment equipment (renovate existing equipment and update equipment in consideration of equipment operation/maintenance)
- Continually make improvements by utilizing issues noticed by contractors, etc.

※ Highly radioactive waste liquid, chemical agents, etc.

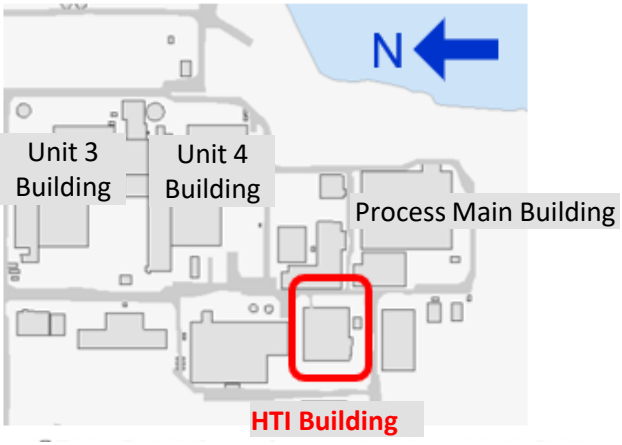
【Reference】 Dose assessment results for workers scanned for body contamination

	Effective dose during pipe cleaning work (October 25) (mSv) 【Accident/malfunction report is required if it is feared that the suffered dose may exceed 5mSv as a result of a malfunction at a commercial nuclear reactor facility, or some other unforeseen event】	Skin equivalent dose for FY2023 (April ~October) (mSv) 【Legal dose limits: 500mSv/year】	Skinny equivalent dose caused by adherents of cleaning waste liquid (mSv)
Worker A	0.9	88.3	76.6
Worker B	0.6	55.8	51.2
Worker C	0.2	7.0	Not subject to assessment due to the absence of skin contamination
Worker D	0.02	4.9	Less than 0.1
Worker E	0.02	1.4	0.2

[Reference] Water leak from the east side wall of the high-temperature incinerator building

- At around 8:53 AM on Feb. 7, a contractor worker discovered water leaking from vent opening[*1] from the #2 cesium adsorption apparatus (SARRY), which is located approximately 5m from the ground on the east side wall of the high-temperature incinerator building.
- During the same time period, filtrated water was being used to flush out SARRY, which was shut down, in preparation for a valve inspection. At around 9:10 AM, the master valve for the filtrated water was closed and around 9:16 AM it was confirmed that the leak had stopped.
- The leaked water consisted of system water and filtrated water, and resulting approximately 1mm deep puddle covered an area approximately 4m x 4m on the metal plates laid on the ground in this location. Since it is possible that the leaked water seeped into the ground through the gaps in the metal plates, as an emergency measure the aforementioned area has been cordoned off and the soil in this area is being collected.
- In conjunction with the leak, we have confirmed that there was no significant fluctuation in site border monitoring posts, continuous dust monitors, and drainage channel monitors, and at current time we have seen no impact on the external environment, but we will continue to closely watch these monitors.
- After a quick assessment of the amount of water that leaked [*2], it was determined an accident, an malfunction or another to be reported to competent ministers based on laws and ordinances.
- The cause of this incident is under investigation, but after determining the cause we will implement suitable recurrence prevention measures.

*1 To vent hydrogen generated inside the adsorption apparatus
*2 Conservatively calculated to be approximately 5.5m^3 of system water; gross γ assessment: 2.2E+10Bq



【Location of the high-temperature incinerator building】


【Field conditions (external view of the building)】


【Enlarged picture of the vent opening】

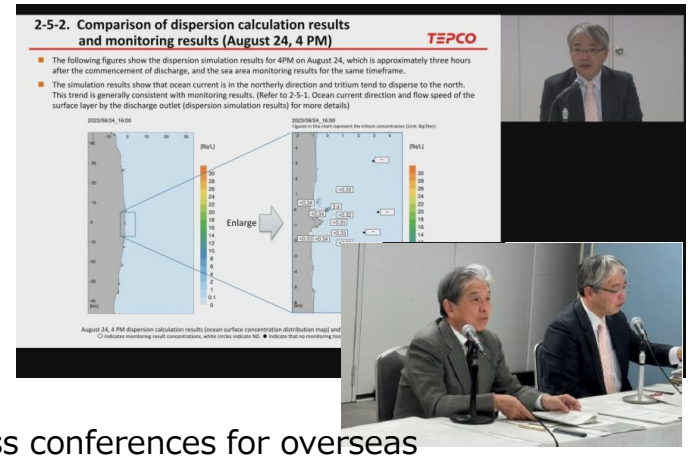
【Metal plates laid on the ground】

1. COMMUNICATING WITH SOCIETY

Status of initiatives to cultivate understanding about ALPS discharge

- Various means are being used to convey scientifically-based information, such as environmental impact assessment results, monitoring data, and information on safety measures pertaining to the discharge of treated water, etc., within Japan and overseas with the understanding that we must minimize reputational damage as much is possible.
- In cooperation with the national government, we are seizing various opportunities to directly engage with regional residents and stakeholders, and repeatedly provide explanations that address their fears and concerns.

Dialogue with regional residents



Press conferences for overseas journalists

Explanations at local events

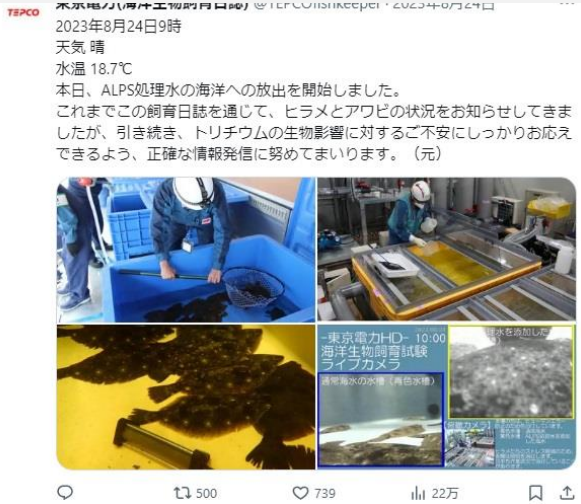
Events at the Science and Technology Museum

Tour/symposiums (Top: tour; bottom: symposium):

Status of initiatives to cultivate understanding about ALPS discharge

- Various mediums are being used to convey accurate and easy-to-understand information in a timely manner

Treated Water Portal Site (translated into English, Chinese, and Korean)



Marine organism rearing log (X (formerly Twitter))

National ad campaigns (example: JR Tokyo Station)

Overarching Radiation monitoring data Browsing System

Allows browsing of all monitoring data from the TEPCO in addition to Fukushima Prefecture, Ministry of the Environment, Nuclear Regulation Authority, and the Fisheries Agency (translated into English, Chinese, and Korean)

TEPCO Shorts. ALPS-Treated Water

Advertisements in local newspapers